

Lean Supply Chain and Vendor Managed Inventory Systems Nexus in Supply Chain Management Organizations – A Review

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ABSTRACT

This paper serves as a framework to expand the cognitive horizons of professionals across various domains of supply chain operations. The premise is to remain informed about the existing best practices and methodologies that may facilitate the re-engineering or revitalization of distressed organizations. An objective of this investigation was to assess the influence of lean supply chain principles and Vendor Managed Inventory (VMI) in the attainment of quality, timely delivery, and locational efficiencies by manufacturing entities. The study employed a documentary research methodology to systematically analyze pertinent literary contributions and excerpts from secondary literature. Such examined resources comprise books and journals selected to reflect a balanced perspective of esteemed authors within the discipline of Supply Chain Management. The analysis determined that the implementation of lean supply chain methodologies and Vendor Managed Inventory (VMI) frameworks is highly advantageous, as lean principles prioritize quality assurance, cost efficiency, and waste minimization, while VMI focuses on intelligent operations, inventory reduction, real-time processes, and the establishment of sustainable vendor partnerships. In summary, the investigation highlighted that the integration of Lean Supply Chain practices along with VMI ensures a fluid movement of materials throughout the delineated processes until they reach the conclusion of their operational trajectory. Moreover, when executed effectively, the outcomes can be remarkable and exceedingly optimistic. Consequently, this study recommends the engagement of specially trained professionals to oversee these domains in order to fulfill established objectives.

KEY WORDS: *Lean Supply Chain, VMI, Supply Chain Management*

1.1 INTRODUCTION

Supply chain management as we know is a seamless system whose ultimate goal is to deploy the various materials related functions at their best to secure high level quality output at reduced costs. To achieve this feat especially with increasing levels of customer demands both vertically and horizontally, firms apply different techniques and initiatives which include speed, innovation, reward, quality and cost friendliness. Holweg (2007) and Negrão (2017) observed that Lean management has emerged as a focal point in the domain of operations management research (OM) over the past several decades. The superiority of lean as process improvement strategy led to its global reliance and acceptability by manufacturers across borders. Given the present business environment and the attendant rapid changes in the global market and technology, Lean supply Chain and VMI concepts have continued to gain fast and wide spread recognition quite of recent.

In consideration of the aforementioned premise, this study chooses to examine the roles of 'Lean Supply Chain' methodologies and Vendor Managed Inventory frameworks in fulfilling the aims of Supply Chain Management, which, as delineated by Joel, Keah-Choon, & Keong Leong (2008), have developed into significant operational doctrines that are pivotal to the prosperity of the organization. According to Dibenedetto (2007) 'Lean' clearly demonstrates a value chain that prioritizes customer satisfaction, waste elimination, cost reduction, quality assurance and customer service. In a similar context, Vendor Managed Inventory (VMI) prioritizes the transparency of all stakeholders in the pursuit of revealing hidden and reciprocal advantages accessible to both the purchasing entity, the supplier, and the consumer populace engaging within the framework of VMI. Vendor Managed Inventory philosophy specifically addresses such cases as holding safety stock of purchased materials, inconsistent supplier's delivery times, and sub-standard quality of purchased goods due to irregular specifications etc. Conversely, its role further cuts across the outbound side of the firm to address problems of keeping stock of finished goods in the warehouse for months prior to shipping, all manner of bureaucracy associated with releasing and dispatching goods to customers, all issues relating to routing and scheduling of loads to respective destinations etc. Such inbound and outbound inventory related costs may amount to wastes of millions of naira to the firm with no value addition to products.

The paper is an attempt to address the application of 'Lean Supply Chain' and VMI strategies that could assist industries unravel solutions to solving problems in materials and inventory areas at minimal costs. Ireland and Crum (2005) had long identified these concepts as

key in all supply chain collaborations particularly viewing today's increasing business demands and competitive threats.

1.2 PROBLEM STATEMENT

Many organizations have not adopted lean supply chain and VMI concepts in their supply chain management. None adoption of these two concepts has affected their supply chain management activities negatively. Also, contrary to solely relying on the existing conventional 'Agile' or 'Robust' management operational culture which emphasizes only the 'flexibility' principle, Lean Supply Chain and VMI strategies had helped to foster and improve the organization's general inventory system. The study is therefore, a throughput review of contributions made by some renowned authors in these areas in order to discover gaps for purposes of improvement. It is common knowledge, the age long practice by most firms who relied predominantly on the declared profits at the end of a financial year without recourse to fragmented unit inputs that made up the figures. In view of the foregoing and also, given years of research coupled with experience of Toyota Production System (TPS) and a paper publication "Triumph of the Lean Production System" (John, 1988), authorities in the Supply Chain Management were quick to discover that integrating the Lean Supply Chain experience into the organization's inventory resource strategy speaks volume in repositioning the income portfolio of the firms.

