

Framework to Implementation for Vendor Managed Inventory

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Abstract—In any industry the relationship between a manufacturer and their customer is important one. In the traditional setting, the customer manages their own inventory and places replenishment orders that are made to order by the manufacturer. Recently, supply chain initiatives such as Vendor Managed Inventory (VMI) have changed the traditional customer-manufacturer relationship. Vendor Managed Inventory is the term for inventory management systems where the supplier manages the day to day inventory activity. In a VMI relationship, the manufacturer becomes responsible for the management of his customers inventory. Often, costs associated with inventory keeping are transferred from the customer to the manufacturer, because of this cost transfer, VMI typically is more expensive for the manufacturer. However, being responsible for the inventory management, the manufacturer can coordinate the production and inventory control decisions. Moreover, a framework to categorize several VMI relationships and gives insights on the structure of the problem as well as some insights on opportunities for cost savings. The VMI system has to follow the various steps they are, setting clear objectives for the VMI program, selecting the supplier that best fits the objectives, selecting the correct VMI model to implement, and implementing the program with both a well defined project plan and adequate resources. This paper will cover these critical steps, providing the supply chain management to effectively implement VMI.

Keywords—Supply Chain Relationships, Vendor Managed Inventory (VMI), Inventory System, Supply Chain Management.

I. INTRODUCTION

Inventory is one of the most valuable assets for any company, but results show that most of the companies are fail to manage it effectively. The majority of manufacturers and distributors rely on out-of-date, too simplistic, or overly localized inventory policies. By doing so the companies tie up working capital, harm customer retention, and hurt shareholders. Faced with lengthening supply channels and tighter service-level demands from customers, many companies are now wholesale reexamining how to flow inventory across their supply chains and how to set inventory policies. In general the companies are finding they have been burdened with inventory misconceptions including around techniques like lean principles, oversimplification, corporate discomfort with changing inventory strategies, and significant underinvestment in breakthrough collaboration and optimization technology.

Inventory is the lifeblood of supply chains properly managed, it drives revenue and efficiency for companies. But as the nature of supply chains changes, the various policies are used to manage inventory. According to survey of supply chain professionals, companies are rethinking how they should flow inventory across their supply chains to ensure that their inventory strategies keep pace with the lengthening of supply channels and customers will tighter the service level demands. This is resulting an interest in inventory management and specifically in what it calls supply chain inventory practices. As a result of this reexamination, supply chain executives are discovering that many of their preconceptions about managing and positioning inventory are dramatically wrong [1].

II. SUPPLY CHAIN MANAGEMENT (SCM)

The purpose of Supply chain management programs is to share information between members of the supply chain resulting in shorter lead times, reduced inventory, reduced obsolescence, and more efficient manufacturing. The up stream member of the supply chain takes on more decision making for what to supply to the customer. The result is a more leveraged relationship for the supplier and improved service for the customer as shown in figure. The shared information can include the, inventory on hand desired inventory levels Min or Max inventory in transit purchase order numbers, production schedules, product expiration dates, lead times, forecasts order quantities or lot size release quantities. The interdependence of supply chain with other domains is as shown in figure 1 given below.

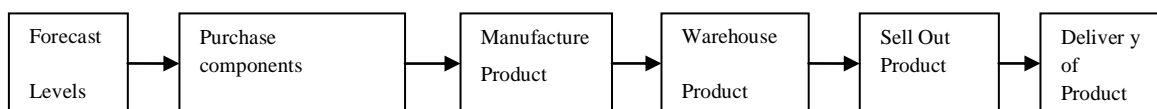


Figure 1: Supply Chain Process

2.1 Relationship between in vendor and Suppliers:

In the traditional setting for inventory, the customer manages their own inventory points and places replenishment orders for the different products. These Replenishment orders are produced by the manufacturer on a make to order basis. The production system consists of a multi-machine job shop, where orders for different products are produced on machines with limited capacity. This type of production system is typically used in a setting with low volume demand for the products. Unfortunately, such job shop production systems are notorious for their long and unreliable lead times. When the production is finished, the orders are delivered to the customer. Because of ongoing pressure to reduce costs, the customer may consider to reorient their traditional relationship with the manufacturer. A popular alternative to the traditional manufacturer-customer relationship is Vendor Managed Inventory (VMI), where the manufacturer is responsible for the management of the customer's inventory. However, in a VMI relationship the manufacturer is responsible for both the inventory and the production control. Therefore, the manufacturer can integrate and coordinate inventory and production control decisions, which may result in a cost reduction. In this way, the manufacturer can at least partially compensate for the cost increase due to the transfer of costs.

