

ANALYSIS OF VENDOR MANAGED INVENTORY SYSTEM IN BANKING INDUSTRY: A CASE STUDY

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ABSTRACT:

The basic principle of VMI is that the vendor, or supplier, becomes responsible for managing the inventory at the customer's site. A suitable framework for implementation can be helpful. Before elucidation of such a framework, it is useful to identify problems that may be encountered during implementation. The conducted case study identifies some problems. Survey of these common problems will help to simplify the work in banking industries in India. The main purpose of VMI is to reduce the inventory. This research is aimed at creating a viable model of a single manufacturer single supplier collaborative supply chain system using a Vendor Managed Inventory (VMI) system.

Key words: VMI, Bullwhip Effect, Demand, Forecast

INTRODUCTION

The basic principle of VMI is that the vendor, or supplier, becomes responsible for managing the inventory at the customer's site. In contrast to buyers who often manage a broad portfolio of purchased items, suppliers are usually responsible for a more limited range of products of which they have more specific knowledge, and therefore should be better in forecasting and managing the flow of their products through to the end consumer. Making the supplier responsible for replenishment should result in inventory and logistics costs being reduced throughout the total supply chain. This research is aimed at creating a viable model of a single manufacturer single supplier collaborative supply chain system using a Vendor Managed Inventory (VMI) system.

The research paper further uses known inventory performance parameters to performance benchmark the VMI system with traditional push-pull systems, develop a collaborative forecasting spreadsheet solution and a best alternative ordering policy amongst EOQ, Monthly, JIT and VMI policies under known lead time and a variety of demand distribution functions. To reduce the risk level due to demand uncertainty, from raw materials to final customers, companies should undergo innovative and revolutionary changes. For continuous growth and to remain competitive, the Banking industries are adopting new approaches; one of them is Vendor Managed Inventory (VMI). This study work identified various elements of VMI and critically examines them to find out which are most important and suitable elements in context to banking industries. Banking industries can become competitive by successful implementation of VMI.

A suitable framework for implementation can be helpful. Before elucidation of such a framework, it is useful to identify problems that may be encountered during implementation. The conducted case study identifies some problems. Survey of these common problems will help to simplify the work in banking industries in India. The main purpose of VMI is to reduce the inventory.

1. LITERATURE REVIEW

Lee et al. [1997] identified four major causes of the bullwhip effect – Demand forecast updating, the rationing gaming, order batching and price variations. **Jan Holmstrom [1998]** suggests that standard business system solutions, e.g. from SAP R/3, might be adopted rather than introducing new problem specific systems solutions for new business requirements. **DALE D. ACHABAL [2000]** describes the market forecasting and inventory management components of a Vendor Managed Inventory (VMI) decision support system and how this system was implemented by a major apparel manufacturer and over 30 of its retail partners. **N. C. Simpson [2001]** model the order picking function and to explore the role of inventory stock levels in achieving economies of scale across this function in a deterministic demand environment. **S.M. Disney [2002]** designed a VMI for various different ratios of production adaptation cost and inventory holding cost. A decision support system using causal loop diagrams and difference equations is proposed to determine the optimum design parameters in the vendor managed inventory, automatic pipeline, inventory and order based production control system (VMI-APIOBPCS) by relating it to the gain on demand when setting safety stocks at the distributor. **S.M. Disney [2003]** modelled three different scenarios – a traditional supply chain, an internal consolidation scenario (with batching in the order rule) and the VMI supply chain to investigate the impact of a vendor managed inventory (VMI) strategy upon transportation operations in a supply chain. **D.R. Towill [2003]** compares the expected performance of a vendor managed inventory (VMI) supply chain with a traditional “serially linked” supply chain. He compared the bullwhip performance of a number of VMI supply chains with two-level supply chains and in all cases there is substantial reduction in bullwhip effect. **George Kuk [2004]** survey the hypotheses related to the effects of organizational size, employee involvement, and logistics integration and find how some of the acclaimed benefits of VMI were subjected to some of the key barriers common in any IT implementation and reengineering initiatives.

