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COORDINATION IN THE SUPPLY CHAIN: VENDOR MANAGED INVENTORY IS THE WAY TO GO

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Abstract

Vendor managed inventory (VMI) has proven to be a successful initiative enabling many companies to cut down their inventory costs, form strategic partnerships with their suppliers and improve service to customers. This article looks at an implementation of VMI at an electronics manufacturer, and discusses the process flow, setup considerations and the requirements to make a VMI implementation successful. Finally, the argument is made that for this practice to proliferate among the vendor community, the benefits of VMI implementation need to be equitably shared among supply chain partners.

Keywords: Vendor managed inventory, Supplier owned inventory, Supply chain coordination

1. INTRODUCTION

As businesses turn global, competition intensifies, and customers become more demanding, companies need to find ingenious ways of improving cycle times of their products and reducing costs. Globalization and demanding customers drive companies to respond at a faster pace (provide quick turn-around time to customers), and increased competition leads to products being sold at the lowest possible price.

Successfully rising to the challenge of meeting customer demand quicker and continuously reducing the cost of meeting that demand will separate tomorrow's winners from also-rans. On their part, companies have realized that any further improvements in costs and cycle times will

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increasingly come from outside the company walls. Towards this end, firms are beginning to collaborate with their suppliers and customers, working to drive costs and inefficiencies out of the supply-chain.

Optimizing supply-chain performance by reducing costs and driving inefficiencies out of the chain requires close cooperation of all the companies involved. Examples of such inefficiencies are too numerous to be listed here. Still, one of the biggest inefficiencies in the supply-chain is inventory scattered across the various echelons of a supply-chain. As inventory is money tied up and does not add real value, the challenge for companies is to reduce inventories across the entire supply-chain.

Inventory can be reduced if participants in the supply-chain share information so that inventory (whether raw material, WIP or finished goods) moves to the next echelon (downstream) only when it is needed there. This reduction in inventory levels can lead to savings for everyone involved.

Reducing inventory costs is what has moved some of the companies towards the practice of Just-in-time (JIT) procurement. In JIT procurement, suppliers delivered items in smaller quantities but delivered more frequently, often once or twice a day. More frequent smaller deliveries result in lower overall levels of inventory.

A natural progression from JIT procurement was towards what has been called vendor-managed inventory (VMI). Companies realized the need to further reduce their inventory costs; this led to some companies asking their suppliers to manage their inventory for them. This practice began in the retail industry sometime back, and has been increasingly adopted in the thin-margin, hi-tech computer and electronics industries. Seeing the value of their inventory plummet as much as 1% per week, companies such as Dell and Compaq began to see the value in letting the suppliers manage their inventory.

In some cases, this practice resulted from the desire (on the part of the customer companies) to focus on their core competencies, whether it be design, manufacturing, or simply marketing, and outsource other activities. VMI occurs when a customer out-sources the management of supplies, such as input components, to the vendor.

In this article, we discuss some of the important considerations that have to be taken into account before a successful VMI implementation can be realized. The discussion is based on a VMI implementation the author was associated with at a computer company, who will be referred to as Smart Computers in this article. These considerations include, among others, pilot projects, legal aspects of the relationship, supply contracts, inventory ownership transfer, and service level agreements (SLAs), such as fill rate. But first, let's look at some of the variations of VMI that are out there.

2. VENDOR MANAGED INVENTORY

VMI has long been practiced in the retail industry and can be defined as follows:

VMI is the arrangement where the vendor continuously and automatically replenishes the customer's inventory, based on product usage and stock level information supplied by the customer.

VMI pushes inventory management and replenishment responsibilities to the supplier, freeing up the customer to focus on its core competencies. The inventory is generally located at the customer's premises.

3. CONSIGNMENT INVENTORY

The practice of consignment inventory is prevalent in some industries; one such example is the supply chain for high price, specialty diamonds. In consignment inventory, the supplier places the inventory with the retailer, and only gets paid (a fixed percentage, maybe) once the goods are sold by the retailer. Until then, the goods may belong to the supplier, and he may also withdraw the inventory at his discretion. As such a practice is not commonly found in the manufacturing/electronics industries that are the focus of this article, we refrain from further referring to this practice.

4. SUPPLIER OWNED INVENTORY

Supplier-owned inventory is a new way of managing inventory where the customer receives and pays for only what is needed, when it is needed.

There is a distinction between VMI and supplier-owned inventory (SOI). Under SOI, the vendor not only manages the inventory, but also owns it. The inventory is owned by the supplier until it is consumed by the customer, at which point an invoice for the inventory that has been consumed can be issued.

The process flow depicting an SOI implementation is shown in Figure 1. In this implementation, the inventory is housed in a warehouse (close to the customer) operated by a Third party logistics provider (3PL), but in general the inventory could also be located at the vendor's or the customer' premises.