In the traditional consignment model, the supplier builds product to a forecast and pushes product to an inbound VMI system. In this model, the supplier still owns the inventory until the buyer pulls product down. This creates higher inventory carrying costs for the supplier, as it has to own an additional inventory and higher inventory risk. Buyers always want more than enough inventories so, as a result when a buyer provides a forecast, and when the forecast is off, it typically left with excess inventory, which is the supplier's liability. Moving to a pull-based, rather than a forecast based replenishment process, as used by lean operations, can reduce that liability. Forecasts should still be shared, but suppliers build to actual demand pulls instead [2].

Vendor managed inventory (VMI) is an operating model in which the vendor or manufacturer takes responsibility for the inventory of its customer. In a VMI-partnership the vendor makes the main inventory replenishment decisions for the customer. The supplier, which may be a manufacturer, reseller or a distributor, monitors the buyer's inventory levels and makes supply decisions regarding order quantities shipping and timing for the major attraction of VMI demand forecasting. The large, infrequent orders from customers force suppliers to maintain inventories that enable them to respond to the uneven demand. In VMI, the supplier is able to smooth the peaks and valleys in the flow of goods, and therefore to keep smaller buffers of capacity and inventory. The vendor has better opportunities to co-ordinate the shipments to different customers. It can schedule either postpone or advance shipments according to production schedules, customer inventory situations and transportation capacity. Usually in VMI the frequency of shipments is increased. Buyers need not monitor the supplier performance by the service level provided by the supplier to the buyer. The only meaningful service level is from the retailer to its customers. The supplier's performance is measured by this service level and by the inventory level at the retailer. Due to the supplier's abilities to plan operations better and due to more frequent deliveries, the service level improves. This generates more sales, because product availability increases. This is especially important in promotions. The successful VMI implementations can be found in the apparel in any organization. In a VMI relationship, the co-operating parties must use the same protocols and common product numbering. This has slowed down the adoption of VMI in this sector, where large stock keeping unit numbers and frequent transactions make implementing VMI more demanding. Also, the customers may not be willing to purchasing, which may be regarded as a core competency of any company [3].

III. OUTSOURCING

The outsourcing is nothing but The trend of outsourcing has been that more goods are outsourced with more advanced services being included. Individual processes or larger entities previously done within the company are being moved to the supplier's responsibility VMI is an excellent example of a value added logistic process being outsourced.

3.1 Outsourcing in Manufacturing Industries:

In manufacturing industry, focusing on the core business and outsourcing the rest has been one of the most central guidelines for a long time. When the company like Henry Ford started the model-T Ford production in the beginning of 20th century, everything was manufactured in a huge factory area that had iron ore processing at one end and the finished cars emerging from the other end. Along with technological development, increasing customer requirements and increasing competition, the cars soon became more complex and required the continuous development of many technologies. So the automotive manufacturers came to a point at which make or buy decisions had to be made. They have started to buy more raw materials and parts from specialized suppliers. The outsourcing trend is not concerned with materials and parts, but such companies have also increasingly outsourced services, of which logistical services and product development have been the most important. Some of the suppliers, for example seat manufacturers, started to deliver ready-made subassemblies directly to the automotive manufacturer's assembly line. Some suppliers have total responsibility for the development and manufacture of the entire system, for example electrical harness and braking systems. According to a recent survey, logistical services are also increasingly bought from third party logistics service providers. In addition to the traditional out sourced logistical activities, transportation and warehousing, the use of value added logistics services is increasing. The trend is catalyzed by the better offerings of the service providers.

It offers more value, more flexibility and more integrated services than internal sources can offer. The relationships are becoming strategic and collaborative. The service provider may take responsibility of a whole process, for example of a spare parts process, including planning, purchasing, inventory, distribution, transportation and customer support. This reduces the number of third-party logistics providers that customers have to deal with. The role of outsourcing has gone through a major change. Now days, outsourcing had moved markedly from performing single functions more efficiently to

reconfiguring whole processes in new ways. The company should do only those activities where they can develop best-in-world capabilities [4].

3.2 Flows of information in VMI

VMI between two entities implies that the manufacturer and the distributor are exchanging additional data on a regular basis:

A. Inventory levels – From distributor to manufacturer

This tells the manufacturer the distributor's inventory level, for each reference it contains:

- The current stock quantity
- The quantity in order
- The quantity reserved for some customer orders
- The backorder quantity or stock out
- The stock status or reference stocked or not

B. Sales history – From distributor to manufacturer

This tells the manufacturer the distributor's sales quantities, for each reference it contains:

- The quantity sold over the last period
- The number of sold lines
- Forecasts can also be provided by the distributor

This information is usually communicated on a monthly basis

C. Order proposal – From manufacturer to distributor

This communicates to the distributor the references and the quantities that the manufacturer advises to order, for each reference it contains: -

- The Ship To location since several warehouses can be handled for the same distributor

- The order quantity

This information is usually communicated on a daily basis. To increase efficiency agreements can be done between the distributor and the manufacturer to place orders only on certain days of the week. The purchase order, order acknowledgement and invoices are sent according to the standard flow, general flows of information in VMI setup.

