The impact of VMI on performance in manufacturing company

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Abstract
The purpose of this paper is to shed the light on the impact of VMI element that lead to high performance of VMI in Malaysia manufacturing company. The VMI elements consist of inventory location, inventory ownership, demand visibility, replenishment decisions, and inventory control limits. Questionnaire was the main instrument for the study and it was gathered from 101 staff in departments of purchasing, planning, logistics and operation. Data analysis was conducted by employing descriptive analysis (mean and standard deviation), reliability analysis, Pearson correlation analysis and multiple regressions. The findings show that there are relationships exist between inventory location, level of demand visibility, inventory control limits and service performance of VMI, but not for inventory ownership and replenishment decisions. Meanwhile, for cost performance of VMI, only inventory location had significant relationship. Visibility of demand is the main predictor of service performance, followed by inventory control limits. However, only inventory location contributes to cost performance of VMI. It is recommended that future study to determine additional VMI element that are pertinent to firms' current VMI practices. Logic suggests that further study to include more integration issues, other nature of businesses and research instruments.

Key words: Vendor Managed Inventory, VMI elements, VMI performance.

1.0 INTRODUCTION

In VMI programs, the suppliers or vendors (mostly manufacturers) generate orders of the customers (mostly distributors or retailers) based on-demand data provides by customers (Irungu&Wanjau, 2011). The demand data that provided by customer to supplier will assist the supplier to make better forecast and used to react the changing in customers' demand in terms of quantities and locations to replenish. The actual demand in the marketplace can be met as a result from accurate replenishment decisions made by the supplier.

VMI was first popularized by Wall-Mart and Procter Gamble in the late 1980s in the retail industry. Successful VMI initiatives also have been trumpeted by many companies such as Whitbread Beer Company, Barilla, Johnson & Johnson, Kodak Canada Inc. and Campbell Soup. Presently, VMI not only belongs to particular industry, but variety of industry, which comprises a range of products; accessories, and raw materials also had been practicing VMI (Elvander et. al, 2007). For instance, several case studies proved that VMI also was implemented by automotive, machinery services, chemicals, packaging, and wood and furniture industries (Kauremma et. al, 2009, Vigtil, 2007).

The benefits of the VMI have been clear since the adoption of the approach in the first implementation cases. Some of the advantages of VMI implementation, generally mentioned in literature was the reduction in customer demand uncertainty, reduction of inventory level, reduction of stock out number and frequency, more flexibility in production planning and distribution, and improvement of customer services (Irungu&Wanjau, 2011; Claasen et. al, 2008, Smaros et. al, 2003). According to Sui (2010), VMI can bring benefits to both customers, and

supplier includes increase services level, inventory reduction, reduction of planning and ordering costs, ease in coordination supply process, and reduced transporters.

2.0 STATEMENT OF THE PROBLEM

Although many studies indicated that VMI programs significantly improved a company's performance, actual results of many VMI programs are disappointing (Muckstadt et. al, 2001). Past studies showed that most of the discourage results are from supplier side (Aichmayr, 2000; Kaurema et al. (2009). Due to the replenishment of customers' inventory was on supplier responsibility, the capability of supplier to operationalize VMI program should be look as a focus of the study. Unfortunately, the operating issues in VMI gained less attention than strategic issues (Zammori et al, 2009). Among the important operating elements of VMI are inventory location, ownership of inventory, visibility of demand, replenishment decisions, and inventory control limits (Zammori et al, 2009; Elvander et al., 2008; Sarpola, 2007).

In Malaysia, manufacturing companies faces several issues that need to be resolved, which include the impact of bullwhip effect on demand, increase of inventory cost, on-time delivery, and inventory shortage (Omar et. al, 2008). VMI can make significant and crucial contributions to the current issues of Malaysian manufacturing companies, if properly designed. Therefore, many manufacturing companies in Malaysia have driven to increase the number of their suppliers to engage in VMI (Panasonic, 2010). However, most of the manufacturers who had no experience with VMI found the topic of interest and wanted to learn more about the concept. Thus, based on the literature inventory location, ownership of inventory, visibility of demand, replenishment decisions, and inventory control limits will be including in this study as the basic of VMI elements.

