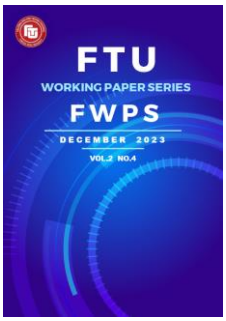

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TẦM QUAN TRỌNG CỦA VIỆC ÁP DỤNG HIỆU QUẢ MÔ HÌNH VMI TRONG DOANH NGHIỆP: TRƯỜNG HỢP CỦA P&G VÀ WALMART

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Tóm tắt

"Quản lý tồn kho bởi nhà cung cấp" (VMI) là một trong những khuôn khổ được sử dụng rộng rãi nhất trong các dự án liên doanh để tăng hiệu quả của chuỗi cung ứng đa công ty. Chiến lược này còn được gọi là bổ sung liên tục hoặc hàng tồn kho do nhà cung cấp quản lý và được phổ biến bởi Walmart và Procter & Gamble (P&G) vào cuối những năm 1980. Sau đó, VMI đã trở thành một trong những giải pháp quan trọng trong chiến lược "phản ứng nhanh" trong ngành tạp hóa, với ngày càng nhiều doanh nghiệp đã thành công gặt hái nhiều kết quả tốt qua giải pháp quản lý này. Với mục đích để có cái nhìn sâu sắc hơn trong chiến lược này, nghiên cứu này sẽ tiến hành đưa ra những cơ sở lý thuyết và đi sâu vào phân tích cụ thể về việc ứng dụng mô hình VMI của Walmart và P&G bao gồm sự tổng quan cũng như kết quả, từ đó rút ra nhận xét cũng như chỉ ra một số khuyến nghị cho các trường hợp trên.

Từ khóa: Quản lý tồn kho bởi nhà cung cấp (VMI), Walmart, P&G

THE IMPORTANCE OF EFFECTIVE VMI APPLICATION TO ENTERPRISES: CASE STUDY OF P&G AND WALMART

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Abstract

Vendor-managed inventory (VMI) is one of the most widely used frameworks in joint venture projects for boosting the efficiency of multi-firm supply chains. This strategy is also known as continuous replenishment or supplier-managed inventory and was popularized by Walmart and Procter & Gamble (P&G) in the late 1980s. Later on, VMI has become one of the important initiatives in the "rapid reaction", "quick response" strategy within the grocery industry, with more and more businesses having hailed successful performances using this initiative. Of the purpose to have a deeper insight in this framework, this paper would investigate the theoretical basis and carry out a specific analysis on Walmart and P&G's application of VMI including cases' overview as well as results, from which to draw comments as well as point out some recommendations for above cases.

Keywords: Vendor-managed inventory (VMI), Walmart, P&G

1. Introduction

It is crucial for businesses to implement a strategy to compete in today's world. The strategy should be customer centric and contain value added processes that are centered around the core processes such as customer relationships, supplier relationships, new product development, and order fulfillment. By focusing on one or more of these processes, a company can differentiate itself from its competitors to gain a critical competitive advantage. Vendor managed inventory is one of the strategies that can allow them to achieve it.

VMI is a flexible business model in which suppliers (vendors) are responsible for a customer's (buyer's) inventory and for restocking items when supply is low. The basic idea is that VMI works to improve and streamline the core process of order fulfillment. Streamlining the order fulfillment process saves time and operational costs, enabling companies to focus on continuous improvement and customer service.

The implementation of VMI has proved to be tremendously beneficial to the collaboration of Walmart and P&G. If others can replicate the success, it will have a huge impact on the supply chains all over the world. That is the reason for the need to look further into this case study. The research's purpose is to analyze the process, along with giving several insights, point out the advantages and disadvantages thereby recommending the ways for companies to take into account.

The objective of this article is to draw out suggestions for future implementations of VMI by studying the case of P&G and Walmart. The methodology followed was: comparing the two inventory management models by using secondary qualitative data, hereby assessing VMI benefits and drawbacks. In particular, the authors analyzed the real-life example of P&G and Walmart' application of VMI. From there, we solidified some lessons and suggestions that would be useful in operational management. The paper is structured as following: a detailed theoretical basis, an

introduction to the two companies, an analysis on the case, fors and againsts deducted and finally, recommendations.

2. Literature review

2.1. Theoretical background

Vendor managed inventory (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 (Angulo et al., 2004). It is a supply chain strategy in which the vendor selects the proper inventory levels for each of the items and the proper inventory management practices to sustain those levels. The retailer gives the vendor access to its current inventory status. The retailer may specify particular service-level and/or shelf-space criteria in this partnership program, and the vendor will take such requirements into account. This means, in a VMI system, the retailer's responsibility is reduced to merely renting out store space (Mishra and Raghunathan, 2004).

The retailer can increase the variety of the vendor's goods that are able to be sold inside a specific store space due to the VMI system. Both the retailer and the vendor benefit from an increase in the brand's profitability. According to the vendor's ability to offer a more timely replenishment system based on more accurate demand information, retailers working alone typically cannot achieve the same productivity benefits (Achabal, 2000).