Albrto Felice De Toni [2005] shows that vendor-managed inventory is also used fine in household electrical appliances sector. **Tinglong Zhang [2007]** discussed an integrated vendor-managed inventory model based on the assumption that the buyer’s cycle times may be different and the vendor’s production cycle is an integer multiple of each buyer’s replenishment cycle. **Peter B. Southard [2008]** compared the costs of inventory systems used in practice by rural farm cooperatives to possible technology- enabled systems. Performance was measured in inventory costs, delivery costs and stock outs. He found that VMI alternatives outperformed traditional delivery methods and that the use of such technology could be economically justified in many logistics problems dealing with variable demand patterns through the cost savings created. **W.K. Wong [2009]** proposed a model in the context of a two-echelon supply chain with a single supplier serving multiple retailers in vendor-managed inventory (VMI) partnership. The proposed model demonstrates that the supplier gains more profit with competing retailers than without as competition among the retailers lowers the prices and thus stimulates demand. **L. Yang [2010]** evaluates the effects of the distribution centre (DC) in a vendor-managed inventory (VMI) system comprising one manufacturer, one DC and n retailers. He proposed a model to evaluate the system performance by considering the scale of the distribution network, influential cost factors, demand distribution, planning horizon, and facility locations. And found that the DC has effects on demand variance and system profit. **G.P. Kiesmüller [2010]** propose three different VMI strategies, aiming to reduce the order picking cost at the upstream location and the

transportation costs resulting in reduced total supply chain costs. He compared VMI strategies with a retailer managed inventory strategy for two different demand models suitable for slow moving products and found that if inventory holding costs are low, compared to handling and transportation costs, efficiencies at the warehouse are improved and total supply chain costs are reduced.

Jun-Yeon Lee [2011] presented and analyzed a simple periodic-review stochastic inventory model to examine the benefits of VMI from economies of scale in production/delivery in a global environment characterized by exchange rate uncertainty and large fixed costs of delivery. He suggested that, despite of all the inventory costs transferred from the retailer, the supplier can be better off when his fixed cost of production/delivery is larger than the retailer's fixed ordering cost. He also suggested that the benefits of VMI may be larger under exchange rate uncertainty.

M.A. Hoque [2011] stated that researchers have synchronized both the single-vendor single-buyer and the single-vendor multi-buyer integrated inventory supply chains by transferring the lot either only with equal-sized or only with unequal-sized sub-lot (batches). He developed two generalized single-vendor multi-buyer integrated inventory supply chain models and provide the minimal cost solutions both for the single-vendor single-buyer and the single-vendor multi-buyer integrated inventory supply chain problems, by a better synchronization of the production flow.

Yohanes Kristianto [2012] proposes an adaptive fuzzy control application to support a vendor managed inventory (VMI). The methodology applies fuzzy control to generate an adaptive smoothing constant in the forecast method, production and delivery plan to eliminate, the rationing and gaming or the Houlihan effect and the order batching effect or the Burbidge effects and finally the Bullwhip effect. The simulation results show that adaptive fuzzy VMI control model reduces the Bullwhip effect by eliminating the Houlihan effect and the Burbidge effect.

Leopoldo Eduardo Cárdenas-Barrón [2012] presents an alternative heuristic algorithm to solve the vendor management inventory system with multi-product and multi-constraint based on EOQ with backorders considering two classical backorders costs: linear and fixed. It demonstrates that the proposed heuristic algorithm is better based on three aspects: the total cost, the number of evaluations of the total cost function and computational time.

Recently Jarial & Garg [2013] made thorough review of vendor selections supporting methods specifically accommodate for buying situations.

2. VENDOR MANAGED INVENTORY (VMI)

Vendor Managed Inventory (VMI) originated in the early 1980s with mass retailers demanding vendors to take up the responsibility for inventory replenishment based on sales figures made available by the retailer. Today, the concept of VMI has spread to industries outside retailing like banking as well. VMI promises a win-win situation for both the customer and the bank.