In addition, there is an increasing awareness of VMI in variety of industries, and practitioners are curious about the suitability of the concept. Practitioners also want to know whether VMI is suitable for their company, and if so, how they should proceed (Claasen et. al, 2008). Although researchers have recognized that VMI can increase the performance, there has been limited empirical research that has directly associated the inventory location, ownership of inventory, visibility of demand, replenishment decisions, and inventory control limits and VMI performance, particularly in the supplier perspective and Malaysia manufacturing context. Therefore, the purpose of this research is:

a) to investigate the association of inventory location, ownership of inventory, visibility of demand, replenishment decisions, and inventory control limits and VMI performance;
b) to predict the inventory location, ownership of inventory, level of demand visibility, replenishment decisions, and inventory control limits on VMI performance;

in the Malaysia manufacturing company from supplier perspective.

A conceptual framework is a research tool intended to assist a researcher in developing an understanding of the situation under investigation. In this study, VMI performance is conceptualized as being dependent on the VMI element (inventory location, ownership of inventory, visibility of demand, replenishment decisions, and inventory control limits.

3.0 LITERATURE REVIEW

3.1 VMI performance

Holmström (1998) investigated the VMI practice through a case study between a vendor (supplier) and a wholesaler (customer). He stated that after the full-scale introduction of VMI program did significantly reduce the delivery and administration costs for all the vendor's products. However, he not affirmed the reduction of the delivery and administration cost actually did for vendor or wholesaler. The pilot implementation of VMI did significantly reduce demand variability for the vendor from 75% to 26%, and the vendor's operational efficiency resulting from full implementation of VMI program also shows increased delivery frequency, reduced cycle stock at the wholesaler and reduced order cycle time from 48 hours to 10 hours. Meanwhile, the new job has been created in the order office of vendor, and several work and role of the account manager and logistics managers also changed. These changing results in an increase of administration cost at the vendor side to support VMI practices.

Daugherty et al. (1999) examined the implementation of VMI and capability of information systems toward effectiveness and performance of VMI through a survey of US manufacturers and retailers. The authors claimed that had been highly effective in terms of improving/increasing customer service levels, fewer stock-outs, improved reliability of deliveries, and faster inventory turns. However, they also reported not as much effective related to achieving a reduction in key business areas in terms of reduced over-stocks, decreased inventory holding, returns and refusals, reduced handling, and decreased product damage. In addition, the capability of VMI in reducing the need to discount product show less effective.

Meanwhile, Stank et al. (1999) evaluated the levels of involvement in cross-organizational collaboration among firms utilizing VMI. The results provided moderate effectiveness in terms of operating process changes include more predictable order cycles, more receivers friendly loads-planning, shorter production runs, and less effective in delaying final production. In terms of performance in achieving performance goals, respondents achieve increased/improved customer service, few stockouts, improved reliability of deliveries, and faster inventory turns. However, less efficiency in terms of reduced overstocks, reduced inventory holdings, reduced handling, reduced costs, and decreased product damage was identified in their study.

Waller et al. (1999) used simulation to study the effect of demand variability, adoption rate, and limited manufacturing capability on supply chain inventories of VMI practice at Hewlett-Packard. The results on the effect of low to high-demand variability presented the inventory reductions for the VMI distribution centre were greater than 85% due to dramatic reductions in cycle stock arose from more frequent deliveries as well as a modest reduction in safety stock. In the case of adoption rate of VMI, the manufacturer got greater benefits when major retailers adopt the VMI to more demands, but retailers' additional benefit due to increased of VMI adoption rates was minimal. Meanwhile, the relationship between manufacturing capacity and inventory requirements with a higher plant utilization only shows a slightly increase in the inventory requirements. They implied that VMI practice allowed the manufacturer to diminish the excess capacity and achieve high production efficiencies without increasing inventory. However, they only simulated the moderate demand variability to examine the effect of adoption

rate and manufacturing capacity. Where as, the different demand variability may produce a different effect on VMI performance (Waller et. al, 1999).

