

Just in Time

Expecting Failure: Do JIT Principles Run Counter to DoD's Business Nature?

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The last several years witnessed both commercial industry and the Department of Defense (DoD) logistics supply chains trending toward an increased reliance on Just in Time (JIT) inventory management. Improvements in technology lending to affordable access at virtually every logistical level, coupled with nearly uniform success by businesses adopting such principles, drive this trend.

Both sectors pay specific attention to leveraging Web-based solutions primarily to gain efficiencies and reduce costs. Although they realize improvements through reduced distribution costs and warehouse management efficiencies, there may be hidden costs and risks associated with such reliance, particularly to DoD. These may include higher direct transportation costs driven by priority shipment directly to end users, decreased Operational Availability (A_o), increased ordering errors, and exposure to additional risks such as natural disasters. Everyone clearly understands the trend toward further incorporation of JIT principles because of their many merits, but as the all-encompassing environment evolves, everyone must also review the potential risks and consider associated costs.

Potential implementation of various risk mitigation strategies will enable DoD to achieve the best posture future logistics support for the warfighter, as implied in the Sept. 10, 2012, Capstone Concept for Joint Operations (CCJO). Subtitled "Joint Force 2020," this document identifies a security paradox of a world becoming more stable but simultaneously characterized by an increase in destructive technologies available to a wider group who wish the United States harm, making the current environment potentially more efficiently dangerous than ever. To keep pace with this changing environment, DoD must equal, if not surpass, our adversaries' efficiencies.

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Commercial History

JIT is a management philosophy that ties inventory to management by combining many disciplines—including statistics, industrial engineering, production management and behavioral science—to expose hidden costs of keeping inventory. Such integration is believed to result in more efficient use of resources. Credit for developing JIT as a management strategy goes to Taiichi Ohno of the post-World War II Toyota Manufacturing Company. Ohno developed JIT strategy in the 1950s as a means of competitive advantage with profit maximization as the main goal. The concept supposedly sprang from the simple observation that when a customer pulled a product from a shelf, an empty, wasteful space was left. Understanding the significant capacity challenges at the time and identifying waste as the primary evil, Ohno categorized Toyota's empty "shelf spaces" as overproduction that resulted in dead stock and inefficient use of labor. Eliminating these hurdles became understood as the JIT philosophy, focusing in an overarching manner on moving items through a production system only when needed.

Equating inventory to an avoidable waste instead of adding value to a company directly contradicts traditional accounting. According to JIT, removing inventory exposes pre-existing manufacturing inefficiencies, a beneficial forcing function that constantly improves processes that drive inventory reductions.

Benefits Realized

Having success at Toyota, JIT rapidly gained popularity, if not outright envy, among the international business community. Such success caused several organizations to emulate Toyota's JIT-specific strategy over the years. JIT's next landmark came when it spread to America in the late 1970s and early 1980s. Today, many organizations such as Hewlett-Packard, Dell, McDonald's, Wal-Mart and others owe their success, at least in part, to the JIT management strategy. Such a system is beneficial to these companies for many reasons.

The JIT inventory system enables companies to fill customer orders when ordered. Such a capability is highly promising for companies like McDonald's and Dell. Instead of trying to sell customers premade burgers or computers that age quickly, these companies prefer to make it right when the customer orders and not before. Because the companies custom tailor all orders as opposed to reconfiguring previously completed products, JIT inventory enables more rapid production. JIT allows companies to satisfy orders at lower cost because tailored products are completed immediately upon request. Waste-conscious JIT companies only request enough material and generate enough products to complete orders that meet exact demand. They deliberately maintain restocking thresholds at very low levels in a further effort to eliminate waste and cost, maximizing profit margins and customer satisfaction.

Evolving Commercial Risks

Sole-Source Global Suppliers

Multiple known risks exist inherently with JIT management. Any company that becomes dependent on one main supplier

is conceivably at a disadvantage due to limited flexibility. Examples of such traumatic occurrences are common. The 1995 Kobe earthquake disrupted production of Toyota's sole supplier of brake shoes for domestic sales, affecting production at an estimated revenue cost of \$200 million. In March 2000, a lightning strike in New Mexico cost Ericsson cellphones more than \$2 billion in sales and by October 2001 Ericsson entered a joint venture with Sony out of necessity. A Japanese earthquake in March 2011 interrupted 25 percent of the world's silicon production, creating multiple significant events. A shortage of General Motors components caused GM to close its Louisiana plant for a week, Honda Motor Company to suspend orders for Japanese-built Honda and Acura models, and producers of Boeing's 787 to run billions of dollars over budget.