VMI also known as continuous replenishment or supplier managed inventory is one of the most widely discussed partnering initiatives for encouraging collaboration and information sharing among trading partners. Popularized in the late 1980s by Wal-Mart and Procter & Gamble, it was subsequently implemented by many other leading companies from different industries, such as GlaxoSmithKline, Electrolux Italia, Nestle and Tesco, Boeing and Alcoa etc. It is a supply chain initiative where the vendor decides on the appropriate inventory levels of each of the products and the appropriate inventory policies to maintain those levels. In a true VMI setting, the supplier is given the freedom to plan its own production and decide upon the replenishment schedule as long as the agreed customer

service levels are met. This enables suppliers to stabilize their production and to optimize the transportation costs. For the buyer, administration and inventory costs can be decreased.

Enhanced collaboration between both supply chain partners should reduce lead times and minimize the risk of demand amplification in the supply chain. Regardless of how promising the theory of VMI may appear, actual results of VMI implementations can be disappointing. Dong, Muckstadt, Sabath and Fontanella, interviewed seven executives in the field of Supply Chain Management and quotes one of these managers saying:“Out of 10 VMI implementations, three or four achieve great benefits. Three or four have some benefits, but not as much as anticipated, and two or three do not get any benefits”.

While many benefits have been identified, there are also a number of challenges that may exist in practice and that can potentially reduce the benefits obtained from VMI or lead to failures in VMI programs. For instance, Spartan Stores, a grocery chain, shut down its VMI effort about one year after due in part to VMI vendors’ inability to deal with product promotions. Similarly, Kmart cut a substantial amount of VMI contracts because they were not satisfied with the forecasting ability of VMI vendors.

2.1 STEPS FOR VMI IMPLEMENTATION

Each Step in this process is extremely important. Skipping or not completing any steps will have a major impact on the success of your VMI program. Plan to invest the necessary amount of time on each step. Before you begin the setup process, both the manufacturer and the distributor must be comfortable with using EDI or some form of routine data sharing.

Step 1 – Senior Sponsorship:

Since the business paradigm is changing, senior management must make a firm commitment to this new process. VMI must have senior management sponsorship. It should be identified as a strategic objective and then communicated throughout the organization. Senior management must commit to the costs involved, and the manpower needed for setup/maintenance. For the distributor, they must also become comfortable with the concept of having someone else manage their inventory.

Step 2 – Employee Acceptance:

Get all employees to buy into the concept, especially the person currently responsible for maintaining the inventory levels. Without their acceptance, your program will never work. They must understand that VMI will not push them out of a job. It will free up some of their time to allow them to be more productive in other areas. Employees should be given a complete overview of what VMI will mean to the company and the reasons why it’s being done.

Step 3 – Synchronize Files:

Synchronize the Distributors Product Files with the Manufacturers. This step alone is one of the greatest benefits you will receive from VMI. Synchronizing means that you must match the manufacturer’s product data with the distributor’s product data. Are there old, obsolete items on the file? Are the correct product numbers being used? Have new product numbers been properly communicated to the distributor? Any time there is a change to the product catalogue, the manufacturer must share the data with their VMI partners. Your initial data synchronization is extremely important as well as the ongoing synchronization that will be needed.

Step 4 – EDI Testing:

Extensive testing of all EDI sets to be used. The manufacturer and distributor must work very closely together to validate that the data is being properly sent/received. For example: Does the Quantity on Hand that is being received by the manufacturer match the Quantity on Hand in the Distributor's stock? Is Quantity Sold being properly sent? You should check a variety of items in different categories (A, B, C). EDI testing many take many tries and adjustments before it is finally correct.

Step 5 – Acceptance and Measurements:

The Distributor must understand and agree with the stocking plan the Manufacturer is creating. Even though the exact method may be a proprietary method, the distributor should still have an understanding of how the plan is calculated. This will help avoid the future question: "Why did they send us this product if we don't need it?"

Additionally, predetermined Inventory Turns, Fill Rates and Service Levels should be targeted. The Distributor should monitor their current performance for comparison to later results. Both parties must agree upon the frequency of replenishment (daily? once/twice per week?). Ideally, the Distributor should have at least one year's worth of measurements prior to VMI for comparison to later results.

