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Vendor Managed Inventory Elements in Banking Industry

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Abstract

Market is moving toward diversification, which requires more product variety, generating demand uncertainty which leads to many managerial problems such as production, planning, forecasting, inventory management, production system, and timely distribution. To reduce the risk level due to demand uncertainty, from raw materials to final customers, should undergo innovative and revolutionary changes. For continuous growth and to remain competitive, the banks 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 Indian industries. A list 20 elements of VMI system has been identified which are suitable for banks. But all elements of VMI may not be easy to implement. Therefore, there is a necessity to find out those elements of VMI system which are easy and which are difficult to implement in Indian context. Hence a case study of a bank can give useful insights on the basis of listed elements and benefits to achieve the above mentioned objectives. Indian banks 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.

Keywords: *Banking Industry, Vendor Managed Inventory.*

1. Literature Review

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. This could be a cost efficient alternative in a situation when supply chain sophistication and integration demands from customers are increasing. **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. He find that As a result of implementing this VMI system, customer service levels improved dramatically, often coupled with a significant improvement in inventory turnover. **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 [2003]** modeled three different scenarios – a traditional supply chain, an internal consolidation scenario (with batching in the order rule) and the VMI supply chain to investigates the impact of a vendor managed inventory (VMI) strategy upon transportation operations in a supply chain. He found that The VMI supply chain enables a smoother dynamic response than that associated with the traditional supply chain, enabling a reduction in manufacturing on-costs. He also shows that transport cost savings are achievable both in the short and long term when comparing the traditional and VMI supply chains. **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. He find that establishing trust among supply chain members is another major barrier to the success of VMI.

Albrto Felice De Toni [2005] shows that vendor-managed inventory is also used fine in household electrical appliances sector. With an example of Electrolux Italia, he presented and analysed the implementation of this technique, highlighting the various processes involved (sales forecasting, capacity need forecasting, master planning, replenishment need calculation, dispatch planning, shipping), parameters (target stock, replenishment need, dispatch plan, assigned stock, etc.) needed to regulate vendor managed inventory. He also points out the benefits obtained following the implementation of this technique and presents based on the case the variables that define and characterize the conditions under which it can be applied.**YU YUGANG [2006]** discussed a VMI supply chain where a manufacturer and multiple retailers play a game with each other under partial co-operation in

the inventory control withVMI policies in order to determine mutually optimal product marketing (retail price and wholesale price) and inventory policies by maximising their individual net profit. In this supply chain problem the manufacturer is the leader and retailers are followers. The results show that: (a) competition or promotion still exists among the different retailer's markets via changed wholesale price even if they only sell the product in dispersed and independent product markets; and (b) the Stackelberg equilibrium benefits the manufacturer; any deviation of the manufacturer from the equilibrium will bring a loss to the manufacturer. **Joseph G. Szmerekovsky [2008]** developed one manufacturer and one retailer model to study the effect on manufacturers and retailers of attaching radio frequency identification (RFID) tags at the item level in a vendor managed inventory (VMI) system. First he study the demand processes between an RFID system which uses continuous review and a non-RFID system which uses periodic review when shelf-space is limited and then determines the optimal inventory policies in a centralized system and establish conditions under which the RFID system is preferable to the system without RFID. Finally, he study the decentralized system and show how the sharing of the tag price can be used to coordinate the supply chain and how it can be exploited in manufacturer and retailer dominated systems. **Choonjong Kwak [2009]** perform a simulation based experiment and proposed an adaptive VMI (Vendor Managed Inventory) model that controls replenishment quantity adaptively depending on a change in customer demand at each replenishment period in a two-echelon supply chain with unstable customer demands. The proposed adaptive inventory control model, supported by the situation reactive approach with the retrospective analysis, successfully relaxed an assumption of a stationary distribution for customer demands.**Jen-Ming Chen [2010]** formulates the profit-maximization problem and carries out equilibrium analysis under cooperative and non-cooperative settings. An equilibrium analyses have been carried out for the decentralized supply system under non-cooperative and cooperative settings with considering three kinds of arrangements: the wholesale-price-only, VMI, and VMI with consignment. The analysis shows that the non-cooperative decentralization tends to set a higher retail price and less inventory, which leads to a lower channel-wide profit.**Seyed Hamid Reza Pasandideh [2011]** developed an economic order quantity (EOQ) model for a two-level supply chain system consisting of several products, one supplier and one-retailer, operates under vendor management inventory(VMI)system, in which shortages are backordered, the supplier's warehouse has limited capacity and there is an upper bound on the number of orders. A genetic algorithm is then proposed to find the order quantities and the maximum backorder levels such that the total inventory cost of the supply chain is minimized. **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 results show that the adaptive fuzzy VMI control surpasses fuzzy VMI control and traditional VMI in terms of mitigating the Bullwhip effect and lower delivery overshoots and backorders. The simulation results show that adaptive fuzzy VMI control model reduces the Bullwhip effect by eliminating the Houlihan effect and the Burbidge effect**.**