As a company's commitment to JIT principles increases, its vulnerabilities become greater. "Because what they do in just-in-time is remove all of the redundancies, and redundancies actually provide some margin for error," says James H. Costner, senior vice president of the property practice at Willis Risk Solutions, a contributor to Sony's "JIT Failure Case Study" in September 2010. As more businesses trend toward JIT management concepts, and reach across the globe in some cases to maximize cost reduction and efficiency, the effects of bad weather in some distant country influences production more than ever before. Gary Lynch, global leader of risk intelligence strategies and resiliency solutions at Marsh & McLennan Companies, says in the same Sony "JIT Failure Case Study": "Certainly what we've seen in a much more accelerated fashion has been the globalization of the supply chain, where the interdependencies are spread throughout the world."

Access Outpacing Control

The divide between levels of responsibility is disappearing as managers become empowered by leveraging Web-based technology. Specifically, executives largely retain overall responsibility, while relying on middle management to maintain an efficient budget and inventory. Although some control measures exist, the trend seems to be to provide lower-level managers with access to purchasing systems designed to spend money on behalf of the whole. Companies incur increased exposure to fraud and error from whoever gains access to these purchasing systems. Empowerment with limited oversight creates fertile ground for an increase in purchase errors. As fraud gets caught and errors are corrected, there is a direct correlation to an increase in returns and, accordingly, shipping costs. The big beneficiaries are carriers that increasingly rely on the virtual retail universe for triggering returns. UPS was expected to carry about 550,000 return shipments on the first business day of 2013 alone.

Mitigating the Commercial Risks

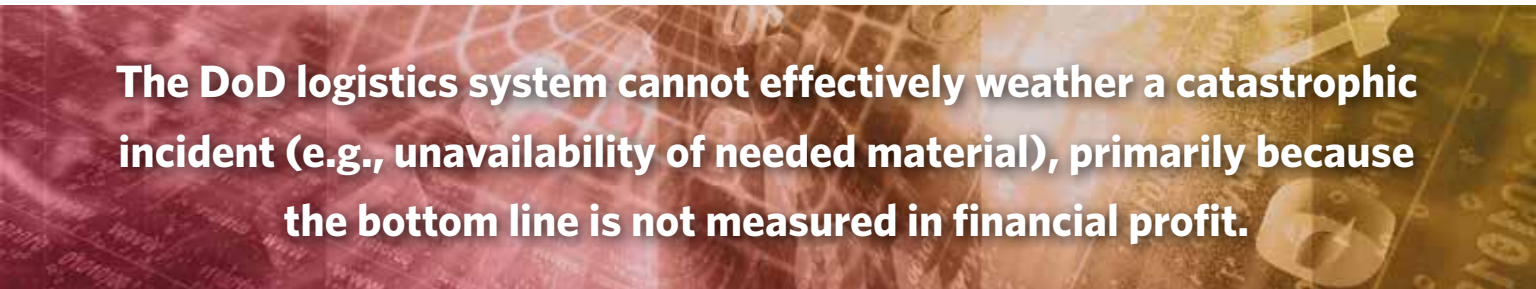
Only about 10 percent of U.S. companies have detailed plans designed to address supply disruptions, but even those contingencies do not fully take into account subsequent waves of consequences. For example, shortages may materialize over-

night in other countries as immediately needy companies seek alternative sources that could negatively affect short-term pricing and availability across the entire market. Some businesses secure more than one company to supply their needs at competitive prices, which is directly counter to the traditional JIT streamlined model. Many businesses avoid long-term contracts with suppliers to maintain influence over their supplying practices. Some companies diversify into manufacturing their own supplies as a means to eliminate outside source influence and variables, effectively bypassing a portion of the known risks associated with the JIT Inventory System. Despite the risks, incredible cost savings make companies extremely hesitant to abandon JIT inventory, says James Womack, founder of the Lean Enterprise Institute, in the online Bloomberg Businessweek magazine article titled "The Downside of Just-in-Time Inventory" by Susanna Ray and Thomas Black.