2.2. Advantages of applying Vendor Managed Inventory

Advantages of applying VMI for suppliers

By giving suppliers access to the buyer's sales and inventory level, VMI can be advantageous to suppliers. Through providing suppliers this level of control over inventory and production planning, VMI allows them to make placement decisions that can help their marketing plans and demand forecasts (Sari, 2007). Therefore, suppliers have a more favorable opportunity to coordinate shipments to different customers, and schedule deliveries – faster or slower – depending on the customer's production schedule, inventory status or goods and shipping capacity.

Advantages of applying VMI for retailers

By using VMI, suppliers and retailers cooperate to meet their end-user customers. A vendor-controlled inventory relationship requires clear communication and mutual trust. This setup is comparable to a vertically integrated company, where one level's performance can have a significant impact on another's performance (Neogrid, 2021). In other words, retailers benefit from the assurance that their most pressing requirements will receive the most attention and be responded to.

Advantages of applying VMI for the whole supply chain

The amount of inventory that must be produced or stocked in order to meet demand is a fundamental issue for businesses with regard to inventory. Increased holding costs as a result of excess inventory secure capital. On the other hand, a shortage of inventory could result in a loss of customers or revenues (Battini, 2010). On the supply chain level, this model reduces inventory to the most optimal level, saving shipping and ordering costs. Finally, VMI assists businesses to increase sales by reducing the risk of shortage in inventory.

2.3. Comparison between traditional ordering model and vendor managed inventory model

2.3.1. Traditional ordering model

In the traditional ordering model, the manufacturer schedules the production after acquiring the retailer's forecasts, and the purchasing department procures the materials. The manufacturer stores the products after the supplier delivers them and is in charge of the inventory costs (depicted in Figure 1). Due to the fact that each component in the chain manages its own inventory and there is no mechanism in place for information sharing, it is challenging to implement inventory control throughout the supply chain. As a result, the chain experiences the Bullwhip effect, which makes the chain's inventory uncontrollable leading to either inefficient production or excessive inventory.

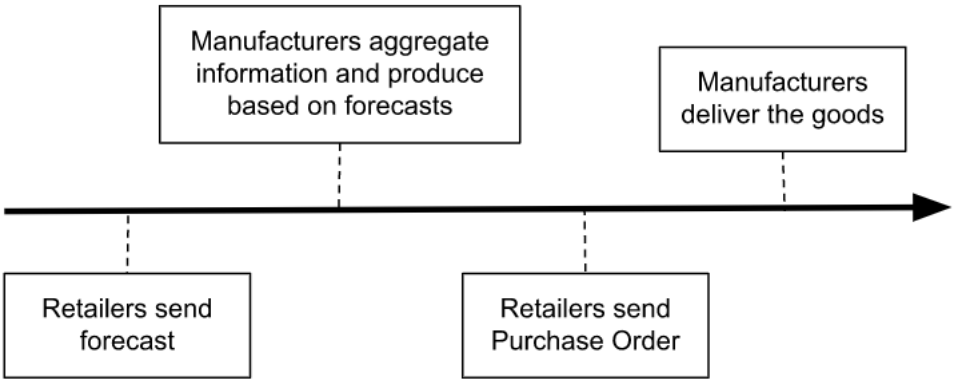

Figure 1: Traditional ordering model

Source: The Logistician, 2021

2.3.2. Vendor managed inventory

A VMI system has three basic variables: minimum stock levels, consignment stock and vendor-managed ordering (Slack, 2006). Companies frequently use a combination of these elements to promise the success of their VMI system. First, a minimum inventory amount is agreed upon by the buyer and the supplier. Customers are ensured that immediate shipping is a choice regardless of lead times and order placement delays by agreeing on a specific supply level that must always be kept by the vendor. Second, quantity of stock is linked to VMI; in which, the seller owns part of the inventory that customers store until it is used up or sold. Finally, based on the desired level of service from the vendor, the customer determines the reorder point and order quantity. In order to complete this step, the supplier must create purchase orders for their goods

rather than the buyer. Customers must notify their suppliers of information regarding sales and demand forecasts in order for this to work. Using this type of accessibility, the vendor may foresee customer demand and create an order. The vendor delivers the order after the buyer confirms payment. Electronic payments are used by the customer. The process is depicted in Figure 2.

Figure 2: Vendor Managed Inventory Model

Source: *Hooshang M., 2020*

2.3.3. Similarities and differences between traditional ordering model and vendor managed inventory model

After introducing the two ordering models' operational procedures, the authors summarized the similarities and differences between traditional ordering model and vendor managed inventory model in Table 1:

Table 1: Comparison between Traditional ordering model and Vendor managed inventory model

	Traditional ordering model	Vendor managed inventory
Similarities	- Need to determine the quantity in stock and time to order - Aim to respond to customer requirements in the fastest way, reduce warehouse management costs, reduce inventory and transport costs throughout the chain	
Differences	- Lack of information sharing between members causing unaware of actual customer demand - Order volume based on forecasting capacity - Bullwhip effect as a consequence	- Information sharing in the whole supply chain - Order volume based on real-time data - Supplier's accessibility to the customer's inventory and demand

	- High lead times for processes - High levels of inventory for each stakeholder in the chain	information - Short lead times for processes - Low levels of inventory for each stakeholder in the chain

Source: Authors

In general, the extent to which a retail company is willing to share internal accounting information with their manufacturer and the reliability of the information transmission from the retailer to the manufacturer determine the effectiveness of a supply chain.