The problem of this study is therefore to critically review the need and otherwise for employing these strategies in our different industries and manufacturing firms.

1.3 OBJECTIVES OF THE STUDY

The main objective of this work is to investigate the place of lean and vendor managed inventory (VMI) in the supply chain management organizations.

Specific Objectives:

- i) To evaluate the impact of lean supply chain in achieving quality, time delivery and place economies by Manufacturing Organizations.
- ii) To evaluate the contributions of VMI in streamlining processes and lowering costs incurred through rush orders, ordering frequency and material replacements.

1.4 SCOPE OF THE STUDY

The phenomenon of "Lean and Vendor Managed Inventory" elucidates the existing disparities among organizations that exhibit minimal or nonexistent distinctions in Lean and Vendor Managed Inventory practices. Moreover, in conjunction with the comprehensive interpretation and scope of the 'Lean Management' phenomenon, this paper is explicitly confined to an exploration of its application within the organizational supply chain domains. In other terms, the research will limit itself to an examination of the challenges pertaining to organizations' inventory resource management, particularly in relation to their interactions with stakeholders in supply chain management within manufacturing enterprises. Consequently, the study will concentrate exclusively on manufacturing and distribution firms where the principles of Lean and Vendor Managed Inventory have been extensively implemented. To effectively underscore our discussion, we shall incorporate as many illustrative examples as feasible to reinforce our analysis.

2.0 LITERATURE REVIEW

2.1 Conceptual framework

The study's conceptual framework is structured to define and discuss the evolutionary trends of the conceptual variables which include: Lean Supply Chain, Vendor Managed Inventory and Supply Chain Management, ascertain the relationships and links existent amongst the variables and isolate the relevance and need of the study in answer to the set study objectives.

2.1.1 Lean supply Chain: Definition and Evolution

Lean supply chain thinking is a philosophy of any management desirous of streamlining the flow of production and seeking to reduce costs through the strategy of identifying and eliminating wastes and bureaucratic bottlenecks to ensure giving the customer the best of services (Womack & Jones, 2003) In other words, satisfying customers order at the right time, quantity and specifications. (Frazzon, Francescki, Melo, Silva, & Reichert, 2017) Womack, Jones and Roose (1990) further defined described lean, as a fusion of mass and craft production consisting of set of principles and best practices aiming at continuous improvement.

Shah and Ward (2003) alluded to the foregoing definitions asserting that Lean supply chain to the manufacturing firms aims at providing an integrated system consisting

of inter-related elements and management practices that assured value delivery to customers.

On lean and its evolution, Ghosh, 2012; Chaplin, Heap, & O'Rourke (2016) posits that Lean supply chain originated from Japan in the 60's and had since received worldwide adoption and resulting to a shift in the global manufacturing landscape and emerging economies speedily gaining ascent. Lean manufacturing, as a conceptual framework for management, primarily originated from the principles embodied in the Toyota Production System (TPS). The designation "Lean Supply Chain" was initially articulated in the scholarly article "Triumph of the Lean Production System," authored by John Krafcik in the year 1988. This article was fundamentally grounded in his Master's thesis conducted at the MIT Sloan School of Management.

Before his studies, Krafcik had worked as a quality engineer in the Toyota-GM NUMMI. 'Lean' then became popular as a result of the publication of the book 'The Machine That Changed the World'. This was the result of his five - year International Motor Vehicle Program (IMVP) study which revealed the performance gap between Japan and Western automotive sector. There has also been a remarkably increased academic interest in the field of lean in the past few decades (Negrao, Godinho-Filho & Marodin, 2017).

2.1.2 Vendor Managed Inventory

Hines, Jones, Cousins, and Rich (2000) characterized Vendor Inventory Management (VIM) as a synergistic strategy established between a client and a supplier, with the primary objective of enhancing product availability while minimizing costs for both entities. The supplier assumes accountability for the operational oversight of the inventory within a collaboratively established framework of performance metrics, which are routinely assessed and refined to foster a culture of continuous enhancement. Edom & Madu (2018) articulated that the VMI model functions as a mechanism that relies on tactical intelligence provided by the purchaser to the vendor, who consequently employs this information to sustain and regulate an

agreed-upon inventory level of materials for the organization. This management may be conducted directly or through the engagement of a third party. Kaipia, Holmström, and Tanskanen (2002) asserted that VMI is designed to diminish the uncertainty associated with customer demand, lower inventory levels, reduce occurrences of stock shortages, enhance flexibility in production planning and distribution, and elevate the quality of customer service.