A promising method for countering some of the more catastrophic JIT risks comes from adopting the principles driving the concept of high-reliability organizations (HROs) outlined

utilized a "just-in-case" logistics system, largely characterized by older inventory tracking systems. High initial costs to procure and maintain inventories were common, with an increased likelihood of item failures for aged inventory. Obsolescence often resulted in high disposal costs as well, creating an overall inefficient logistics system. Following the end of the Cold War, the effort to realize a peace dividend caused dramatic DoD budget cuts and the subsequent quest for a more efficient logistics system. To reduce the cost of operating its forces while maintaining acceptable levels of readiness, DoD adopted JIT logistics and management principles.

While the significant benefits of JIT in the private sector are understood, they predominantly reflect decreased cost and increased profit, which are not the primary measurements of success in DoD. The nature of defending the United States and its national interests carries a different business culture and risk set, which must be considered when applied to DoD logistics. The CCJO's Strategic Vision 2020 comes into play in the form of "globally integrated operations" as



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in the book "Managing the Unexpected" by Karl E. Weick and Kathleen M. Sutcliffe. Weick and Sutcliffe reserve the term "HRO" for diverse organizations that have no choice but to be reliable: air traffic control teams, hostage negotiation teams, nuclear power plants, wild land firefighting crews, and others. This array of entities employ several practices in common that deviate from the norm of modern businesses. Most notably, they tend to expect failure (while most others at best "expect the unexpected"), they maintain a broad view of mindful awareness (as opposed to focusing on known or possible problems) and they deliberately organize infrastructure that facilitates maximum flexibility in response to emergency.

The theory and key point of the HRO concept is that by mirroring some of these proven practices, any company can reduce the severity and frequency of catastrophic events, accelerate recovery and facilitate learning. The principles are largely attitudinal, and while such a transition may require upfront costs, the enduring result will prove a cost benefit once the inevitable catastrophes occur.

JIT and New Risks Enter the DoD

As an instrument of national power, DoD requires a flexible, adaptable and responsive logistics system but must balance effectiveness with efficiency, especially in light of the conditions emphasized in the current CCJO. Before the early 1990s, DoD

utilized a "just-in-case" logistics system, largely characterized by older inventory tracking systems. High initial costs to procure and maintain inventories were common, with an increased likelihood of item failures for aged inventory. Obsolescence often resulted in high disposal costs as well, creating an overall inefficient logistics system. Following the end of the Cold War, the effort to realize a peace dividend caused dramatic DoD budget cuts and the subsequent quest for a more efficient logistics system. To reduce the cost of operating its forces while maintaining acceptable levels of readiness, DoD adopted JIT logistics and management principles.

Conceptually, globally positioned Joint Force elements combine with one another as well as mission-specific partners (be they interagency, foreign states or elements without borders) to integrate capabilities across all domains, echelons, affiliations and boundaries with a fluidity and quickness previously unseen. The vision specific to sustainment is in energy efficiency and implementation of the Joint Logistics Enterprise, with the three main goals of sharing resources, integrating logistics capabilities and sustaining logistics readiness. To sustain logistics readiness, the plan requires forward-positioned stock, balanced inventory levels and a fully utilized distribution pipeline. The four metrics measuring success of this end-to-end process include logistics response time, perfect order fulfillment, information content and quality, and total supply chain costs. In essence, the concept magnifies the need for organizational agility and flexibility, whereas JIT views stock, redundancy and multiple sourcing as wasteful. The concepts at broad brush are juxtaposed. If DoD is trending toward best business practices stemming from JIT principles, DoD also is trending away from the Strategic Vision 2020.

DoD uses high-priority transportation from established commercial vendors to reduce order and shipping time (OST),

thereby enabling a reduction in inventory levels. DoD must be careful to understand that the models are designed based on delivery in the Continental United States. Obviously, the most challenging portion of the logistics trail is found in the last mile. If retail stocks for end users are allowed at a level based on a reduction in OST to, say, 3 days and does not consider the additional time needed to get replacements to an operational unit, mission accomplishment could be at risk.