The effect of VMI practice in Taiwanese grocery industry was studied by Tyan and Wee (2003), which involved a case between P&G (supplier) and Wellcome (buyer), a supermarket chain store. The results illustrated that VMI practice, if implemented successfully, may result in the cost reduction, reduce inventory level, service level improvement, billing accuracy, reduce order cycle and fill rate. They also found that the service level was increased more than expected, but the targeted inventory level was failed to achieve at 10 days of inventory due to inaccurate forecast. At the end of phase III of VMI implementation, the inventory level was slightly increases compare to previous phase, from 13 days of inventory to 16 days of inventory. On the other hand, they did not discuss the effect of VMI program to P&G as to support the high service level at the Wellcome distribution service centre. Notice that a high service level may require P&G to stock high inventory at their distribution centre which in turn can increase the cost associates with inventory control and management. In addition, the case also shows that cancellation and overrode of order were occurred at every phase of VMI that may lead to overstock at the P&G distribution centre.

Kulp et al. (2004) researched on the impact of information sharing and manufacturer and retailer collaboration on the manufacturer's profit margins. This was accomplished using a survey of 54 senior executives in the Food & Packaged Consumer Goods industry. They expected that manufacturer strive to increase the wholesale price and reduce stockout rate to impact on profit margins positively. Here, it was found that participated in VMI did not associate with stockout rate and whole sales price. However, they point out that if VMI has a direct effect on the profit margin, the benefit for the buyer was sure, but the effect to the supplier wase not clear.

On the other hand, research carried out by Kaipia and Kallionpaa (2007) examined the types of flexibility that can be affected by information sharing in VMI. The results shown that synchronizing the production schedule according to downstream production plan can reduce the inventory level and reduce the order cycle time from 0 to 20 days with a more accurate order due to precise of aggregate forecast. However, synchronizing the planning process was compensated for the rise of production cost.

The performance of VMI from a buyer's perspective has been investigated through a survey of 64 respondents from the variety of industries by Claasen et. al (2008). In terms of inventory cost, administration cost, flexibility, customer service level, and number of stockout, the study has shown a fairly positive effect. However, transportation and material's handling cost, customer responsiveness and forecasting accuracy was received less effective. The exploration studyshows that from perspective of the buyer, VMI was helped to reduce incorrect order and only one buyer mentioned a reduction in administration costs. They also argued that imposing a tight inventory control by buyer can cause inflexibility to the supplier to replenish inventory. However, in three cases, an increase in the sales margin for the supplier was noticed. Both buyers and suppliers mentioned the advantage of increased supply chain control. With respect to costs, their findings were mixed. Some had the advantage of reduced transportation costs while others benefited more from inventory costs reduction.

Liu, Lu, and Shi (2008) had three parameters were introduced, namely the fixed and variable transportation cost, and the service cost per unit. A model was developed for comparing the performance of the supply chain between non-implementing VMI and implementing VMI. They summarized that VMI can reduce the total logistic cost of the supply chain, but the total logistic cost for the supplier is not decisive. Further, the contract purchase price between supplier and customer also not deceived under VMI practice. The results also show an increase of profit for the buyer. However, profit for the supplier is not discussed in the study.

Meanwhile, Yao and Dresner (2008) developed models to value the benefits and distribution of benefits from VMI program with a two-level supply chain (supplier and customer). Results from the model revealed that frequent replenishments have reduced the cycle stocks and safety stock. However, benefits from inventory reduction are not equally distributed between the manufacturer and the retailer. They also stated that the distribution of benefits is determined by certain parameter, such as replenishment frequency and inventory holding costs. The results show that when the replenishment frequency was higher, and the inventory holding cost was low; the more manufacturer will benefit from inventory reduction.