Step 6 – Point of Sale (POS) History:

The Distributor sends the Manufacturer his POS (Point of Sale) History file, usually 1-2 years (Disk or Email). This will allow the manufacturer to base the inventory plan on direct sale data rather than data from the distributors past ordering history. The format of the file must be compatible to the needs of the manufacturer. Then the Distributor sends an EDI #852 All Item Refresh. This tells the status and stock level of every item they have. Make sure to verify both sets of data. This will be the last and most important point.

Note: The standard #852 only sends those products that had a change in position since the last transmission (if no activity took place for that item, then the item isn't sent). A #852 All Item Refresh sends every item.

Step 7: The Distributor makes a sale and enters that transaction into their computer.

Step 8: On a daily/weekly basis the Distributor sends a #852 Product Activity. This reports a change in position on any item since the last #852.

Step 9: The Manufacturer receives the #852 and updates the Distributors Stock Plan. Once an Item or Items have hit their Reorder Point (ROP), the Manufacturer creates an Order.

Step 10: The Manufacturer sends out an #855 Purchase Order Acknowledgment to the Distributor. This lets the distributor update their system with the newly created PO. During the beginning stages of your VMI partnership, it is important to have the Distributor review the #855 and point out any problems.

Step 11: The Manufacturer picks and ships the order and transmits a #857 Advance Ship Notice. This tells the distributor exactly what is being sent and when it's shipping.

Step 12: When the shipment is received, the Distributor transmits a #861 Receipt Advice. This tells the manufacturer exactly what was received. The manufacturer can then match this to his Purchase Order to determine any potential problems (miss-shipped, etc.)

2.2 ELEMENTS OF VMI

TABLE 1.1 ELEMENTS OF VMI

S.NO.	ELEMENT	DETAIL
1	Location of Bank/Customers	Location of bank/customer place in terms of distance. Whether it is near or far away from the bank.
2	Effective Communication between Bank and customers	No communication gap b/w bank & customer so that there is no time laps in collecting the information again and again. Also it shows how much they trust each other by sharing the right information at right time.
3	Planning	Planning means: Transportation Planning, Production Planning, Replenishment Planning, Procurement Planning, Requirement Planning, Distribution Planning.
4	Risk Analysis	Risk analysis should be performed as part of the risk management process for each project. By this technique organizations have back up plans if a particular customer failed to deliver at required time.
5	Highly Effective MIS	It implies use of latest technologies like Electronic Data Interchange (EDI), Bar Coding, Scanning etc.
6	Top management commitment	Top management support has been recognized as the most important factor when some changes are required or when some new technique/ concept have to be implemented in an organization.
7	Team Work	Working together should be heavily emphasized by top management as it is always results in improved performance of an organization
8	Trust between Bank and Customers	Trust between bank and customer in sharing the information and partnership in a supply chain should be like all the partners get their mentioned profit.
9	Organization Policies	To provide direction and to indicate to the work for that management is concerned and involved, cover a wide range of subjects, customer service.
10	Data Communication and analysis	Periodic review and calculation of order points and order quantities based on movement data and special information such as promotions, seasonality, etc. Frequent comparison of on-hand inventory to order point and generation of recommended replenishment orders.
11	Monitoring and Reporting	When trading partners begin VMI, they start by agreeing upon objectives for: Inventory turns, Fill rates (in- stock

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		percentages), Transaction cost. The system monitors actual activity with measurements against those objectives. The system must report the same information to both the bank and the customer so that the process is highly transparent. Information should always be available to both parties on-demand.
12	Employee Training	Employee Training is must in banking services. In this process all the employee well trained to satisfy the customers.
13	Employee feedback and suggestion	Employee feedback and suggestions should be encouraged and rewarded while keeping both formal and informal lines of communication open.
14	Evaluation of Employee capabilities and technical skills	How much quantity of amount can be calculate per day and whether the workforce are technically sound or not.
15	Infrastructure/ Layout	Good organizational building with attractive facilities attracts the customers.
16	Customer feedback & suggestion	Customer feedback & suggestions should be encouraged and find the organization what can do best for the customer satisfaction.
17	Commitment	An agreement to perform a particular activity at a certain time in the future under certain circumstances.
18	Brainstorming Session	Brainstorming is a group creativity technique designed to generate a large number of ideas for the solution of a problem.
19	Information flow analysis and corrective and preventive action for scattering	Corrective action and preventive action (CAPA) are improvements to an organization's processes taken to eliminate causes of non-conformities or other undesirable situations. It focuses on the systematic investigation of the root causes of non-conformities in an attempt to prevent their recurrence (for corrective action) or to prevent occurrence (for preventive action).
20	Standardization	Standardization is the development of a set of defined reference conditions and procedures (standards) to consistently apply to a process to obtain consistent results. Establish a committee to include a Physician Advisor, Nursing, Pharmacy, Material Management, Finance, Purchasing, and Prime Vendor personnel, whose purpose is to standardize material used

