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Deterministic Parameters for the Success of Vendor-Managed Inventory in Sri Lanka

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1. Introduction

Inventory is considered as one of the most important assets in any company, having a significant impact on the cash flow and the profit of the company. An increase of inventory indicates that the company has purchased more than required and reduces the financial performance. Better inventory management strategies help a company to plan operations and budgeting effectively and efficiently. Hence inventory management has become a core concern of any business. Inventory management can be defined as a process of ensuring the availability of enough products in stock while minimising the costs. Many inventory control techniques fail to keep balance between cost and product availability/service level. Therefore, companies tend to keep extra stock to mitigate supply chain risks occurred due to stock-outs. [1].

Vendor-Managed Inventory is one of the most widely-implemented partnering initiatives for improving inventory performance in supply chain operations. It involves a strategic relationship between a supplier and a buyer through better collaboration. Basically, the vendor manages inventory on behalf of the buyer, while the buyer shares information and operational plans with the vendor allowing them to replenish the inventories while optimising stock levels at the buyer's consumption locations. A VMI strategy, which is a symbiotic relationship, allows the supplier to schedule their operations more productively because it enables monitoring inventory levels at the customer's location on a regular basis. Customers will eliminate major stock-outs as the supplier has the ability to replenish inventory without interrupting customer's operations [2].

In addition to avoid stock-outs, implementing VMI results in benefits such as reducing inventory costs for both buyer and supplier, improves customer service levels, reduces order cycle time and improves order fill rates. However, there are certain requirements for the success of VMI [3]. VMI implementation fails mainly due to lack of trust and collaboration between supplier and customer. Complicated logistics flows and complex distribution channels also contribute to failure of VMI [1]. In fact, many organisations in the world were able to achieve significant

improvements with implementing VMI [4]. For example, world retail giants such as Wal-Mart improve their inventory performance by implementing VMI successfully. Research shows that there are many factors which determine effective VMI implementation. These include four key enablers, namely: quality of ICT systems, quality of information, intensity of information sharing, and relationship quality and considered them as the most important factors for VMI success [5].

2. Research Methodology

Primary data was collected through a survey questionnaire. The survey questionnaire was sent online to over 70 industry professionals including managers, directors, and executives in industries including the apparel, dairy, manufacturing and FMCG (Fast Moving Consumer Goods) sectors, where we collected responses from 46 respondents with a 66% response rate. Additionally, several site visits were carried out to observe operations to get an overall understanding regarding current practices in the industry.

3. Data Analysis

3.1. Descriptive Analysis

Analysis shows that factors such as long-term relationship, compatibility of the suppliers, IT infrastructure and the historical delivery performance of the supplier are considered as major factors in choosing potential suppliers to implement VMI. The buyers are mostly willing to share information such as demand forecasts, items in stock, suggested shipping orders and actual consumption with the vendor. Results shows that currently information transferring methods such as MRP systems, automatically generated emails, one or two-way web based communication systems and conventional manual e-mails are widely used in the Sri Lankan context. Analysis shows that around 64% of the companies still use manual methods, 56.5% use barcodes and 52.2% of respondents use physical Kanban signals (cards) to track stock level and stock consumption.

3.2. Factor Analysis

The analysis describes how variables are categorised into several factor themes. According to the analysis the factors that affect VMI were identified as follows:

- **Benefits**: Reduce Inventory Cost, Reduce Transport Cost, Reduce Logistic Cost, Improve Inventory Performance, Improve Supplier Performance, Improve Customer Service and Reduce Administration Cost
- **Barriers**: Financial Costs, Poor return on Investment, Lack of top management commitment, Access to better Human resources, Supply chain Configuration, Firm Size, Lack of Innovation, Government Policies,

Employee Attitude, Lack of Supply Chain Collaboration and Integration, Poor Infrastructure, Access to New Technology and Lack of Expertise

- **Success Factors**: Supply Chain Visibility, Supply Chain Integration, Supply Chain Collaboration, Trust, Information Sharing, Information Technology, Performance of Supplier, Supplier Location, Scale of the Company
- **Impact on performance:** Reduce Inventory Cost, Reduce Warehouse Cost, Reduce Transport Cost, Reduce Total Logistics Cost, Improve Inventory Performance, Improve Supplier Performance, Improve Customer Service, Improve Buyer-Supplier Relationship

Factor analysis was carried out to identify the most important benefits of VMI, barriers for VMI, influence for VMI and finally the impact of VMI. The initial step of factor analysis is the general 'dimension reduction' method. Until a better relationship and accepted values come in to the result, the analysis has been repeatedly done by eliminating unnecessary and least correlated barriers.