3. Case study overview: VMI application in P&G and Walmart

In practice further, the paper will continue to look into the case of the retailing industry, which will be followed by the examples of P&G and Walmart in order to explore the application of VMI.

As mentioned above, VMI basically is the planning and management of a system in which the supplier is responsible for maintaining the customer's inventory level. Inventory forwarding is an extension of the VMI program where suppliers order inventory for customers while retaining ownership of the inventory. Inventory payments are not made until the inventory is resold or consumed. Manufacturers receive electronic messages (usually via EDI from customers) that tell manufacturers what distributors have sold and what they have currently in inventory. The manufacturer considers this information and decides when it is appropriate to create an order.

3.1. Company overview: Walmart and P&G

Walmart: Walmart Inc (Walmart) is a retailer that operates grocery stores, supermarkets, hypermarkets, department and discount stores, and neighborhood markets. The company’s stores offer grocery and consumables, health and wellness, technology, office and entertainment, hardlines, apparel and home categories at everyday low prices. It operates warehouses and merchandises products through various e-commerce (Global Data, 2023).

P&G: The Procter & Gamble Co (P&G) is a manufacturer and marketer of fast-moving consumer goods (FMCG). The company’s products include conditioners, shampoo, male and female blades and razors, toothbrushes, toothpaste, dish-washing liquids, detergents, surface cleaners and air fresheners. P&G sells goods through a variety of outlets, including pharmacies, drugstores, department shops, high-frequency retailers, membership clubs, specialty beauty retailers, and grocery stores (Global Data, 2023).

3.2. VMI application of P&G and Walmart in the past

Figure. 3 depicts the VMI application of P&G and Walmart in the past. During application using VMI, typically the operations of forecasting and generating orders were executed by suppliers (P&G) and not by retailers (Walmart). Electronic data interchange (EDI) was an integral

part of the VMI process and had an important role in the process of data communication. Walmart shared their data of sales and inventory to P&G through EDI or B2B collaboration facilities, and then P&G would generate orders based on established inventory levels and fill in the ratios of Walmart. During the VMI process, P&G forecasted and created orders, which was responsible for maintaining inventory plans for the retail stores of Walmart. Accordingly, P&G then would send shipment notification before shipping the product to the retail stores of Walmart. Afterwards, an invoice would be sent to the retailers, which here is Walmart. Upon receipt of the goods, Walmart invoiced and paid through the account system. Below is an example of steps to establish the EDI platform in the VMI application of P&G and Walmart:

Step 1: Synchronizing

One of the main benefits of VMI is that P&G and Walmart's data will be synchronized. In order for VMI to work, P&G must keep their trading partners updated daily on store changes or product data. Therefore, it is necessary to synchronize the data and adjust for any differences.

Step 2: Checking

P&G and Walmart will work closely together to ensure that the data is transmitted properly. By testing several different types of products (such as existing inventory or on-the-go inventory), they can ensure that the system is working properly.

Step 3: Planning

In this step, P&G will create an inventory plan for Walmart and then Walmart will decide whether to agree or readjust to that plan.

Step 4: Setting up

By collecting POS data from Walmart, P&G can base their inventory levels on direct sales instead of through order history. This is the final validation point in the setup process and ensures that the inventory level and condition is correct. (POS stands for Point Of Sale, POS data is data that is collected from transactions made at a point of sale, such as a retail store. This data can include information about the products that were purchased, the date and time of the transaction)

Step 5: Running the system

Once the software starts running, both sides can start controlling sales and entering transactions using the VMI system. Daily and /or weekly reports calculate the level of replenishment and ordered goods accordingly.