An exploratory multiple case study was conducted with the data from five operational VMI dyads (Kauremma et. al, 2009). The result shows a mix impact in terms of inventory reduction at the buyer and supplier side. Three buyers reported that they could reduce the inventory level, and the other two buyers claim no impact. Meanwhile, two suppliers reported an increase of inventory level, one supplier showed decrease impact, and one supplier shows no impact. All the three suppliers say no impact on production efficiency, except one, stated an increase of production efficiency. However, all the buyers and suppliers noted a positive impact on the material availability to the buyer and forecast accuracy of the supplier. Further, at the buyer side shows a decrease in replenishment work. Conversely, the supplier shows an increase in replenish works. This circumstance could be due to the shifts of responsibility to replenish inventory from buyer to supplier.

3.2 Inventory location

Elvander et al. (2007) refer inventory location as inventory physical location, which is managed by vendor in VMI practice. Inventory location can be located at both the supplier's and the customer's premises (Danielsson&Lundqvist, 2005; Sarpola, 2006; Elvander et al., 2007), customer's premises in a distributed manner (directly at a manufacturer's production line or at a retailer's shop floor, Hines et al., 2000), and at customer's central warehouse (Sarpola, 2006; Elvander et al., 2007). However, in order to achieve high level of responsiveness through the use of inventory, locating large amounts of inventory close to the customer should be considered.

In fact, different inventory location also can impact the total cost, which include the cost of transporting all inputs required from their respective sources, the cost of transporting outputs to the markets at the various locations and the cost of providing the warehousing facilities that have been or are to be acquired.

3.3 Inventory ownership

Inventory ownership refers to the ownership of the inventory and when the invoice was issued to the customer (Elvander et al., 2008). Owning the inventory mean the company was responsible for the capital costs, obsolescence costs, and subject to a fluctuation in prices of inventory (Wallin et al., 2006). However, with a more accurate forecast based on demand data shared by customer, supplier can keep inventory at minimum level just to meet the customers' need. Though, managing the entire inventory system by one of the partners allow the supply chain to be better synchronized according to both companies's cost characteristic (Dong and Xu, 2002). Among the others advantage of owning inventory (Sarpola, 2006; Kuk, 2004) for supplier includes to push new products to the market and to place special products to top of the line to their retailer's assortment that then boosts the sales of the manufacturer's other products (Sarpola, 2006).

3.4 Visibility of demand

This elements concern the type of demand information provides to the supplier in order to control the customer's inventory. The different types of demand information communicated in VMI practice was studied by several researchers. Among demand information that visible to the supplier comprises of sales data, stock withdrawal, production schedule, inventory level, goods in-transit, back order, incoming order, and return (Vigtil, 2007; De Toni &Zamolo, 2005). Increased visibility of demand information will allow the supplier a larger time window for replenishment planning (Kaipia et al., 2002) through the improvement in the supplier's production planning, which result in more stable production plan (De Toni and Zamolo, 2005). In fact, by sharing demand information between supplier and customer can faster the replenishment, easy to identify goods and materials flow, increase the accuracy of forecast, and high customer service level through product availability (Irungu and wanjau 2011).

3.5 Replenishment decisions

This element concerns the extent to which the supplier is authorized to make replenishment decisions about quantity and delivery time. In VMI program, replenishment decision can be made fully determined by supplier (Yao et al., 2007; Vigtil, 2007; Sari, 2007) where the supplier has the right to decide on both quantity, time for delivery (Elvander et al. (2007)., and location (Kuk, 2004). This alternative would logically give the supplier most freedom and flexibility in the inventory control process. According to Yao et al. (2007), when suppliers have the autonomy to retain orders until an agreeable dispatch time is reached, it is expected that economic consolidated dispatch quantity will accumulate before an order is dispatched. In addition, supplier can gains more benefit by means improved optimization of its manufacturing and distribution (Cetinkaya& Lee, 2000) as well as for minimization of out-of-stock expenses through the possibility to prioritize customer orders (Waller et al., 1999).