3.2.1. Benefits of Implementing VMI

The Kaiser-Meyer-Olkin (KMO) value is 0.474 and since the value is close to 0.5, the research assumes that sample is adequate and proceeds with factor analysis. Analysis indicates that87.91% of variance can be explained with two components: identified as inventory performance and supplier performance as shown in Table 1.

Table 5: Rotated Component Matrix

	Component	
	1: Inventory Performance	**2: Supplier Performance**
Q4.1: Reduce Inventory Cost	.932	
Q4.4: Improve Inventory Performance	.766	.482
Q4.5: Improve Supplier Performance		.967

3.2.2. Barriers & Challengers for implementing VMI

The KMO value is 0.674 and it shows the suitability to proceed with a successful factor analysis for the researched sample. Two components have been used to explain 89.08% of variance and it can be concluded that the variance of the sample is categorised into two major components. As shown in Table 2, two major themes which include Leadership & Human Resources and Supply Chain Structure can be identified.

Table 6: Rotated Component Matrix[a]

	Component	
	1: Leadership and Human Resources	**2: Supply Chain Structure**
Q5.3: Lack of top management commitment	.867	
Q5.5: Access to better Human resources	.891	
Q5.6: Supply chain Configuration		.974

3.2.3. Key Success Factor of VMI

The KMO value is 0.778 and indicates adequacy to proceed with factor analysis. The two components can be used to explain 79% of the variance. As per the rotated component matrix, they can be labelled as supply chain integration and location and scale of company (See Table 3).

Table 7: Rotated Component Matrix

	Component	
	1: Supply Chain Integration	**2: Location and Scale**
Q7.1: Supply Chain Visibility	.818	
Q7.4: Trust	.893	
Q7.5: Information Sharing	.857	
Q7.6: Information Technology	.891	
Q7.8: Supplier Location		.937
Q7.9: Scale of the Company		.928

3.2.4. Analysis of Impact of Performance

The KMO value is 0.766, hence it indicates the suitability to use the factor analysis to analyse data. Two components have been identified and can be explained from 82.136% of variance. Those two categories can be used to categorise factors in to two major themes as explained below.

Table 8: Rotated Component Matrix[a]

	Component	
	1: Inventory and Warehouse Cost	**2: Transport & Logistics Cost**
Q8.1: Reduce Inventory Cost	.931	
Q8.2: Reduce Warehouse Cost	.913	
Q8.3: Reduce Transport Cost		.887
Q8.4: Reduce Total Logistics Cost		.841

4. Conclusion

This prevailing scientific research was reviewed in order to explore the process of VMI implementation and the key factors that lead to benefits for the both supplier and customer. This study shows that the implementation of VMI mainly depends on the commitment of leadership and the availability of knowledgeable human resources as well as the supply chain structure. It shows that for the VMI to be successful, better supply chain integration which increases supply chain visibility, trust between partners, information sharing and better information technology is required. Information sharing is important for VMI and according to the findings, a majority of the customers share demand forecasts, items in stock and suggested shipping orders with the vendor. The frequency of transferring information is real-time and continuous. When considering technology automatically generated emails, manually-sent emails, ERP systems and web based communication systems are widely used to share information. Furthermore, many companies widely use tracking systems which are manual while few companies use physical Kanban system and Barcode systems; RFID and e-Kanban systems. The following table demonstrates the summary of Factor analysis:

1. Barriers, Challenges	Lack of top management commitment Supply chain configuration
	Firm size
2. Importance to success the VMI	Supply Chain Visibility Trust between Partners Information Sharing Information Technology
	Supplier Location Scale of the Company
3. Impact on Performance	Reduce Inventory Cost Reduce Warehouse Cost
	Reduce Transport Cost Reduce Logistics Cost
4. Benefits	Reduce Inventory Cost Enhance Inventory Performance
	Improve Supplier performance

5. References

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