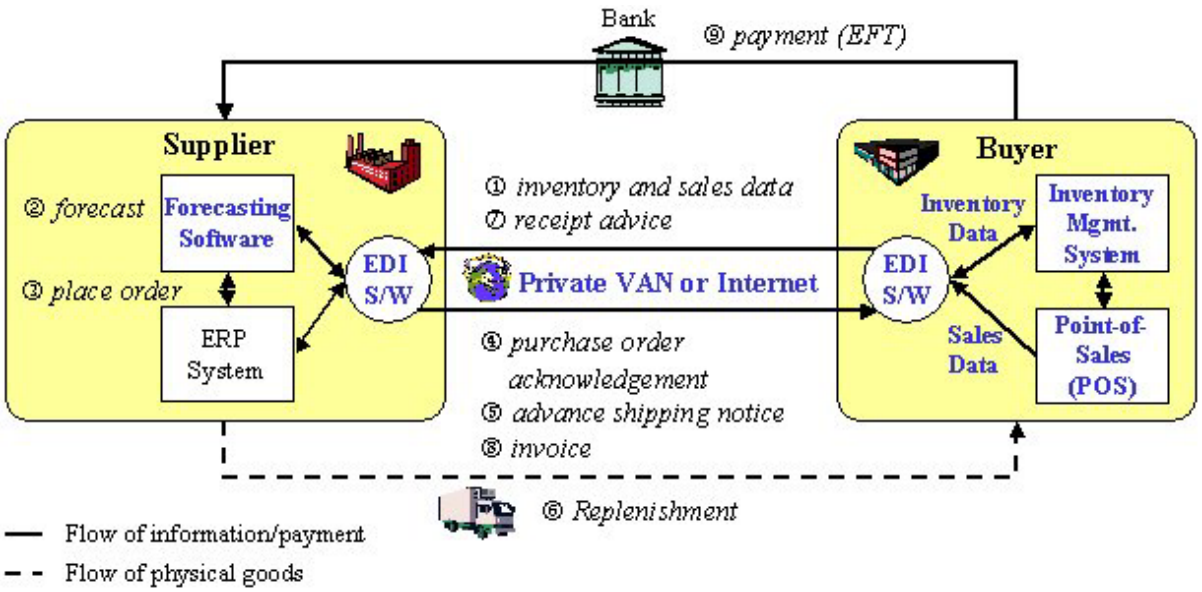

Figure 3: The VMI application of P&G and Walmart

Source: *Kunsoo H., 2011*

3.2. VMI application of P&G and Walmart at the present

However, as time passed, with the purpose of prioritizing continual development, P&G and Walmart realized the need to switch to a more modern VMI platform. An example can be mentioned is Datalliance because it provides a flexible and affordable solution.

*Datalliance is one of the largest main providers of technology and services for cooperative replenishment schemes like Vendor Managed Inventory - VMI and related strategies. Provided as a cloud-based platform with strong customer support).

As in this situation, P&G and Walmart have also been able to optimize the actual time they take to generate VMI orders while enhancing vehicle fill capabilities thanks to the tool's simplicity of use and sophisticated algorithms in constructing orders. In comparison to their prior system, analysts touch the solution roughly 50% less, which increases productivity by lowering the amount of information searches. Automatic order consolidation was one of the newly offered features that, when paired with improved efficiency and fewer touches, raised VMI analysts' overall productivity by 20% to 25% (Consumer Good Technology, 2015). Because of the system's adaptability, P&G is also more responsive to particular customer needs of Walmart. These criteria range from a minimal shelf presence at stores to single truck deliveries. The new technology has also aided in establishing uniform global work processes, and P&G as well as Walmart have developed a collection of VMI best practices that are easily implementable, enhancing productivity and VMI outcomes globally. In addition, closer integration has been made possible by the software-as-a-service delivery paradigm both internally and externally.

The key to the integration of work between P&G and Walmart is data. Although not very challenging, the integration is growing to accommodate increased data usage and to increase understanding on both sides of the equation. P&G and Walmart might continue to use the same EDI technology that they have been using for 20 years which depends on the situation. Nowadays, more and more new data elements are being added, particularly forecasts for promotions. On the supplier's end, P&G has worked extensively with web services, which are closely related to the back-end operations carried out by the supplier's systems. This guarantees that both sides are also receiving the appropriate data to guide the procedure. Moreover, in order to facilitate the VMI application of P&G and Walmart, the primary data capability that Walmart must have is 'Product Activity' records (852, INVRPT or equivalent) and receive 'PO Acknowledgement' records (855, ORDRSP or equivalent). Finally, some challenges and difficulties that P&G and Walmart might encounter while applying VMI are the standard procedures that any organizations would anticipate with any cooperative information-sharing effort, such as confirming data accuracy, aligning resources to discuss problems, and attending to client-specific requirements. It simply takes time for both sides to resolve those issues.

4. Advantages and disadvantages of VMI in P&G and Walmart

In the traditional model, before using VMI, Wal-Mart purchasing and inventory management of P&G products is similar to most industries. Demand forecasts and current inventory levels are reviewed, and planning is determined by product movement. The problem inherent in the system was variable demand, which was not precisely in the purchasing pattern. Without the real-time data of current inventory, buyers would only speculate on replenishment and order products as needed. Their orders will be based on predictions of future demand, but in many cases this can lead to sufficient or deficient supply of inventory. Wal-Mart will have to contend with retailers at risk of co-working, under-stocking or excess inventory.

One potential problem is that at peak sales times where volume demand is higher than average, the capacity may not be sufficiently suitable for higher volume production because of the fact that suppliers cannot forecast peak times without prior knowledge. This can lead to the danger of back-inventory shortages leads to a potential loss of sales

Moreover, Procter & Gamble (P&G) discovered this effect a decade ago which is related to the Bullwhip effect nowadays. The company found a strange phenomenon with Pampers, their famous disposable baby diaper product: despite the steady flow of babies and demand for diapers, orders for Pampers products still remarkably fluctuated. This was because information about product demand gets distorted as it travels along the supply chain. As an example, a retailer may see a slight increase in diaper demand, so the retailer has increased the order quantity for a wholesaler. The wholesaler will then increase estimated sales, forcing the manufacturer to increase the quantity produced. However, the increase in demand turned out to be negligible, so the supply chain was overwhelmed with inventory and orders were cut. At first glance, the difference in order

volatility may seem unreasonable. Because consumers, in this case, babies, consume diapers at a fairly stable level, while the level of order volatility increases as they move further into the supply chain.

4.2. Advantages of VMI application

4.2.1 Achieved costs benefits in inventory management

To investigate this aspect, Kamalapur, Lyth and Houshyar (2013) compared the cost benefits of VMI over traditional supply chains (TSC). By applying 4 control variables: Variable Demand, Production Capacity, Backorder Penalty and Delivery Lead Time to apply in retailer and manufacturer response variables by running a simulation, the study showed that VMI performed better than TSC in reducing inventory management cost for the retailer and the manufacturer.