3.6 Inventory control limits

The inventory control limits refers to how the supplier controls the inventory (Elvander et al., 2007). Normally, in case of VMI, the supplier is responsible for maintaining a continuous stock level within the predefined limits. The inventory control limits can be used to avoid extremes inventory (Wild, 2002). By reducing the maximum level, average inventory levels can be reduced and thereby increase the turnover rate and reduce inventory carrying costs (Vigtil, 2007). On the other hand, the minimum level can ensure the availability of inventory for customers to consume. Fry, Kapuscinski, and Olsen (2001) compared the performance of traditional retailer-managed inventory (RMI) systems and vendor-managed inventory (VMI) with minimum and maximum limits. Numerical results indicated that good maximum and minimum limits acquired 10 percent to 15 percent savings when moving from RMI to VMI and that savings increase with higher levels of demand variance. While, Yao and Dresner (2008) stress that imposing penalty cost due to stockout can lead to greater inventory reduction.

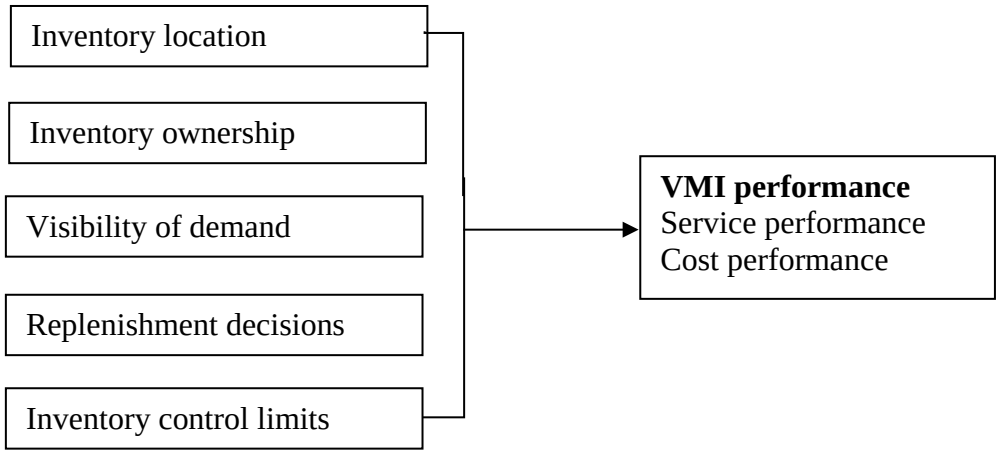

Figure 1: Research framework of VMI performance

The following hypotheses are proposed:

H1: Inventory locationhas a positive relationship with service performance of VMI.
H2: Inventory ownershiphas a positive relationship with service performance of VMI.
H3: Visibility of demandhas a positive relationship with service performance of VMI.
H4: Replenishment decisions have a positive relationship with service performance of VMI.
H5: Inventory control limits have a positive relationship with service performance of VMI.
H6: Inventory location has a positive relationship with cost performance of VMI.
H7: Inventory ownership has a positive relationship with cost performance of VMI.
H8: Visibility of demand has a positive relationship with cost performance of VMI.
H9: Replenishment decisions have a positive relationship with cost performance of VMI.

H10: Inventory control limits have a positive relationship with cost performance of VMI.
H11: VMI elements have impact on service performance of VMI.
H12: VMI elements have impact on cost performance of VMI.