Vendor Managed Inventory (VMI) was initially popularized within the retail sector by prominent corporate entities such as Wal-Mart and Procter & Gamble during the late 1980s. A multitude of organizations, including Whitbread Beer Company, Barilla, Johnson & Johnson, Kodak Canada Inc., and Campbell Soup, have likewise documented successful executions of VMI initiatives (Kauremaa, J. Småros, and Holmström, 2009; Vigtil, 2007). At present, VMI is being employed across a variety of sectors, including automotive, machinery services, chemicals, packaging, as well as the wood and furniture industries; however, a broad spectrum of industries encompassing an extensive range of products, accessories, and raw materials has also embraced the VMI strategy (Ståhl Elvander M, Sarpola, S., and Mattsson, S. A., 2007).

2.1.3 Supply Chain Management

The American Production and Inventory Control Society (APICS, 1990) define the supply chain as the processes which flows from the initial raw materials supply through conversion to finished product until consumption is accomplished. American Production and Inventory Control Society (APICS, 1990) define the supply chain as the processes from the initial raw materials the final consumption of the finished products.

Supply chain constitutes all functions within and outside an industry, which enable the value chain to make products and provide services to customers (Inman, 1992). Some researchers suggested a clearer SCM definition by adding the information system necessary to monitor all of the activities (Lee, 2002; Morgan, 1995; Talluri, 2002).

According to The State of Cloud Computing (2020) Supply chain underwent stages of evolution as follows:

Stage 1 – The early 1980s: This is known as the consolidation stage featuring an era of focus on products, quality and the key performance metrics such as inventory turns and production cost.

Stage 2 – Late 1980s: This is era of Integration and gets towards production capacity expansion and throughput.

Stage 3 – The early 1990s: This is an era of Market Value when Organizations in this started to focus more on market-driven results. Here the problem was no longer making more products but about delivering them to the markets

Stage 4 – The late 1990's: An era of Brand Values during which firms realized that customers were the game changers for revenue generation and thus shifted business strategies and made 'lead time' the key factor in their goals. With this, the key performance metrics changed from market share and order fill rate to customer satisfaction, value-added, and response time.

Stage 5 – The twenty-first century: This is the era of automation and globalization. An era more driven by knowledge and that is why having more information is preferred to be ideal for a company's supply chain management. The key performance metrics for the 5th stage of supply chain management is real-time communication and business intelligence. Over the years, with a growth in each segment of the supply chain, employment has also increased more people in the circle and communicating every little detail to one another.

2.2 Links and Contributions of Lean Supply Chain and VMI

The new normal in managing current supply chain to effectively sustain its "life spring" position especially in the manufacturing firms is through full integration. Integration has enabled all level and components in supply chain to react to market change via a number of ways such as on time delivery, auto material replenishment program, electronics resource planning program and etc. The bottom line remains, organization's ability to serve customer with speed, focus and integrity. These attracts necessary feedbacks such as customer loyalty, Goodwill other related return

information that buyer organization require from time to time. To achieve this feat therefore, company's tilt towards deploying Lean, VMI supply chain strategies and processes to carry out its inventory related services. These variables and or concepts interface in their roles to put the organization on wheels of faster results.

According to Guimarães and Rodriguez, (2018) unlike, the traditional Supply Chain Management practice which harbours excessive stock with notable flaws and inefficiencies, the lean culture exist to maximize flow value potentials to seamlessly achieve waste reduction and avoidable losses in the organization's operational framework Hosh, (2012), Chaplin, Heap, & O'Rourke (2016) emphasized the need for lean and VMI applications in increasing organizational consciousness to remain competitively focused in satisfying customer's needs and optimizing operations. Lean eliminates warehousing, stocking of materials and finished goods thus, exhibiting an improved feature of the JIT system as it as well seeks to eliminate wastes and other non-valuable activities (Edom & Madu, 2019). Lean Supply Chain according to Ghosh (2012) was developed with the aim of minimizing company waste and maximizing the value of the product or service to the customer without compromising quality, VMI on the other side relies on partner information exchange to successfully execute a planned event (Lee, 2000)

The review conjectured that the contributions of these variables are central to the success of any supply chain driven manufacturing firm hence, Vendor Managed Inventory (VMI) programs are one of the most powerful tools in setting up formidable lean organizations hence it's programs leverage on the strength of lean to eliminate wastes, reduce costs and maintain quality standards. (Patti, 2006)). To this end, we can establish that for VMI programs to overcome its major challenge to achieve beyond the narrow focus of internal cost reduction, it must function and operate within an existing lean driven organization or environment. The foregoing clearly demonstrates the thesis of this study and glimpse that Lean Supply Chain is a function of VMI