For details, in this research, 'Pairwise Comparisons' method is applied to compare VMI with TSC using a 95% confidence level. For the production capacity, it is shown that when production capacity is high, the cost benefits of VMI are generally low, especially when demand variability is low.

Next, higher cost gains are achieved for both the manufacturer and the retailer when backorder penalty costs (Backorder costs include costs incurred by a business when it is unable to immediately fill an order and promises the customer that it will be completed with a later delivery date. Backorder costs can be direct, indirect, or ambiguously estimated) are high. It has been demonstrated that information sharing in the VMI approach significantly lowers the cost of inventory management for both supply chain partners when backorder penalty costs are high.

In the case of delivery lead time, for both the manufacturer and the retailer, the VMI approach has noticeably greater cost benefits when demand variability is high and delivery lead time is also high. It is well known that there is an increased variance (bullwhip effect) in order quantity for retailers and production quantity for manufacturers when demand variability is high and information is not shared among supply chain members. Additionally, higher order quantity and production quantity variance will substantially raise the costs connected with safety stock inventory or backorder penalties for both the manufacturer and retailer when delivery lead times are high. Through the use of the VMI strategy, forecast, sales, and inventory level information can be made available in this scenario to help minimize the variance and improve service levels and inventory costs for both the manufacturer and the retailers.

4.2.2. Decreased inventory level

The inventory levels can decrease by applying a VMI system. Overall safety stock will be decreased due to the increase in information transferred by the synchronizing electronic system that Walmart is capable of meeting the true demand from P&G. There is no longer a need to have high inventory levels when they know the exact demand and inventory levels.

4.2.3. Increased service level

The information should be detailed and accurate so as to make an increase in service level. The information in the VMI relationship contains inventory data, forecasts and sales figures. When implementing the VMI system, the fluctuation will be smoothened and the production planning will become more optimized and flexible. This will lead to an increase of service level when orders can be fulfilled and delivered in time.

4.2.4. Reduced Bullwhip effect

Bullwhip effect is a supply chain phenomenon which describes a small fluctuation in demand from retailers leading to larger fluctuations in demand at wholesaler, distributor and manufacturers level. Applying VMI method, specifically by updating Electronic Data Interchange to improve communication and collaboration at each level among supply chain members, suppliers can deeply understand and well-prepared the demand from customers, which can positively affect the accuracy in forecasting and supply the true amount of demand due to the real- time data updating from all level in the supply chain. According to Disney and Towill (2003), a number of VMI supply chains and two-level supply networks were compared for bullwhip performance in general by a simulation model based on difference equations. In this case, bullwhip is significantly reduced in each scenario (usually cutting the impact in half). This is true regardless of the bullwhip measure employed.

Moreover, in another study of Disney and Towill (2003) which focus on proving the reduction of Bullwhip effect by using VMI system, they have concluded in a summary table below:

Table 2: The Impact of VMI on the Bullwhip Effect in Supply Chains

Source of the Bullwhip Effect	VMI Supply Chain
Price variations (Promotion Effect) (1)	Step responses show that VMI produces approximately 50% less overshoot when responding to step inputs
Rationing and gaming (Houlihan Effect) (2)	Completely avoided by VMI supply chains because of the change in the nature of the relationships in the supply chain
Demand signal processing (Forrester Effect) (3)	In a well-designed system, it is easy to substantially reduce bullwhip to about the level of a single echelon supply chain
Order batching (Burbidge Effect) (4)	Completely avoided by VMI supply chains due to the structure of the information flows

Source: Disney and Towill, 2003

(1) Price variations or the Promotion Effect refers to the practice of offering products at reduced prices so as to stimulate demand. Assuming an elastic demand, this creates temporary increases in orders where customers take advantage of this opportunity and forward buy or "stock up". However, this has serious impacts on the dynamics of the supply chain, as when the price is released from the discounted level, demand slumps, creating a perceived need for further discounting in order to stimulate demand.

(2) The Houlihan Effect was highlighted by Houlihan (1987) who recognised that as shortages or missed deliveries occur in traditional supply chains, customers overload their schedules or orders. This in turn places more demands on the production system that inevitably leads to more unreliable deliveries. Customers then increase their safety stock target in a vicious circle that further distorts the demand signal, giving rise to the Bullwhip Effect. Houlihan has summarized this phenomenon as the Flywheel effect.

(3) Demand signal processing has in the past been called the "Demand Amplification" or the "Forrester Effect" after Jay Forrester (1961) who encountered the problem and subsequently demonstrated it via DYNAMO simulation. The Forrester Effect is also encompassed by Sterman's bounded rationality, (Sterman, 1989), terminology that is common in the field of psychology as used to describe players sub-optimal but seemingly rational decision making behavior.

(4) Order batching is also known as the Burbidge Effect (Burbidge, 1991). It refers to the practice of placing orders up the supply chain (or on the various manufacturing processes) in batches. The philosophy behind this action is to gain economies of scale in set-up activities (such as setting up a specific machine or placing and receiving an order)

4.3. Disadvantages of VMI implementation

4.3.1. Partner relationship

The success of VMI largely depends on the supplier-retailer relationship. For some companies, giving third-party access to supplier data can be unsettling. Suppliers might not want a third party to manage their inventory, particularly if they are uncertain of the vendor's capacity to meet their particular requirements. Additionally, they might be reluctant to share their information due to security worries.