Additionally, heavy reliance on highest-priority shipping due to reduced inventories can cost up to 20 times more than standard shipping. Due to “color of money” differences, those costs are not borne by the end user directly and, therefore, are not considered when choosing shipment modes and methods. This cost increase is assumed to be insignificant when compared to the savings associated with inventory reductions realized through JIT.

Another potential risk associated with JIT revolves around calculating A_o . Different variables affect availability, and the tendency in some circles to overemphasize the importance of OST can negatively affect stocking strategies. JIT management consistently praises a decrease in OST as a reflection of an ability to reduce inventory on hand for operational units. This can be dangerous if a decrease in OST is assumed to outweigh the effect of other variables if they change, are made in error, or are not weighted properly. Consider as an example the importance of Mean Time Between Failures (MTBF)—quite simply, the time between failures of a particular component. Using what turns out to be the wrong MTBF for a component will produce a false A_o by overestimating the component’s reliability. Because JIT relies on inventory reductions, a combination of such mistakes can prove quite costly.

Tying this concern to the civilian sector trend of access channels outpacing control measures is U.S. Transportation Command’s (TRANSCOM’s) Corporate Services Vision from November 2008, which identified an online model of mouse-click ease for product purchase and delivery as the model for military acquisition. In her “New Effort Taps Best Commercial Practices for Defense Acquisition” article for the American Forces Press Service, Donna Miles cited Robert J. Osborn II, TRANSCOM’s deputy director for distribution portfolio management, command, control, communications and computer systems at the time: “... [this] compared the effort to what a consumer experiences when buying an item online. The buyer simply keys in an item name to determine which vendors offer the product and at what price. Then the buyer selects a vendor and designates how quickly he wants delivery and how much it will cost. Finally, the buyer pays by a credit card and receives a code to track the shipment to delivery.” Although the new means integrates many redundant and arguably incompatible systems into a single, simple operation across the logistics enterprise, this could create ideal conditions for extreme error or deliberate manipulation. Eliminating steps in theory

reduces costs, but without significant control measures it can do anything but save money.


Weathering the Inevitable in DoD

As previously mentioned, the DoD logistics system cannot effectively weather a catastrophic incident (e.g., unavailability of needed material), primarily because the bottom line is not measured in financial profit. Overarching investment in JIT management with heavy emphasis on streamlined efficiencies is counterintuitive to the nature of DoD’s business, which historically relies on a system of redundancy to reduce risk and increase resiliency. JIT is a viable inventory management plan that DoD should continue to consider, but with a better understanding of the risks associated with a changing environment.

DoD must gain a better appreciation for potentially decreased availability of critical parts at the operational level due to streamlined supply chains and destructive weather. DoD also must gain a better appreciation for an increased reliance on high-priority transportation by measuring those costs and including them in the overall JIT computation. DoD must counterbalance the risks associated with flattened organizations that enable and encourage lower-level purchases and selection of delivery means. Mitigation techniques may include a proper balance of inventory on hand for critical operational units (e.g., CVN on station, Army/MC units in theater), forward-stationed inventory of the most critical spare parts (e.g., increased use of intermediate inventories in Bahrain) and increased scrutiny of other items affecting availability (e.g., MTBF).

To bring Ohno’s philosophy of “waste is the enemy” into better balance with the nature of an “in extremis” profession, DoD must take a closer look at HROs rather than relying on best business practices across the commercial sector. By gaining a healthy preoccupation with assumed failure, a reluctance to simplify problems and indicators, a true commitment to logistical resilience and deference to experience as opposed to rank or title, the organizational culture of DoD may mitigate inherent JIT risks effectively while maintaining the clear financial benefits.

Conclusion

The concept of JIT logistics supports DoD’s responsibility to maximize the effectiveness of limited resources but can come into direct opposition to DoD’s primary responsibility to win the nation’s battles. This dichotomy is analogous to the balancing of effectiveness and efficiency in a resource-constrained environment. For DoD to attain and sustain this balance, it must collaboratively develop and formally establish its JIT logistics strategy and nest with the Strategic Vision 2020. JIT logistics will continue to assist DoD in maximizing the effectiveness of its limited resources ... it just must be aware of and manage limitations. 

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