2.3 Lean Supply Chain Stakeholders, Principles and Benefits

2.3.1 Lean Stakeholders:

Womack and Jones (1996) assert that the framework of lean management encompasses three principal stakeholders, namely the Employee, the Organization, and the Customer. According to their analysis, these distinct categories of individuals engage in varying degrees of activities to optimize the efficiency of an organization, thereby rendering it as lean as feasible.

i. **Employees:** Employees constitute the foundational agents within an organization. The aggregate of their endeavors and trust establishes the degree of authority an organization wields within the commercial landscape. Consequently, management is tasked with the provision of motivational frameworks and incentives that are capable of instilling within employees the requisite attitudes to perform at their utmost capacity. Such motivational frameworks and incentives encompass: the establishment of a supportive work environment, competitive remuneration, opportunities for professional development, specialized performance-based reward systems, avenues for administrative engagement, and mechanisms for the expression of opinions and ideas, among others. The implementation of these strategies would significantly mitigate various forms of lethargy, informal communication, insubordination, undue inquisitiveness, subversive behaviors, work-to-rule actions/strikes, and corrupt practices, among others. The more organizations effectively eradicate these and other disruptive behaviors, the closer they align with the ideal of operational excellence, which is the paramount principle of 'Lean' and the ultimate aspiration of every organization.

ii. **The Organization (Management):** Organization in this context imply top management like, Governing Board, Managing Director/CEO, Stakeholders and all those involved in making corporate and operational policies of the organization. It also includes policies, programs, manuals and procedures adopted for guidance during certain decision making sessions. A wellstructured Management will surely end up achieving customer satisfaction at all times. **iii.. Customers:** The delight of customers is paramount to all customer oriented organizations. To bring lean thinking to bear at the outbound aspect of the organization, every effort is geared towards customer satisfaction. However, customers owe it as duty to provide organizations with necessary feedbacks to give room for continuous improvement as no system can

be adjudged 100% perfect. The promptness in attending to issues raised by customers explains the level of lean sensitiveness in the organization. Such customer care services would not only attract customer loyalty but as well serve as tool to win more customers and increase consumerism. Lean management is a philosophy which intends to continuously eliminate waste in all the processes, through small and incremental improvement. It improves quality and reduces defects, as well as enhances the overall manufacturing flexibility. (Liker, 2004)

2.3.2 Lean Supply Chain Principles

The subsequent principles and advantages have been delineated for the effective execution of Lean Supply Chain manufacturing. Lean, as previously underscored, originated from manufacturing methodologies; however, it has significantly revolutionized the manufacturing sector in contemporary times. It promotes the ethos of continuous enhancement grounded in the fundamental tenet of respect for individuals. Womack and Jones (1996) articulated the five principles of Lean manufacturing in their seminal work, “The Machine That Changed the World.” These principles are regarded as a framework for augmenting workplace efficiency and encompass:

i. Value identity: The first principle of lean is to define what value represents to a customer. Value, like ‘utility derived’ is the level of satisfaction a customer declares of a product or service. It is paramount to discover the actual or latent needs of the customer. It is not uncommon for consumers to remain uncertain regarding their desires or to lack the ability to express them coherently. This phenomenon is particularly prevalent in the context of innovative products or advanced technologies. A variety of methodologies, including interviews, surveys, demographic data analysis, and web analytics, exist that can assist in elucidating and uncovering the aspects that consumers deem valuable.

ii. Value stream: Once the value (end goal) has been determined, the next step is mapping the “value stream,” This is by way of checking through the processes and activities that occurred all through a product’s raw material’s stage to delivery of final product to the customer. Valuestream mapping is a simple but eye-opening experience

that identifies all the actions that happened in a given process. That process can be in design, method of production, acquisition modalities of the raw materials, human elements and influences, administrative system, delivery system etc. In this context, all activities that enhance value are emphasized, whereas those that do not contribute to value are deemed as waste. The categorization of waste is divided into two distinct classes: necessary and unnecessary. Efforts are made to mitigate the necessary waste, while the unnecessary category is completely eliminated. By minimizing and eradicating superfluous processes or steps, one can ensure that customers receive precisely what they desire, concurrently lowering the costs associated with the production of that product or service **iii. Flow creation:** Upon the elimination of waste from the value stream, the subsequent imperative is to ascertain that the progression of the residual steps transpires seamlessly, devoid of interruptions or delays. "Facilitate the occurrence of value-creating steps in a closely coordinated sequence to ensure that the product or service transitions smoothly toward the customer. The realization of this objective may necessitate the disaggregation of steps, the reconfiguration of production processes, the balancing of workloads, the establishment of cross-functional departments, and the training of employees to be versatile and adaptive (Lean Enterprise Institute, 2000)