Critics of VMI argue that failure of VMI is in part due to lack of shared information on production schedules, stock levels, actual demands, demand forecast, product portfolio, point-of-sale (POS) data and computer-based forecasting programs (Cooke,1998; Qian et al., 2012; Sahin & Robinson, 2002).

Lack of trust in data exchange can cause:

- Inventory imbalance
- Out of stock

In the case of Walmart and P&G, the collaboration between Walmart and P&G places P&G in charge of inventory management duties, which are frequently handled by brick-and-mortar retailers themselves. While Walmart requires P&G to carry out this process on its behalf, it also gives P&G a wealth of prompt and useful information about Walmart's product requirements, enhancing the effectiveness of P&G's production activities. more sensible and effective. Therefore, Walmart must be willing to make concessions and aid their supply chain stakeholders in achieving their objectives if they want to cooperate.

Two businesses always made an effort to make sure that both parties adhered to the "co-determination" concept. To put it another way, neither side would make a choice that might undermine the other's position without first consulting the partner. P&G consults Walmart on the best product lineup without bias and without trying to upsell anything. As a consequence, P&G frequently found itself advising Walmart on how to interact with other suppliers, and a strong foundation of confidence was built. Finally, they both paid close attention to the equality principle in the culture of the other.

The relationship between the two companies is still positive but it is not as good as how it used to be. This was due to growing pressure from both parties, which, if not handled, would weaken the relationship, and cause it to revert to its previous state. Since Walmart Stores is the biggest retailer in the world, its shelf space is naturally in high demand. This naturally leads to a conflict of interest between major suppliers like Procter & Gamble Co, which wants to control every square inch of the stores with their products, and Walmart, which wants to keep the store clean and fresh.

Walmart is concentrating on enhancing the physical appearance of the store by clearing out clutter and emphasizing private label brands that give customers the opportunity to make small savings. On the other hand, P&G wants Walmart to increase sales of its goods, keep the prices higher on some of its important products, and add more shelf space.

Additionally, there have been adjustments in both directions in the leadership levels of the partnership. This has resulted in each company making more independent choices as a result of mounting business pressure rather than the collaborative problem-solving that was the hallmark of the original team. If both companies fail to keep the relationship and cannot work together, they would crash the VMI.

4.3.2. Technology to response to VMI

Walmart and P&G used EDI-enabled to leverage existing technology investments to rapidly launch VMI initiatives after EDI was introduced. Through this collaboration, Walmart is able to keep track of inventory in its retail locations and create a system that connects all of P&G's

computers with its retail locations and warehouses. Every time the computer system decides that a particular good needs to be replenished, P&G will receive a text message about it. A replenishment order will then be sent to the closest P&G through this system before products are delivered to distribution centers or to stores.

Since VMI calls for a basic shift in how buyers and sellers interact, this is the true obstacle to its widespread adoption. Businesses must make sure that their internal data, organizational structures, business processes, and information technology tools support the implementation of VMI. For instance, many organizations struggle with outdated systems that need to be replaced, a lack of support from senior management, and a reluctance to share sensitive information.

With the change in technology and the operation under the VMI model, the inevitable consequence is an operational problem. Employee resistance to change is a possibility because implementing a VMI system will require them to adapt to new processes, expectations, and working methods.

However, by the 1990s' end, the high expense of EDI technologies and the widespread use of the Internet had made it possible for even the smallest retailer and manufacturer to benefit from the VMI's collaborative capabilities. Additionally, Web-based applications enabled open two-way real-time communication between business partners instead of one-way data transmission, which was backed by formal standards.

5. Recommendations for retail corporations and their vendors to the success in VMI implementation

5.1. Enhance the partners' relationship

Communication of expectations between both parties is the first step to a better vendor-customer relationship in VMI. Suppliers and consumers must agree on the terms of their contracts and know what their expectations are before implementing VMI. The second factor is sufficiently test systems before going live. The suppliers and buyers need to work together to properly test the system before it goes live to avoid failures which could result in increased inventories in warehouses instead of on the store shelves (Mirasol, 2019; Muntz, 2015; Yalcin et al., 2018).

Furthermore, the ingredients for a successful partnership are trust, ability to find and create win-win ideas, collaboration on forecasts, goal setting and metrics scorecard reviews. View your customers or suppliers as an extension of your company and supply chain.

Win-win mindset is especially important for any firms that have implemented a VMI system. Win-win here means the customer must commit to sharing precise information and the supplier must ensure reliable transmission, receipt, and use of information. Barratt (2004a) and Kumar and Kumar (2003) have observed that in order for the supplier to be able to manage the 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 be proactive, which results in reduced lead times or delivery on time (Kaipia et al., 2002)

5.2. Process redesign & Modification in operational management

Businesses need to understand that they will need to realign or redesign their current processes if they want to get profit from VMI and have a stronger supply chain management system. Process redesign should be based on a value chain view of the business where various business units such as purchasing, operations, logistics, marketing and accounting coordinate their work, focus on value-adding activities and eliminate redundancy. Such an undertaking requires top management support and willingness to allocate necessary resources to implement the project successfully. Generally, companies who have implemented VMI find it necessary to change employee responsibilities and activities regarding purchasing, order fulfillment, and supply chain management (Yen et al., 2016; Zammori et al., 2009).