2. Vendor Managed Inventory and Its Implementation

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.

In order for the supplier to be able to manage this inventory, information about inventory levels, expected demand, promotional activities, and product related costs should be made available to the supplier by the buyer. This information enables the supplier to make better replenishment decisions based on total supply chain costs, and prevent local sub-optimization when both players would try to optimize their own profits individually. Early availability of such information enables the supplier to be pro-active, which should result in reduced lead times. Effective implementation of VMI thus requires a cross-functional and inters organizational approach. Accurate and timely demand information needs to be shared between the marketing and supply functions of the buyer as well as with the planning function of the supplier.

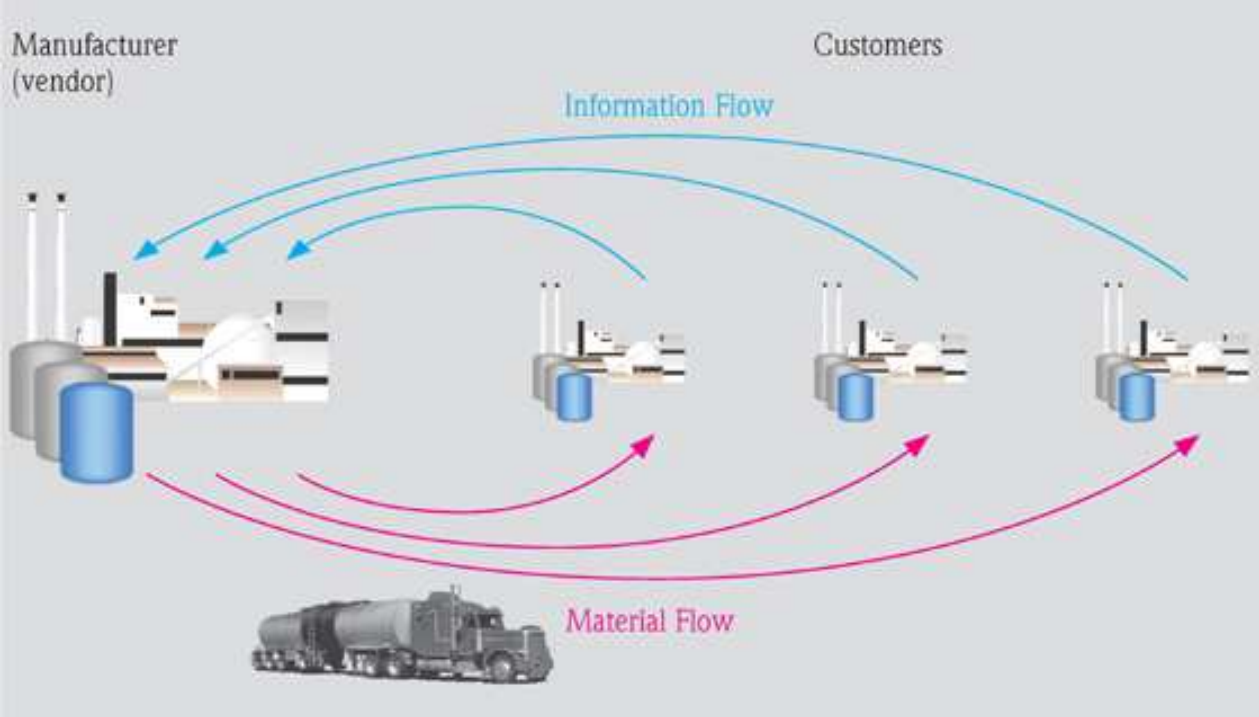

Fig. 1.1 Process of VMI

2.1 Objectives of VMI

1. To reduced overall inventory in supply chain.
2. To improve the overall information system capabilities.
3. To solidify customer loyalty through development of a long-term trustworthy relationship.
4. To increase gross margins.
5. To stabilize vendor's production.
6. To increased sales.
7. To control the bullwhip effect.