iv. Establish Pull: Inventory is regarded as one of the most significant inefficiencies in any manufacturing system. The objective of a pull-based system is to minimize both inventory and work in process (WIP) items while guaranteeing that the necessary materials and information are accessible to facilitate an uninterrupted workflow. In other terms, a pull-based system enables Just-in-time delivery and production wherein goods are fabricated precisely at the moment they are required and in the exact quantities necessary. Pull-based systems are invariably established based on the requirements of the end consumers. By tracing the value stream and progressing in reverse through the production system, one can ascertain that the manufactured products will adequately meet the demands of the customers and

v. Perfection: Accomplishing Steps 1-4 constitutes a significant foundation; however, the fifth step may be regarded as the most crucial: integrating lean thinking and process enhancement into the fabric of your organizational culture. As benefits

continue to accumulate, it is essential to acknowledge that lean is not a fixed paradigm and necessitates ongoing diligence and commitment for refinement. Every member of the workforce ought to engage in the implementation of lean methodologies. Lean specialists frequently assert that a process cannot be deemed genuinely lean until it has undergone value stream mapping a minimum of six times.

2.3.3 Benefits of Lean Supply Chain

Marodin, and Saurin (2013) posit that benefits of Lean Supply Chain Management are massive with supply chain complexity increasing in recent years it is more important than ever to have a concrete supply chain strategy. According to Panizzolo, Garengo, Sharma and Gore (2012) Lean Supply Chain Management provides your business with a competitive advantage over a normal supply chain and a framework that can be applied across your business.

i. Inventory Costs: Lean supply chain management has the potential to facilitate a reduction in the volumes of raw materials, work in progress, and finished goods. The financial implications of inventory can accumulate rapidly, resulting in minimal profit margins or inflated expenditures. The implementation of Lean supply chain management methodologies concerning your inventory will provide insights into the concealed costs associated with maintaining an excess of inventory that exceeds your requirements. **ii. Waste Elimination:** The initiation of the Lean supply chain development process necessitates the execution of value stream mapping, which will reveal all forms of waste that can be eradicated from your supply chain. The eradication of such waste permits a concentration on the most crucial aspect, which is the customer.

iii. Increased Productivity & Flexibility: The systematic eradication of inefficiencies inherently results in an augmentation of both productivity and adaptability within your organization. Providing your enterprise with the requisite agility to respond to market fluctuations is essential for maintaining a competitive edge. Furthermore, this approach fosters a workforce that is not only productive but also engaged and motivated, thereby enabling timely and complete delivery to your clientele.

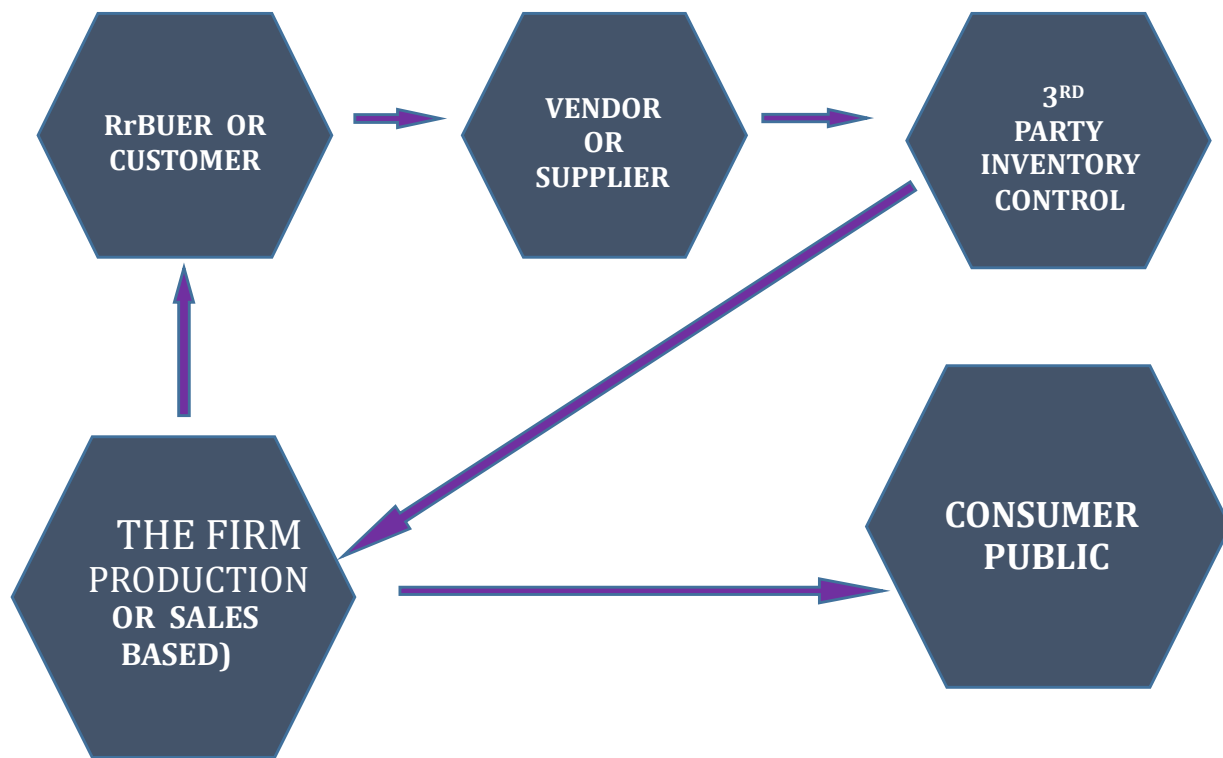
iv. Quality Improvements: The implementation of lean supply chain management will not solely enhance your productivity and flexibility; it will also facilitate a reduction in customer errors by allowing a concentrated emphasis on quality enhancements for the end user. Enhancements in the quality of your manufacturing processes translate to fewer errors in your upstream operations, consequently leading to a decrease in delays.