However, when redesign the current process, firms face operational problems such as employee resistance to change. As when implementing VMI, employees will have to change the way they perform their daily tasks, new procedures, and expectation measures that come with the execution of a VMI system. Therefore, it is needed for managers to train and motivate their workers. Some solutions such as providing training lessons, reminding employees that they still have influence, rewarding or giving them positive feedback.

Organizational learning and support for change is essential when implementing a VMI system. The commitments of top managers are essential for successful operational change. Managers need to be on board with the change and be involved in the pre-implementation stages to make sure that the system will provide the desired outcome. Management involvement ensures conformance to corporate policies and procedures.

Forming a cross-functional team that includes representatives from key departments and the suppliers is vital in generating employee support as well as assurance that the VMI system is developed and implemented in a way that leads to a good strategic fit. A cross-functional approach that includes representation from suppliers in the implementation process is likely to be more successful as suppliers and customers can work together to enhance the system (Gorane & Kant, 2016; Yuliang et al., 2012).

5.3. Outsource a third company for technology application

Several businesses struggled with the VMI system because they lacked the necessary technology and found it challenging to devote the necessary time and resources to a whole new information system like EDI. Critics of VMI argue that failure of VMI is in part due to lack of shared information on production schedules, stock levels, actual demands, demand forecast, product portfolio, point-of-sale (POS) data and computer-based forecasting programs (Cooke, 1998; Qian et al., 2012; Sahin & Robinson, 2002).

Since technology changes so rapidly, it would be impossible for the buyer or supplier to stay abreast of all changes, especially if they are not related to the firm's core business competencies. As a result, third-party logistics providers (3PL) appear to help companies manage the software and communication aspects of VMI. They are in charge of all VMI training as well as any ongoing supplier or customer education. In order to maintain a seamless supply chain, third party logistics providers must make sure that their systems can manage connection with ERP or other systems used by both suppliers and customers. One of the advantages of using 3PL providers in managing VMI is reduced implementation time. 3PL providers are responsible for getting both the supplier and customer up and running on their system, which means that employees can continue to focus their time on operations.

Nowadays, there are many companies that use 3PL providers to help them manage the VMI system. An example is P&G, today, they did not use their traditional EDI database to manage VMI anymore. Instead, they outsourced a tech company named Datalliance to help them manage VMI activities. For Vietnamese firms, there are now many 3PLs that provide VMI service such as ITL Corporation and CJ Gemadept Logistics. Another way is to outsource a technology company to provide the online platforms (E.g: Datalliance in the case of P&G).

6. Conclusion

Over the years, retailers, suppliers and manufacturers like Walmart and P&G have used VMI as a competitive technological tool to lower the cost of inventory management. In order to take advantage of this technology, the firm must analyze its strategic position and environment. Once the firm understands its strategic position, then it can determine if VMI is the right technology for maintaining or enhancing its competitive capabilities. VMI has a strong industry backing and research has demonstrated that it has the potential for significantly improving a company's bottomline and supply chain dynamics. By improving supply chain dynamics, VMI can foster better customer service to the end user, which is an essential ingredient in sustaining or gaining a competitive advantage. VMI is an operations project, but the positive ramifications of such a system can be seen throughout the entire company and its supply chain network. While there are initial investments and ongoing costs to consider in terms of time, implementation challenges and obstacles, the quantitative (inventory storage costs, inventory turnover ratio, lead time, etc.) and qualitative (customer satisfaction, service level, quality of service, flexibility, etc.) benefits of implementing VMI far outweigh the costs. This research, however, failed to highlight the advantages and disadvantages of VMI in recent years, as well as give recommendations for the implementation of VMI in different majors. Furthermore, Vietnamese businesses are also one of areas which have not been able to successfully implement VMI or turn this method into practical when hardly did the research team find any Vietnamese firms applying it. As a result, this contributed as a motivator for the authors to conduct our research.

For future successful implementation, an organization must view VMI as a business tool to improve competitiveness of the firm in the marketplace and develop a plan for its implementation and to overcome operational problems. A few key-takeaways are: enhancing the partner relationship, process redesigning & modification in operational management, outsourcing a third company for technology application, e.t.c. This paper provides a better understanding of VMI's superiority to traditional methods.

REFERENCES

Achabal, D. et al. (2000), "A decision support system for vendor managed inventory", *Journal of Retailing,* Vol. 76 No. 4, pp. 430-454.

Alexander, H. (n.d.), "How Walmart and P&G Can Enhance Supply Chain Management with CPFR Initiatives", *Academia*, Available at: https://www.academia.edu/10317486/How_Walmart_and_P_and_G_Can_Enhance_Supply_Chain_Management_with_CPFR_Initiatives (Accessed: March 6, 2023).

Angulo, A., Nachtmann, H. & Waller, M.A. (2004), "Supply chain information sharing in a vendor managed inventory partnership", *Journal of Business Logistics*, Vol. 25 No. 1, pp. 101-20.