4.1. SOI Process Flow

In SOI implementation involving Smart Computers, the inventory was stored at a third-party warehouse, located close to Smart Computers' premises. The process began with Smart Computers providing a three months blanket purchase order (P.O.) and a six months rolling horizon forecast to the vendor (1). Upon Smart Computers placing a pull request (2) with the warehouse, the material was shipped (3), and the supplier notified of the pull request as

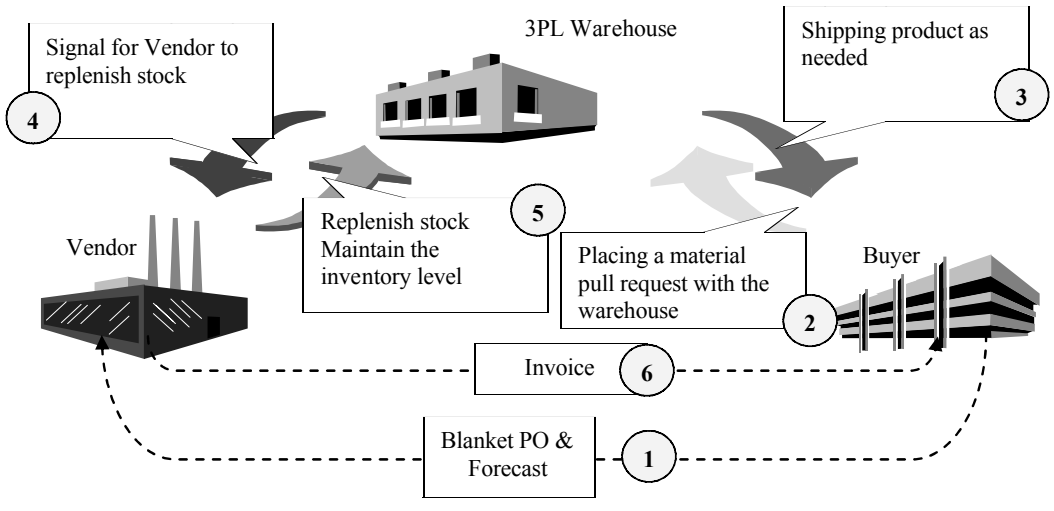

Figure 1. SOI process flow

well as the new inventory level (4). When the inventory level fell below the desirable level, the vendor would replenish the inventory (5). In addition the vendor would invoice Smart Computers (6) on a weekly (mutually agreed upon) basis.

While customers are all excited about this new concept in inventory management for obvious reasons, some suppliers are beginning to see their inventory levels go up. They are being asked to not only manage the inventory, but also to get paid only after the customer pulls the inventory from the warehouse. This practice has resulted in some customers (most notably Dell) realizing a negative cash conversion cycle. Such objections to VMI have also been put forth in many a conversation the author has had with component suppliers to major computer assemblers based in the Asia-Pacific region (including the one involved in the Smart Computers implementation). The point is that this arrangement only works in the long run if customers are willing to share the benefits of reduced inventory (and costs) with their vendors, instead of simply passing the costs associated with inventory (management) back upstream. The table below (table 1) lists the benefits and drawbacks of the VMI/SOI arrangement to the customer and the supplier.

5. VMI SET-UP CONSIDERATIONS

Detailed discussion and careful planning on the part of all parties involved is required to ensure an arrangement which benefits everyone. Various critical issues such as communication mechanisms, the financial, legal, and contractual agreements which dictate ownership transfer, payment and freight terms, safety stocks and selection of 3rd party logistics providers were hashed out before kicking off the VMI program involving Smart Computers.

Next these critical considerations are discussed.

5.1. Communication Mechanism

The communication mechanism used is the backbone of a VMI program. It can range from the least technically advanced tool (such as a paper fax) to the most technically advanced one (such as an EDI link). Today, most inefficiency in the distribution of goods and services as well as in the movement of funds stems from delays in the transfer of information or input of erroneous information. As sales volumes and revenues justified a web-based system implementation, all the parties involved in this implementation chose to use such a system to streamline the flow of information.

5.2. Cost-benefit analysis

To determine whether a VMI arrangement would be cost-effective or not, a cost and benefit analysis was conducted. Smart Computers determined the total logistics cost (for the supply chain) for the specified customer service level. The components of total logistics costs considered were:

5.2.1. Inventory Carrying Cost

Inventory carrying costs are dependent on the amount of inventory stored, and include a number of different cost components. They represent the largest part of logistics cost. Inventory carrying costs should include only those costs that vary with the quantity of inventory and can be categorized into the following groups: capital costs, inventory

service costs, storage space costs, and inventory risk costs.