2.2 Features of VMI

- Shortening of supply chain.
- Centralized forecasting.
- Frequent communication of inventory
- No manufacturer promotions.
- Relationship with downstream distribution channels.

2.3 Benefits of VMI

The main benefits of VMI are:

1. **Lower customer Inventories** is the primary benefit of a VMI implementation program. Under VMI, the supplier is able to control the lead-time component of the order point better than a manufacture/supplier with a host of suppliers can ever hope to. Additionally, with frequent inventory review, the need for safety stocks on the supplier side is dramatically reduced.
2. **Better Forecasts** occur because of demand information sharing. Better forecasts result a more stable demand distribution pattern. The demand is reflected in more frequent orders for the same parts and therefore lowers variability of demand in business.
3. **Reduced costs** occur because of the reduction in the demand volatility downstream of the supply chain. VMI helps dampen the peaks and valleys of production, allowing smaller buffers of capacity and inventory. With VMI, greater channel coordination supports the supplier's need for smoother production without sacrificing the

manufacturer/retailer's service and stock objectives. Transportation costs are reduced with VMI because the approach helps to increase the percentage of full truckload shipments and eliminate the higher cost LTL shipments.

4. **Improved Service** From the manufacturer/retailer's perspective, measuring product availability usually assesses service. With VMI, coordination of replenishment orders and deliveries across multiple suppliers helps to improve service.

Overall the VMI benefits can be summarized as:

- **For the customer:**

For the customer, VMI results in increased profitability due to:

- Reduced inventory/increased turns
- Reduced administrative costs
- Fewer stock-outs or shortages
- Increased sales (for distributors and retailers)

- **For the supplier:**

For the supplier, VMI results in increased profitability due to:

- Increased sales
- Reduced operating costs
- Stronger customer relationships

- **For both parties:**

For both parties, VMI also provides:

- Better information for planning (e.g. demand visibility).
- A closer, more effective working relationship - both parties work together to sell more to and/or better serve end customers.

2.4 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.)

2.5 ELECTRONIC DATA INTERCHANGE (EDI)

EDI, as a technology, refers to the computer-to-computer transmission of business information between trading partners. But, more importantly, EDI as an enabler of business process re-

engineering is the driving force for supply chain efficiency.

EDI trading messages can be as basic as orders and invoices, but EDI can also develop into a much more sophisticated information exchange, so that trading partners manage their whole supply chain more effectively. Key elements in EDI are the application software at either end of the exchange, linked to EDI message handling software, linked to a communications network.

EDI transaction sets can be easily transmitted using ftp via the Internet. The cost is the same as sending an email across the Internet, but the EDI data is already in a structured format that can facilitate integration into a VMI system. EDI allows the use of functional acknowledgments that allow for tracking the transmission. EDI value added networks can also be setup to forward files the moment they are received, albeit at a greater cost.

2.5.1 EDI TRANSMISSION PROTOCOL:

 # 852-Product activity: sent by the distributor→Tells the manufacturer the distributors inventory level and product activity. The standard #852 only transmits a "change" since the previous transmission. An all item refresh sends every field for every item.

 # 855-Recommended Replenishment: sent by the manufacturer→the order the manufacturer has created.

 # 856/857-Advanced Ship notice: sent by the manufacturer→Sent out right before the Shipment leaves the Manufacturer.

 # 861-Receipt Advise: sent by the distributor→what the distributor actually received.

 # 810- Invoice: sent by the manufacturer→Electronic Billing.

 # 820- Payment Remittance advice: sent by the distributor.

2.6 ROLE OF COMPUTER AND SOFTWARE IN VMI COMMUNICATION

Some of the main steps in a VMI system, in which both the distributor and the supplier have software that allows them to communicate, include the following:

1. The distributor updates inventory data, bookings, and purchase orders which is transmitted automatically to the supplier daily.
2. The vendor has a .VMI Planner, which includes a forecast, analyzes what has been shipped and ordered, and what is in the distributor's inventory.
3. The vendor transmits back to the distributor an order acknowledgement containing promised shipment data. The distributor then creates an order in its business system.
4. The supplier ships; transmitted back to the distributor is container, carrier, line item, and billing data.
5. The distributors system prepares to make a payment. At this time payment is not automated.