v. Employee Morale: An additional significant advantage of the implementation of Lean methodologies within the supply chain is the enhancement of employee morale. Granting employees increased responsibility along with cultivating a relationship founded on mutual trust will result in an improved organizational culture. This culture will promote and encourage a work environment focused on the pursuit of continuous improvement. (Lean Enterprise Institute LEI, 2000).

2.4 VMI STAKEHOLDERS, PRINCIPLES AND BENEFITS

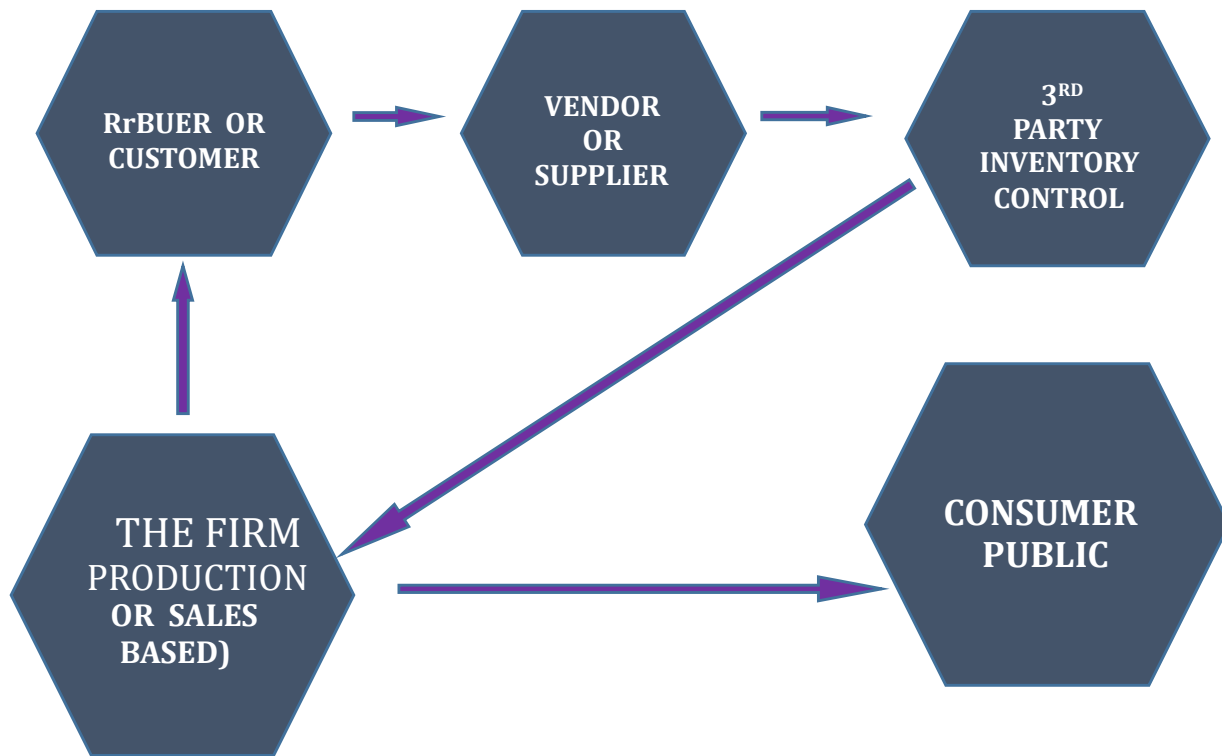
2.4.1 VMI Stakeholders

As discussed under 'lean', stake holders of VMI include: The buyer who invariably is an offshoot of the organization within the manufacturing industry, Vendor or Supplier and a 'third party' who represents and regulates inventory on behalf of a chosen vendor to the organization. However, the other level of stakeholder is the consumer who is the main beneficiary of every VMI effort. All these can be represented diagrammatically as follows:



BENEFITS OUTFLOW

Figure 1: VMI Activity Flow Diagram



2.4.2 Principles of VMI

Mejza, Laosirihongthong, and Prajogo (2013) alluded to the earlier definition of VMI as a collaborative strategy between a customer and supplier to optimize the availability of products at a minimal cost. This definition can yield the desired impact only when the following operational steps and principles are religiously adhered to;

1. Clarify Expectations. The first assignment in operating a VMI program is to engage in an elaborate discussion regarding how the initiative will be of benefit to both parties and organizations in the long term since ordinarily the supplier is often at the loose end considering disappointment with some of the short-term results. Therefore, at this juncture, both parties should agree on terms and conditions mainly associated to the target objectives of VMI aligning each other with the pros and cons

of the program. If these items are not addressed the program will likely be terminated quickly with neither side gaining any of the benefits expected from the program. This way and with both parties working in conjunction they can be assured that the planning function, for both sides, will begin to smooth over time.

2. Information sharing specifics. The supplier and customer (Buyer) now goes into agreement to share information bothering on restocking in a timely manner and how to reduce the odds of a synchronized system. The arrangement must streamline key areas of interest avoiding any form of espionage or divulging of proprietary information. The customer should be willing to share production schedules and/or forecasts to provide some visibility for the supplier.

3. Maintenance of some level of flexibility in communication: When the two parties set out to implement a VMI program, they need to meet and discuss their goals and how they need to proceed in order to realize those goals. Once a VMI program has been activated, each side needs to understand that there are going to be some miscues. These miscues need to be studied as opportunities for learning and then used to avoid repetitive problems in the future.

2.4.3 Benefits of VMI

Kaipia and Tanskanen (2003) stated that when VMI is implemented, the supplier has a better vision of the buyer's demand. It results in more accurate sales forecasting methods and more effective distribution of inventory in the supply chain (Achabal et al. 2000). Production, logistics and transportation costs can be reduced due to coordinated production and replenishment plans for all buyers (Tang 2006). Thanks for a better visibility, the supplier is able to smooth the peaks and the valleys in the flow of goods (Kaipia and Tanskanen 2003).

Yao and Dresner (2007) inferred that information sharing reduces the supplier safety stock, thereby reducing the average inventory level. Furthermore, implementing VMI leads the supplier to higher replenishment frequency with smaller replenishment quantity (Yao et al. 2007, Dong et al. 2007) and greater inventory cost saving (Cetinkaya and Lee 2000). The supplier obtains a new degree of freedom,

making decisions on quantity and timing of replenishment (Rusdiansyah and Tsao 2005). The delivery frequency appears like a performance lever for the Supplier hence, effects of transportation disruption impact are less severe when VMI is used (Wilson, 2007).

2.5 THEORETICAL FRAMEWORK

The study is underpinned to the theory of Collaborative Supply Chain Management. Gomes and Kleimann (2015) asserted that this idea emerged in the 1990s as a transformed Just in Time (JIT) kanban system, the Quick Response (QR) or better still the Electronic Data Exchange (EDI) techniques. A collaborative supply chain comprises two or more companies working together to plan and execute supply chain activities to achieve greater success than when functioning separately (Fawcett et al., 2008).

Current trends underscore the need for organizations to think out of the box and seek external opportunities to collaborate with in order that their supply chains are operating seamlessly with results and responsiveness to market demands (Cao & Zhang, 2011). Firms have begun to see closer relationships and information sharing as better tools to and hasten decision making processes and as well reduce demand uncertainties thereby keeping the system green and healthy (Whipple & Russell, 2007). Therefore, given these considerations and more, the study is quite apt at a time the world is seen as a global village due to the fast transformation being witnessed in the fields of technology and information systems.

3. METHODOLOGY

This investigation employed a rigorous systematic literature review to establish a theoretical framework that aligns with its research aims. In essence, it embraced a documentary research method typology that meticulously scrutinized pertinent literary perspectives and excerpts from secondary sources. The materials analyzed encompassed books, scholarly journals, and periodicals selected to provide a balanced representation of esteemed scholars in the domain of Supply Chain

Management. Payne & Payne (2004) characterized the documentary method as a systematic approach utilized to classify, examine, interpret, and discern the constraints of tangible sources, predominantly conventional written documents within both private and public spheres. Furthermore, this review ensures the replicability of the study by meticulously documenting its search methodology, thereby enhancing the reliability of the process (Vom Brocke et al., 2009). This investigation adhered to the five steps for conducting a review as delineated by Denyer & Tranfield (2009).