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3. METHODOLOGY

Every essential element of VMI may not be easily implemented and some elements are difficult to implement. These problems may be related to in appropriate understanding of VMI methodology or may be related to technical, operational and human problems.

There are some questions related to VMI system:

1. Which are the essential elements of VMI?
2. Which elements are important and difficult to implement?
3. Which elements can be easily implemented?
4. Which elements are highly beneficial in banks?

This section details the procedures for the study in the following subsections:

- Research design,
- Instrument,
- Survey participants
- Data collection, and
- Data analysis.

3.1 Research Design

This study employed non-experimental quantitative research. Specifically, the design involves mail survey method, which is the most frequently used descriptive research design. This research design requires responses from the banks personnel and further requires quantitative data analyses. To increase the internal and external validity, the sampling procedure in this study applied the stratified random sampling technique.

3.2 Instrument

A survey was designed to find out the most important elements of VMI which are easy to implement in banks. The survey consists of comparison based on following common parameters. The parameters are Top Management Commitment, Trust between Bank and Customers, Employee Training, Employee feedback and suggestion, Customer feedback & suggestion, Commitment, Standardization.

3.3 Survey Participants

A questionnaire regarding the importance and difficulties of VMI elements was designed and distributed/mailed in various banks. This study uses a mail survey to distribute and gather the data. A mail survey provides the most appropriate method to obtain relevant, up-to-date information from a large number of banks.

3.4 Data Collection

Data were collected following the self-administered mail survey method. Self-administered mail survey has the advantages of relatively low cost and easy access to widely dispersed samples. These people were also assumed aware of the general characteristics of the banks.

In mailing, the survey sends with:

- i) The cover letter that informed an overview of the aim of the survey, identification of the researchers,
- ii) Details of the VMI elements chosen for the survey.

After sending the questionnaire, a follow- up postcard was sent to the participants one week later thanking for their cooperation.

3.5 Data Analysis

The data was analyzed with the help of ANOVA (Analysis of Variance) Technique. The ANOVA technique is important in the context of all those situations where we want to compare more than two populations such as in comparing the yield of crop from several varieties of seeds. In such circumstances one generally does not want to consider all possible combination of two populations at a time for what would require a great number of tests before we would be able to arrive at a decision.

4. RESULTS

The questionnaire was distributed in 45 banks taking 1 employee from each bank. The questionnaire was collected from all the banks successfully with a very good response. Then all the responses were analyzed. The mean score for each element was calculated. There are two tables giving the mean score of VMI elements for importance and difficulties in context Indian banks. Table 1.3 and 1.4 reveals the degree of importance and degree of difficulties respectively.

4.1. DEGREE OF IMPORTANCE OF VMI ELEMENTS IN INDIAN BANKS

The following table gives the mean score of Degree of Importance of VMI elements in various banks.