Forecasting tools are used to plan the manufacturing flow. Just before actual shipment, the planner determines the optimum shipment quantity by indicating the point where costs are lowest and inventory is needed.

In most cases, the distributor still owns the inventory. Even though the manufacturer triggers the replenishment order, the ownership remains with the distributor. Many manufacturers will work out some type of return policy if the distributor becomes overstocked because of any VMI error. The Vendor has access to the entire customer's usage information on a regular basis, giving them new accuracy in producing bills, controlling production needs, anticipating customer usage, and tracking inventory status.

The requirements for a distributor are a computerized business system, EDI capability, business system integration with the supplier and the support of industry standard formulation. Thus companies can improve their bottom line by reducing the internal costs through the application of VMI.

The heart of the VMI system is a powerful computer that performs complex mathematical calculations using finite logic and heuristics and generates relatively accurate forecast data that the vendor eventually uses to determine his optimal stocking levels. The computer with associated hardware is called .Middleware. a term that is gaining popularity in Database circles as a client-server module.

The middleware process goes something like this.

1. The system receives daily sales and inventory activity as EDI transactions (EDI 852) from the distributor.
2. It then stores and analyzes the data and generates a demand forecast.
3. Based on the forecast the system calculates a suggested purchase order.
4. The manufacturer, using the browser, reviews the PO making adjustments and modifications wherever necessary.
5. After order acceptance, the system transmits the electronic order to the manufacturer.
6. The manufacturer then prepares the order for the shipment and electronically returns to the system an Advance Shipping Notice (ASN).
7. The system then performs a quality assurance test against the ASN, identifying data and shipping errors.
8. The system finally directs the shipment confirmation to the distributor ensuring quick and accurate product receipt upon arrival.

2.7 THE BULLWHIP EFFECT (BWE)

One important mechanism for coordination in a supply chain is the information flows among members of the supply chain. These information flows have a direct impact on the production scheduling, inventory control and delivery plans of individual members in the supply chain.

The Bullwhip Effect (BWE) where the orders' variability is amplified in each echelon of the supply chain: from retailer to distributor, from distributor to manufacturer and from the manufacturer to the suppliers. Bullwhip Effect is the amplification of the demand (order) variance up the supply chain, from customer to factory, as demand information passes back through the supply chain. Distorted information from one end of a supply chain to the other can lead to tremendous inefficiencies: excessive inventory investment, poor customer service, lost revenues, misguided capacity plans, ineffective transportation, and missed production schedules.

2.7.1 The impact of Vendor Managed Inventory on the BWE

A supply chain is a system consisting of material suppliers, production facilities, distribution services, and customers who are all linked together via the downstream feed-forward flow of information (orders). In a traditional supply chain each "player" is responsible for his own inventory control and production or distribution ordering activities. According to Disney et al. (2003), in a traditional supply chain, each company operates individually, with interactions between them limited to just feed-forward flow of physical products and the feedback flow of information, in the form of orders and cash. As a consequence of the structure, the traditional supply chain suffers from long lead-times, multiple decision points, unclear information and minimal synchronization.

The lack of visibility of end customer demand causes a number of problems. The most evident is the Bullwhip Effect, as shown in Fig. 1.4, due to the structure of the ordering decisions with its lead-time for deliveries. The retailer as a result of forecasting customer demand introduces extra fluctuations into the pattern of demand.

The distributor, whose forecast is based on the orders of the retailer, then increases these variations further. This effect continues up the supply chain, resulting in a significant distortion of the actual customer

demand by the time the manufacturer receives the orders.

With VMI, the supplier controls the buyer's inventory level, so as to ensure that predetermined customer service levels are maintained. In such a relationship, the supplier takes the replenishment decisions for the buyer, dispatching a quantity of product that may be fixed or variable. Replenishment occurs when the stock level at the buyer reaches a specified level, based on both the average demand during the transportation lead-time and safety stock to cover for demand variations