(1) Capital cost: There is an opportunity cost to holding inventory, as the money tied up could be used elsewhere to provide a return on capital. The rate of return used for this calculation was the rate of return on equity invested in Smart Computers. The value of the inventory for calculating carrying cost is computed by multiplying the number of units of each product in inventory by the standard or actual direct (variable) cost associated with manufacturing the product and moving it to the storage location.

(2) Inventory service cost: This comprises ad valorem (property) taxes and fire and theft insurance paid on inventory held.

(3) Storage space cost: These are (fixed) costs associated with the storage facilities which could be a plant warehouse, public warehouses, rented or leased warehouse or a company-owned warehouse.

(4) Inventory risk cost: These typically include charges for obsolescence, damage and relocation of inventory.

5.2.2. Transportation Cost

Transportation cost is the cost of moving the inventory from the supplier's to the customer's warehouse.

5.2.3. Transaction and Information Cost

Transaction costs are costs associated with the administrative, purchasing and financial activities that occur as part of running the warehouse facility where the inventory is stored. Information cost is costs incurred as part of setting up, maintaining and using the information systems which enable the transfer of information and inventory into and out of the warehouse. This could be the cost of subscribing to (for example) a third-party system, such as ECNet (www.ecnet.com).

5.3. Supply Contract

The most critical component, by far, in the success of the VMI arrangement was the agreement with the supplier. The terms and conditions of the agreement were negotiated before the VMI implementation. Things such

Table 1: Benefits and drawbacks of VMI/ SOI

	Customer	**Supplier**
Benefits	Lower inventory	Improved service to customer
	Lower obsolescence costs	Ties customer to the supplier; improves customer loyalty, resulting in higher barrier to entry for competitors
	Development of partnership	More efficient planning of production
	More control on supply (higher availability, predictable results)	Better control of demand (better predictability, lower variation)
	Simplified administration (focus on core competencies)	Development of partnership
Drawbacks	Loss of control (?)	Higher inventory costs (under certain situations, and if savings are not shared by the customer)

as service level (fill rate) requirements, processes to be followed, lead-times (of delivery), IT system requirements, performance metrics, payment terms and liabilities were clearly defined and agreed upon.

It is very important to get these things out of the way, if for no other reason than to satisfy the legal departments of the companies involved. While the duration of such contracts (and of the time horizon used in doing all the analysis) is maybe two to three years, both the parties involved must realize that the arrangement has to last much longer for them to benefit from it.

Another element that is critical to the setup of a VMI arrangement is the promised volumes to the supplier. One way in which this is done (by the customer) is to share the (rolling horizon) forecast with the supplier, while also specifying the safety stock (e.g. 2 weeks worth of demand) to be kept in the (VMI) warehouse at all times. This ensures a certain service level to the customer. This, in conjunction with penalty costs specified in the contract, protects the customer.

At the same time, the supplier also needs to be protected, in case the customer inflates his forecasts on a regular basis (to derive a better service level). While I have yet to see such a practice, it would be very easy for suppliers to protect themselves by including a clause in the VMI contract which specifies the percentage of forecasted demand the customers should pull in each period.

5.4. Selection of 3rd Party Service Provider

As mentioned earlier, one of the possible locations for the vendor-managed inventory is a 3PL warehouse, in which case a third party (rather than the supplier) manages the inventory. Selection of the 3PL should take into account their capacity (both financial and physical), their resources, their proximity to the customer location, and their IT capability. As should be clear by now, the IT capabilities of all the parties involved (the supplier, the customer, and the 3PL, if involved) are critical to VMI's success. In the case of Smart Computers, an established 3rd party service provider with a global presence was chosen to manage the VMI warehouse.

6. CONCLUSION

From a modeling study of the VMI/SOI arrangement, I have noted that the customer and the entire supply chain should always benefit (should at least not be worse off) from adoption of a VMI arrangement. The vendor may, or may not, benefit from participating in such an arrangement, depending upon the parameters, such as holding costs at the VMI warehouse, or the volume of business provided by the VMI customers. So it is understandable when some suppliers begin to see their inventory costs go up as a result of VMI engagements, as happened in the case of Smart Computers' supplier.

My argument is that the customer companies implementing VMI arrangements have to find ways of sharing the resulting gains with the suppliers. So far, the suppliers have been getting into such arrangements not because they see financial gains from doing so but because they have been asked by their (all powerful) customers to manage their inventory for them. What needs to become an essential part of any VMI arrangement is a cost benefit analysis, and a revenue sharing arrangement which distributes (equitably)

the benefits of VMI between all the parties involved. For, if VMI only means inventory management and costs being passed upstream to suppliers, the inefficiencies in the supply-chain (and the resulting costs) will remain and ultimately be reflected in higher prices for the customer companies engaging in this practice. Smart Computers is in the process of computing the supply chain costs and setting up such an arrangement with their VMI supplier.