IV. SET OBJECTIVES

One commonly held problem is the mistaken belief that the major benefits of VMI are shifting ownership of inventory to the supplier. The VMI programs that succeed are the ones that derive their objectives from the company's overall business and supply chain objectives. The supply chain manager must also recognize that shifting the burden of inventory ownership is only one benefit and the other benefits provide the greatest savings. The objectives that drive for time savings are the most beneficial because they generally results in reduced costs as well, the objectives that drive for cost savings can also generate time, flexibility and efficiency bottlenecks elsewhere.

One of the major benefits of VMI is how it can drive the cash cycle closer to its theoretical best balance. Businesses try to balance their payments, and their receivables, so that receipts happen before payments are made. The reality is that in manufacturing there are many variables that restrict a business from achieving the theoretical cash cycle. The customer schedules are pushed out after parts are delivered and production can run longer than planned, just to name a few variables. A properly designed and implemented VMI system will get the closer to the theoretical cash cycle because lead times are reduced close to zero. Since stock is not bought until the job is ready to be issued to manufacturing, the chance of scheduling delays is reduced, if not eliminated, and since the material already resides in the VMI store, delivery delays are eliminated effectively [5].

V. 5W-1H ANALYSIS

It is a question-asking method used to explore the cause and effect relationships underlying for a particular problem ultimately, the goal of applying this method is to determine a root cause of a defect or problem. The real key is to encourage the troubleshooter to avoid assumptions and logic traps and repeating five times, the nature of the problem as well as its solution becomes clear. For adopting VMI this analysis is very much useful.

When to order?

This is related to the lead time required for high value items from various vendors to company. The lead time is time interval between placement of an order for an item and its receipt in stock. So for the any organization it is replenishment order on an outside firm or within the works. This stock level is reorder level, it is determined by balancing the cost of maintaining these stocks and the disservice to customer if the orders are not filled in time.

What to stock?

This is important point of view for both the manufacturer and the suppliers that what should they stock? As the any industry wants to minimize the inventory level by adopting VMI, ensuring that no stock outs take place.

Where to produce?

This is another important parameter concern to inventory control that the items required to any product should manufacture in house, or by outsourcing by their various vendors. For outsourcing the items the company should focused on the lead time and minimum inventory level so that it will economical for any industry to produce or manufacture any item.

Why those happen?

Many industries outsourced with their various vendors so that there is no proper balance between them that over stocking happens between them in various industries itself had much more inventory so it will gives out excess inventory carrying cost, so effective implementation of VMI to avoid inventory any inventory control.

Who Benefits?

The companies, who have used VMI, even where it has not shown improvements on the normal measures, have all seen an improvement in their relationship with and understanding of, their partner. So that VMI acts as a catalyst for developing relationships.

How much to order?

Each order has associated with it the ordering cost or acquisition cost, to keep it low, the number of orders should be as few as possible, that the order size should be large, but large order size would imply high inventory cost. Thus the problem of how much to order is solved by compromising between the acquisition costs and inventory carrying costs [6].

VI. SELECT THE SUPPLIER

Supply chain managers often find it puzzling that supplier selection comes before development of the VMI model. Effective VMI implementations come up on the supplier's experience and expertise with VMI programs. The supplier is actually the best resource for ideas and best practices. Avoid the common mistakes of telling the supplier how to run the VMI model. The supplier knows how to best run the business. Instead of give them objectives and let figure out how to best design the VMI system to meet them. Supplier expertise is the most significant supplier selection criteria. Make sure the supplier has the practical experience not only in running VMI systems but also in dealing with the types of materials that will have in the program [7].

VII. SELECT THE CORRECT MODEL

Another common mistake is the belief that one size fits all. The most effective VMI implementations use a combination of models to fit different situations. The various models are third-party logistics, consignment store, etc, after model has been appropriately selected, the development of a statement of work is essential. This fundamental should become an integral part of the contract with the supplier. It is in fact the most important part of the contract adopted between manufacturer and customer.