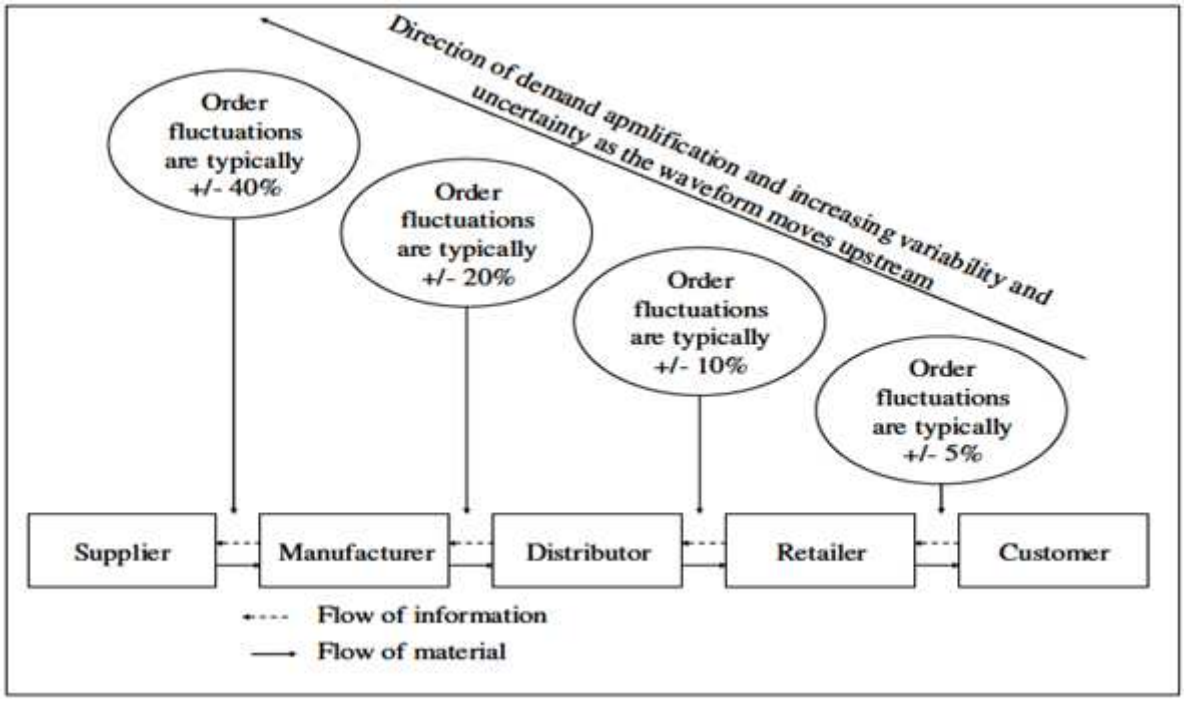

Fig. 1.2: The BWE in a traditional supply chain

Consequently, there is no passing of orders between the two companies. For VMI be successful it is necessary for a large amount of information to be transferred between both parties, particularly data regarding end user sales and inventory levels at the buyer. A simple diagram of a VMI supply chain can be found in Fig. 1.3.

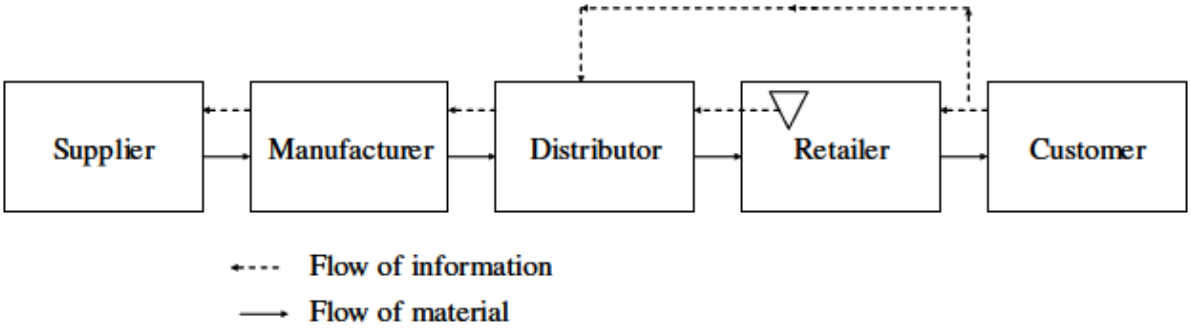

Fig. 1.3: A VMI supply chain.

Table 1.1 summarizes the results of an executed simulation, reporting the main impacts of VMI in the causes of the bullwhip effect. Two situations are compared: the same Supply Chain using and not using the logic of VMI.