Battini, D. et al. (2010), "Consignment stock inventory model in an integrated supply chain", *International Journal of Production Research,* Vol. 48 No. 2, pp. 477–500.

Beheshti, H.M., Clelland, I.J. & Harrington, K.V. (2020), "Competitive advantage with vendor managed inventory", *Journal of Promotion Management*, Vol. 26 No. 6, pp. 836–854.

Consumer Good Technology. (2015), "How P&G does vendor management inventory - A new era of global innovation Consumer Good Technology", Available at: https://consumergoods.com/secure-file/6297 (Accessed: March 1, 2023).

Disney, S.M. & Towill, D.R. (2003), "The effect of vendor managed inventory (VMI) dynamics on the bullwhip effect in supply chains", *International Journal of Production Economics,* Vol. 85 No. 2), pp. 199–215.

Disney, S.M. & Towill, D.R. (2003), "Vendor-managed inventory and Bullwhip Reduction in a two-level supply chain", *International Journal of Operations & Production Management*, Vol. 23 No. 6, pp. 625–651.

Global Data. (2023), "The Procter & Gamble Co Company Profile - Overview (2023)", Available at: https://www.globaldata.com/company-profile/the-procter-gamble-co/ (Accessed: February 27, 2023).

Global Data. (2023), "Walmart Inc Company Profile – Overview", Available at: https://www.globaldata.com/company-profile/walmart-inc/ (Accessed: February 27, 2023).

Henningsson, E. & Lindén, T. (2016), "Vendor managed inventory: Enlightening benefits and negative effects of VMI for IKEA and its suppliers", *DIVA*, Available at: http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1025271 (Accessed: March 9, 2023).

Hooshang, M. et al. (2020), "Competitive Advantage with Vendor Managed Inventory", *Journal of Promotion Management*, Vol. 26 No. 6, pp. 836-854.

Kamalapur, R., Lyth, D. & Houshyar, A. (2013), "Benefits of CPFR and VMI collaboration strategies: A simulation study", *Journal of Operations and Supply Chain Management*, Vol. 6 No. 2, pp. 59-73.

Kunsoo H. & Robert J. (2011), "Who should own "IT"? Ownership and incomplete contracts in interorganizational systems", *ResearchGate*, Available at: https://www.researchgate.net/publication/228604887_Who_should_own_IT_Ownership_and_incomplete_contracts_in_interorganizational_systems (Accessed: March 6, 2023).

Logistics4vn. (n.d.), "Vendor Managed Inventory Là Gì? Thế Mạnh Và Hạn Chế Của VMI", Available at: https://logistics4vn.com/vendor-managed-inventory-la-gi-manh-va-han-che-cua-vmi (Accessed: March 6, 2023).

Luu, M. (2017), "Walmart's vendor-managed inventory model", *The blog of Logistics at MGEPS at UPV*, Available at: https://logisticsmgepsupv.wordpress.com/2017/03/13/walmarts-vendor-managed-inventory-model/?fbclid=IwAR1vaalXyRyjZcLNxBRLf_JjqE2FemDd-A6KXyOhKPDpP5OdFoTlp7OPKlQ (Accessed: March 4, 2023).

Mishra, B.K. & Raghunathan, S. (2004), "Retailer- vs vendor-managed inventory and brand competition", *Management Science*, Vol. 50 No. 4, pp. 445-57.

Neogrid. (2021), "Advantages of Vendor Managed Inventory for Retailers", Available at: https://neogrid.com/en/blog/advantages-of-vendor-managed-inventory-for-retailers (Accessed: February 23, 2023).

Sari, K. (2007), "Exploring the benefits of vendor managed inventory", *International Journal of Physical Distribution & Logistics Management*, Vol. 37 No. 7, pp. 529–545.

Slack, G. (2006), "Managing Customer's Inventory. Paperboard Packaging", Vol. 91 No. 8, pp. 8–22.

Smartlog. (2020), "Kinh nghiệm quản lý chuỗi cung ứng của Walmart", Available at: https://gosmartlog.com/kinh-nghiem-quan-ly-chuoi-cung-ung-cua-walmart/#:~:text=S%E1%BB%B1%20h%E1%BB%A3p%20t%C3%A1c%20gi%E1%BB%AFa%20P%26G,th%C3%B4ng%20tin%2C%20marketing%2C%20logistics%E2%80%A6 (Accessed: March 6, 2023).

SME, S. (2018), "Six steps to a successful VMI system: SCM: Supply Chain Resource Cooperative (SCRC): North Carolina State University, Supply Chain Resource Cooperative",

Available at: https://scm.ncsu.edu/scm-articles/article/the-fiscal-cliffs-impact-on-global-supply-chains-2 (Accessed: March 8, 2023).

The Logistician. (2023), "Vendor Managed Inventory (VMI)", Available at: https://logistician.org/blog/vendor-managed-inventory-vmi.html?fbclid=IwAR0wyMbaHRfQq6gnv9vf5PGYgklx_Wz_3Se6MqavN_FW0lIO7642njj2i_c (Accessed: February 27, 2023).

Valuecreator. (n.d.), "Walmart develop level 5 relationship", *Valuecreator*, Available at: https://www.valuecreator.com/pg-walmart-developed-level-5-relationship/ (Accessed: March 6, 2023).