VIII. IMPLEMENT THE PROGRAM

One of the final critical steps is the implementation. At this stage it is important to develop an Implementation project plan, clearly defining action items, responsibilities, due dates, resources required, etc. The suppliers can do most of the work but it is essential that required, internal resources be applied, monitored and kept on schedule very much effective. In most of the implementations the information technology staff, at the very least will be required. Maintaining commitment from the internal resources will be the biggest roadblock to successful implementation. Steps need to be taken to minimize the natural tendency of internal resources being misdirected. Before bringing the system "live" one should perform a series of tests to ensure correct operation. These tests must encompass all process elements like software, procedures and peoples. For effective implementation appropriate actions must be taken to correct deficiencies. The tests should be split into prototype and pilot runs. The staff that will be working in the system should already have been part of the implementation team and be fully trained. But there are others who work in auxiliary roles. There are buyers, planners, technicians that have to be briefed because even though they may not actually work with the system it will touch their lives. The training should also include the announcement of the Go-Live date so that everyone knows when the kick-off will occur for this the effective control the data exchange is done by the various software systems, for example, implementing EDI (Electronic Data Exchange) with trading partners is becoming dramatically less expensive with the availability of Internet EDI software or ERP [8].

IX. CONCLUSIONS

The management of inventory by the supplier or vendor continues to draw attention in many industries. The operational benefits of VMI are very compelling. The costs of implementing VMI include investment in technology and in creating the organizational structure. Many of the technology costs associated with VMI are declining. Most of the inventory reduction achieved with VMI can be attributed to more frequent inventory reviews, order intervals, and deliveries that characterize this approach. Opportunities for greater coordination of activities among supply chain participants can be exploited in sophisticated ways to increase the value created by VMI. Demand volatility does not play role in determining likely benefits, businesses with low and high volatility of demand benefit to more or less equal degree. Customers participating in VMI partnerships benefit under all conditions examined and additional benefits to the manufacturer under certain conditions. VMI has been widely touted in recent years. The successful implementation depends heavily on sound business processes and interpersonal relationships. An Effective teamwork is required, with strong participation by both

manufactures and retailers. Moreover, trust between supply chain partners is critical, both must experience and recognize clear benefits or the relationship is doomed. Finally, organization incentives and metrics must be aligned with VMI goals.

REFERENCES

- [1]. An integrated model of the periodic delivery problems for vending-machine supply chains Ahmad Rusdiansyah ,Department of Industrial Engineering and Management, Tokyo Institute of Technology, Tokyo 152-8552, Japan Received 30 September 2003;received in revised form 1 May 2004;accepted 5 May 2004 Available online 22 Dec2004.
- [2]. The value of coordination in manufacturer-customer relationships,Pieter L.M. Van Nyena -J. Will M. Bertranda Henny P.G. Van Ooijena - Nico J. Vandaeleb Technische Universiteit Eindhoven - The Netherlands University of Antwerp – Belgium April 10, 2004.
- [3]. Achabal, D.D., S.H. McIntyre, S.A. Smith, K. Kalyanam. 2000. A decision support system for vendor managed inventory. *Journal of Retailing* 76 430-454. Andel, T. 1996. Manage inventory, own information. *Logistics Today* 3754-58.
- [4]. Vendor managed category management – an outsourcing solution in retailing, Riikka Kaipia and Kari Tanskanen Department of Industrial Management Helsinki University of Technology PB 9500, FIN LAND 02015 TKK.
- [5]. Annual report of the Japan Vending Machine <http://www.jvma.or.jp/pdf/fukyu.pdf> (inJapanese).Baptista, S. R. C., Oliveira & Zuquete, E. (2002). A period vehiclerouting case study. *European Journal of Operational Research*, 139,220–229.
- [6]. Integrated Supply Chain Management In The Government Environment R.K. Gupta* and Pravin Chandra Charnes A., W.W. Cooper, R.J.Niehaus and A. Stedry, “Static and Dynamic Assignment Models with Multiple Objectives and Some Remarks on Organizational Designs”, *Management Science*, Vol. 15, No. 8, pp. B365-B375, 1969.
- [7]. Vendor Managed Inventory Jeffrey Jackson, CPIM, C.P.M., North American Supply Chain ManagerPioneer Standard Electronics, Incorporated “Project Planning Situation”, 1990, Human Synergistics, Inc.“Consignment Example 1 Project”, 1998, Jeffrey Jackson, CPIM, C.P.M. & Eric Lund. (727) 942-0664.
- [8]. Ana Cristina BarrosInstituto Superior Técnico, Universidade Técnica de Lisboa Av. Rovisco Pais, 1049-101 Lisboa, Portugal, Decision Support Framework for Supply Chain Collaboration ,POMS 19th Annual Conference La Jolla, California, U.S.A.May 9 to May 12, 2008.
- [9]. M.A.Darwis & O.M.Odah Department of Industrial and Management Systems Engineering, College of Engineering and Petroleum, Kuwait University, Vendor Managed Inventory model for singlevendor multi supplychains,Safat,Kuwait 23 November 2009.