4. DISCUSSION OF FINDINGS:

This paper specifically discusses Lean Supply Chain and Vendor Managed Inventory concepts within the confines of Supply Chain manufacturing domains. Most companies are today engaged in the search for solutions to overcome challenges posed by all forms of competitive and global market forces. This they do to grow and as well sustain the tempo in the dynamic market scenario. Lean management and Vendor Managed Inventory philosophies emerged as very rich strategies in today's Operations Management paradigm at the behest of organizations to meet dual objectives of improving quality, flexibility and delivery while at the same time focusing on cost reduction (Krafcik, 1988; Slack, Lewis & Bates, 2004)

Observation regarding diffusion of lean globally reveals that 'lean' has been adopted by both developed and emerging economies with noteworthy tilt towards its adoption in Asian countries in the recent past whereas initially it was confined to developed countries. There is also an opportunity for emerging economies to significantly impact their pace of development by exploring new avenues such as integration of sustainability practices along with lean, pursuing lean in combination with other improvement methodologies such as Six Sigma, and Agile strategies.

VMI and Lean Supply Chain has been around in various forms for many years as veritable tools of operating and administering the inventory policies of the organization for optimal advantages through reducing management and inventory holding costs. Therefore, organizations desirous of controlling their excesses buy into

these strategies successfully. For instance, a lot can be saved where firms lack warehousing space or shelves for storage purposes but engaged in production of goods and services. The focus of any innovative program must include environmental benefits. Therefore, engaging these variables as in collaborative SCM leverages the traditional reductionist practices and positively reposition company's operations and results. Integration of sustainability issues with lean management and VMI holds promise as both strategies takes minor resources but give more than proportionate opportunities and benefits to firms that patronizes it.

5. CONCLUSION

The assessment ultimately posits that the implementation of Lean Supply Chain methodologies and Vendor Managed Inventory (VMI) ensures an uninterrupted flow of materials throughout the established process until it reaches the conclusion of its trajectory. These occurrences, when executed with precision, possess the potential to instigate a significant transformation within any manufacturing framework. Nevertheless, it is imperative to note that Lean Supply Chain principles and VMI are not solely the domain of enterprises engaged exclusively in product fabrication; they can also be effectively employed within organizations to optimize their operational workflows through the eradication of waste and non-value-added activities.

When a company implements an integrated inventories management systems such as the LSC and VMI, the firm's efficiency is assured. Correspondingly, there is bound to result an increasing level of performance that translates in high turnover, growth, responsive management and ultimately profitability. (Oballah, 2015, Anichebe, Agu, 2013 & Ogbo, 2014) However in all, it is expected that extensive information sharing is required such that the vendor or supplier maintains a high degree of visibility of its goods at the customer's location.

Instead of the customer reordering when its supply has been exhausted.

In a full VMI partnership, the supplier, usually the manufacturer or a distributor, makes the main inventory replenishment decisions for the consuming organization. This means that the vendor monitors the buyer's inventory levels (physically or otherwise) and makes periodic re-supply decisions regarding order

quantity, shipping, and timing. Normally, in the case of VMI, the supplier is responsible for maintaining a continuous stock level within the predefined limits. The inventory control limits were calculated based on the expected demand over respective replenishment lead times. The inventory control limits can be used to avoid extreme inventory. Visibility of demand, inventory control limits, and inventory location are three components of VMI elements. Sharing information and application of inventory control limits are crucial for VMI performance especially in terms of inventory availability. While proximity of inventory storage location is required for reducing cost associated to inventory management. As every product will experience different stage of product life cycle.

This review highlights the invaluable contribution of VMI hence, the goal of Vendor Managed Inventory is to provide a mutually beneficial relationship where both sides will be able to more smoothly and accurately control the availability and flow of goods. In VMI, the Supplier becomes the inventory planner for the customer or manufacturer.

6. RECOMMENDATIONS

In the light of the above review and the numerous testimonies highlighted, the following recommendations were adduced;

- i.** Lean and VMI be introduced in manufacturing and distribution industries to enhance the performance of their supply chain management operations.
- ii.** Lean thinking be extended to all management functions to help reduce wastes in terms of idle times, documentations and operational man hours processing.
- iii.** Vendor Managed Inventory policy be generalized to pave way to information dissemination and application of inventory control limits especially in terms of inventory availability. While proximity of inventory storage location is required to reduce costs associated with inventory management.
- iv.** This study noted that there can be no improvement in areas involving supply chain without deploying the tenets of Lean holistically. Thus, issues as

material standardization, waste reduction in consignment, stakeholder collaboration to seamless material and information are issues for continued research

- v. This research advocate that world-class companies revisit these trends on a regular basis to stay abreast in today's dynamic and rapidly changing environment and as well be open to consider new challenges.

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