Table 1.1: The impact of VMI on causes of the Bullwhip Effect

Cause	Traditional Supply Chain	VMI Supply Chain
Demand Forecast Update	It can be reduced only with supply costs two times bigger	In a well projected system it is easy to reduce this cause in the supply chain for the level of the effect in only two subsequent echelons
Shortage Gaming	It can provide a significant "contribution" to the bullwhip effect	It can be completely prevented with the use of the VMI due to change in the nature of the relationship in the supply chain
Order Batching	It can provide a significant "contribution" to the bullwhip effect. However this can be reduced if the deliveries occur constantly and if the batch sizes be variable.	It can be completely prevented with the use of VMI due to the structure of the flow of information.
Price Fluctuations	It requires considerable increases of capacity to provide rise in the customer service level.	It requires lower capacity to answer a request of increase in the customer service level

2.8 POTENTIAL PITFALLS OF VMI

Although VMI has many benefits, it also has its potential pitfalls. Here are the common ones:

1. **EDI Problems:**
   Extensive EDI testing should be done to validate the data being sent. Is the distributor sending all the data that should be sent? Is each field populated with the correct data?
2. **Acceptance:**
   Make sure that all employees involved in the process fully understand and accept this new way of doing business. It's not enough to just sell the concept to

senior management; all employees who are involved must be willing participants.

3. **Promotions/Events:**
   Anything that adds or takes away from the normal ordering pattern must be properly communicated to the manufacturer.
4. **Customer Base:**
   Any large customers, either gained or lost, must be communicated to the manufacturer. The distributor must guide the manufacturer on how this will affect sales.
5. **Over/Obsolete Stock:**
   An agreement must exist between the manufacturer and the distributor on what to do if an overstock does occur (or in the case of an ordering error). Also, both parties must agree on how to handle obsolete stock.
6. **Time:**
   Both parties involved must understand that this is a learning process. Errors will occur. You will probably not have a perfect process in place day 1.

2.9 ELEMENTS OF VMI

TABLE 1.2 ELEMENTS OF VMI

S. N.	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 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 throughout the bank.

Present work analyses some vital issues in Indian banks in VMI context on the basis of a questionnaire followed by several visits and conducting interviews with the middle management and top level executives. Figure 1.4 shows the flow diagram of the methodology adopted.

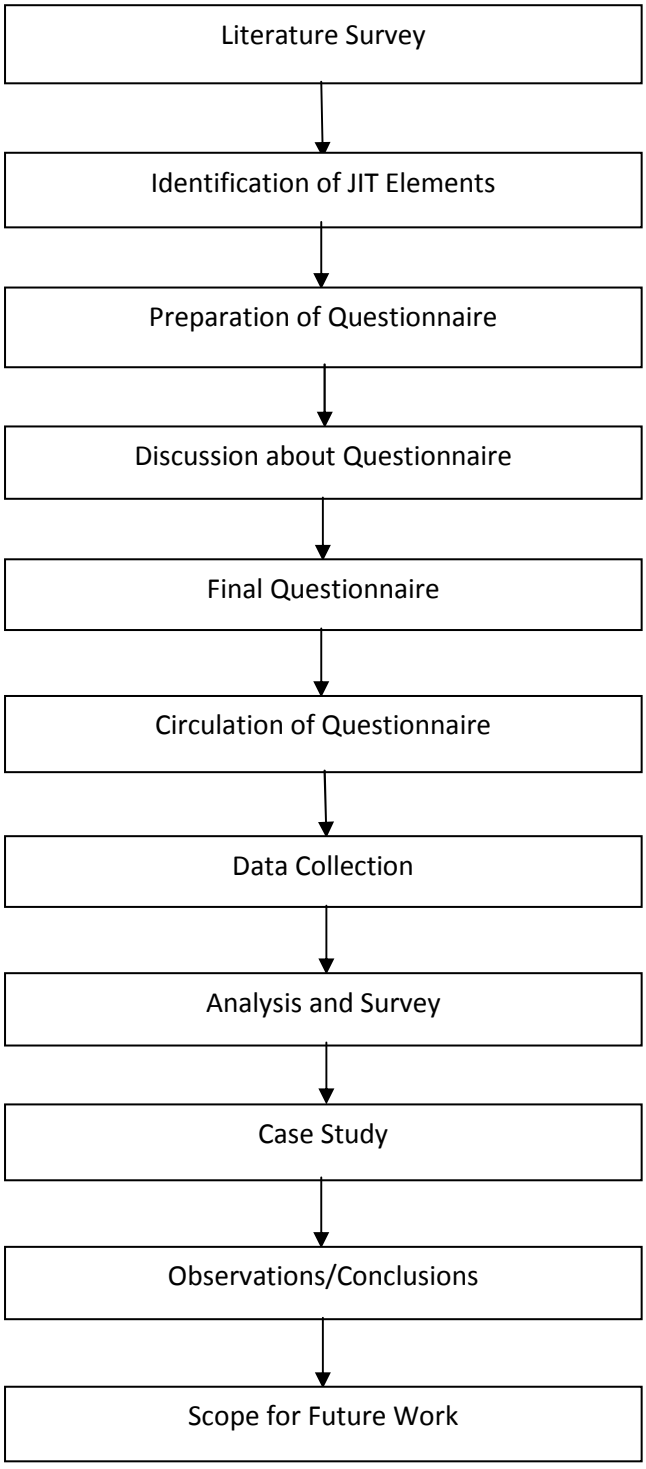
Literature Survey
Identification of JIT Elements
Preparation of Questionnaire
Discussion about Questionnaire
Final Questionnaire
Circulation of Questionnaire
Data Collection
Analysis and Survey
Case Study
Observations/Conclusions
Scope for Future Work