TABLE 1.3 DEGREE OF IMPORTANCE OF VMI ELEMENTS IN BANKS

Sr. NO.	VMI ELEMENTS	RESPONSE					Mean Score (0-180)
		4	3	2	1	0	
1	Location of Bank/Customers	22	20	3	0	0	154
2	Effective Communication between Bank and customers	7	7	13	10	8	85
3	Planning	27	17	0	0	0	159
4	Risk Analysis	27	12	5	0	0	154
5	Highly Effective MIS	25	19	0	0	0	157
6	Top Management Commitment	23	11	0	0	0	125
7	Team Work	7	8	12	10	8	86
8	Trust between Bank and Customers	12	29	3	0	0	141
9	Organization Policies	32	11	1	0	0	163
10	Data Communication and analysis	8	8	10	10	9	86
11	Monitoring and Reporting	2	10	13	15	5	79
12	Employee Training	16	25	3	0	0	137
13	Employee feedback and suggestion	14	27	3	0	0	143
14	Evaluation of Employee capabilities and technical skills	10	23	9	2	0	129
15	Infrastructure/ Layout	9	10	6	10	10	88
16	Customer feedback & suggestion	20	22	2	0	0	150
17	Commitment	24	20	0	0	0	156
18	Brainstorming Session	4	5	18	13	9	80
19	Information flow analysis and corrective and preventive action for scattering	5	8	10	12	10	76
20	Standardization	29	15	0	0	0	161

Table 1.3 indicates that Organization Policies has got the maximum value (i.e. 163), hence is the most important element of VMI for Industries and Standardization got 161, as mean score, which is second most important element of VMI whereas, Information flow analysis and corrective and preventive action for scattering got 76 as mean, which is the least one, hence it can be termed as least important in bank in Indian context.

From Table 1.3, other most important elements are Top Management Commitment, Trust between Bank and Customers, Employee Training, Employee feedback and suggestion, Customer feedback & suggestion, Commitment. Table 1.3 also reveals the least important elements and these elements are Monitoring and Reporting, Brainstorming Session.

4.2. DEGREE OF DIFFICULTIES OF VMI ELEMENTS IN BANKS

Table 1.4 gives the mean score of Degree of Difficulties of VMI elements in various banks.

TABLE 1.4 DEGREE OF DIFFICULTIES OF VMI ELEMENTS IN BANKS

Sr. NO.	VMI ELEMENTS	RESPONSE					Mean Score (0-180)
		4	3	2	1	0	
1	Location of Bank/Customers	5	22	16	0	1	118
2	Effective Communication between Bank and customers	6	9	14	8	8	87
3	Planning	10	10	13	11	1	97
4	Risk Analysis	8	15	17	4	0	115
5	Highly Effective MIS	4	15	15	9	1	100
6	Top Management Commitment	4	3	25	8	4	83
7	Team Work	2	9	16	11	7	78
8	Trust between Bank and Customers	2	7	27	8	0	83
9	Organization Policies	0	1	28	11	4	114
10	Data Communication and Calculation	0	3	17	15	9	58
11	Monitoring and Reporting	12	12	10	7	2	111
12	Employee Training	0	1	15	23	5	56
13	Employee feedback and suggestion	0	3	11	22	8	53
14	Evaluation of Employee capabilities and technical skills	0	18	19	4	3	96
15	Infrastructure/ Layout	0	12	12	17	3	77
16	Customer feedback & suggestion	3	1	17	14	9	63
17	Commitment	3	12	16	10	3	90
18	Brainstorming Session	9	10	16	5	5	103
19	Information flow analysis and corrective and preventive action for scattering	7	6	22	7	2	97
20	Standardization	7	7	12	9	10	82

From the above table the most difficult elements are Location of Bank/Customers, Planning, Risk Analysis, Highly Effective MIS, Organization Policies, Evaluation of Employee capabilities and technical skills etc.

The least difficult elements from Table 1.4 are Effective Communication between Bank and customers, Team Work, Data Communication and analysis, Infrastructure/ Layout etc.

TABLE 1.4 ELEMENTS WHICH ARE IMPORTANT AS WELL AS EASY TO IMPLEMENT

S. NO.	ELEMENT	VALUE OF MEAN FOR IMPORTANCE (0-180)	VALUE OF MEAN FOR DIFFICULTY (0-180)
1.	Top Management Commitment	125	83
2.	Trust between Bank and Customers	141	83
3.	Employee Training	137	56
4.	Employee feedback and suggestion	143	53
5.	Customer feedback & suggestion	150	63
6.	Commitment	156	90
7.	Standardization	161	82

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