Fig. 1.4

References

[1] Alberto Felice De Toni, Elena Zamolo, "From a traditional replenishment system to vendor-managed inventory: A case study from the household electrical appliances sector", International Journal of Production Economics, Volume 96, Issue 1, 18 April 2005, Pages 63-79.

[2] Choonjong Kwak, Jin Sung Choi, Chang Ouk Kim, Ick-Hyun Kwon, "Situation reactive approach to Vendor Managed Inventory problem", Expert Systems with Applications, Volume 36, Issue 5, July 2009, Pages 9039-9045.

[3] Dale D. Achabal, Shelby H. McIntyre, Stephen A. Smith, Kirthi Kalyanam, "A decision support system for vendor managed inventory", Journal of Retailing, Volume 76, Issue 4, 4th Quarter 2000, Pages 430-454.

[4] George Kuk, "Effectiveness of vendor-managed inventory in the electronics industry: determinants and outcomes", Information & Management, Volume 41, Issue 5, May 2004, Pages 645-654.

[5] Jan Holmstrom," Business process innovation in the supply chain – a case study of implementing vendor managed inventory", European Journal of Purchasing & Supply Management, Volume 4, Issues 2–3, June 1998,Pages 127-131.

[6] Jen-Ming Chen, I-Chen Lin, Hung-Liang Cheng, "Channel coordination under consignment and vendor-managed inventory in a distribution system", Transportation Research Part E: Logistics and Transportation Review, Volume 46, Issue 6,November 2010, Pages 831-843.

[7] Joseph G. Szmerekovsky, Jiang Zhang, "Coordination and adoption of item-level RFID with vendor managed inventory", International Journal of Production Economics, Volume 114, Issue 1, July 2008, Pages 388-398.

[8] N. C. Simpson, S. Selcuk Erenguc, "Modeling the Order Picking Function in Supply Chain Systems: Formulation, Experimentation, and Insights", IIE Transactions, 33(2), pp.119-130, 2001.

[9] S.M. Disney, A.T. Potter, B.M. Gardner, Transportation Research Part E: Logistics and Transportation Review, Volume 39, Issue 5,September 2003, Pages 363-380.

[10] Seyed Hamid Reza Pasandideh, Seyed Taghi Akhavan Niaki, Ali Roozbeh Nia, "A genetic algorithm for vendor managed inventory control system of multi-product multi-constraint economic order quantity model", Expert Systems with Applications, Volume 38, Issue 3, March 2011, Pages 2708-2716.

[11] Yohanes Kristianto, Petri Helo, Jianxin (Roger) Jiao, Maqsood Sandhu, "Adaptive fuzzy vendor managed inventory control for mitigating the Bullwhip effect in supply chains", European Journal of Operational Research, Volume 216, Issue 2, 16 January 2012, Pages 346-355.

[12] Yu Yugang, Liang Liang, George Q. Huang, "Leader–follower game in vendor managed inventory system with limited production capacity considering wholesale and retail prices", International Journal of Logistics Research and Applications, Volume 9, Issue 4, December 2006, pages 335-350.