4.0 RESEARCH METHODOLOGY

4.1 Sampling and data collection

The unit of analysis for this study is the Malaysia manufacturing companies that play a role as a supplier or vendor in the VMI collaboration. We investigate two dependent variables: organizational factors and performance of VMI in terms of service and cost. Little empirical data has been published on this topic; therefore; a survey method of data collection was considered appropriate (Klein et. al, 1990). The sampling frame for the data collection included members of the Federation of Malaysia Manufacturer (FMM) 2011. FMM members are likely to be involved in the inventory management of the firm.

4.2 Measurement scale

A survey instrument was developed and pretested with business executives and managers. A six-point Likert scale was mainly used in this study to indicate the degree of agreement for each criterion, with 6 (strongly agree) as the maximum and 1(strongly disagree) as the minimum. After modifying the questionnaire to incorporate panels' suggestions, 440 of companies was recognized through the random sampling. The surveys were then sent to these companies, with reminder cards being sent two weeks later. After reminding, a total of 85 surveys were returned that yield 19 percent f return rate. However, 4 had been reluctant to answer and 12 were ineligible because no VMI was utilized in their firms.

4.3 Data analysis

The reliability test was assessed in the study, and the alpha scores were range from 0.64 to 0.89 as shown in Table 1. In this sense, the scales used were reliable and consistent (Malhotra, 2004). Following data collection, missing values and outliers screening also were examined. In order to test the hypotheses, the correlation method and multiple regressions were utilized. A correlation analysis is used to summarize the strength of association between two metric variables (Malhotra, 2004) which called Pearson's Correlation Analysis. It indicates the strength and direction of linear association between two random variables (Malhotra, 2004). Pearson's correlation coefficient and two-tailed tests were carried out to measure the co variation or association between the variables. Meanwhile, multiple regressions were used in order to explain the relationship between two or more independent variables by allowing prediction of the relationship between the predictor and the criterion variable. Beforehand, the normality, linearity, homoscedasticity, and multicollinearity of the data were examined and action has been taken in order to meet the assumptions of regression analysis. In this study, VMI performance (service performance and cost performance) is a dependent variable and the VMI elements as an independent variable (inventory location, ownership of inventory, visibility of demand, replenishment decisions, and inventory control limits).

Table 1: Cronbach's alpha scores for variables.

Variables	No. of Items	Cronbach's alpha
Service performance	7	0.873
Cost performance	7	0.897
Level of demand visibility	8	0.892
Inventory ownership	3	0.800
Replenishment decisions	4	0.777
Inventory location	3	0.641
Inventory control limits	4	0.663

5.0 RESULTS

A descriptive analysis (means) of relations betweenVMI elements and VMI performancewas carried out in the manufacturing company from supplier perspective. Theaverage distribution of scores was slanted toward agreement.Participants in the survey rated that the factor ofperformance measurement had the most influence onVMI performance.The Pearson's correlation was used to explore a correlationbetween VMI performance and VMI elements. As shown in Table 2, the results indicated significant positive correlation between VMI performanceand several VMI elements. The value ranges from +0.22to +0.48.

Table2:Correlation coefficient for VMI element –VMI performance.

Variable(s)	Service performance	Cost performance
VMI elements		
Level of demand visibility	.483**	.183
Inventory ownership	-.002	.085
Replenishment decisions	-.013	-.053
Inventory location	.222*	.319**
Inventory control limits	.464**	.156

** correlation is significant at the 0.01 level (2-tailed)

* correlation is significant at the 0.05 level (2-tailed)

A multiple regression analysis was conducted to examine the relative impact of VMI elements on service performance. Significantly, visibility of demand [F (1, 98) = 29.852, p<0.01] contributed 22.6 percent of variants (R^2 0.226) in service performance. The result showed that visibility of demand (β=0.367 p< 0.01) was a primary indicator to the service performance. The combination of visibility of demand (β=0.263 p< 0.00) and inventory control limits [β=0.237, p< 0.01] contributed to 29.8 percent or adding 7.9 percent (29.8-22.6) to the variants (R^2 0.298) in variable criterion of service performance [F (1, 97) = 11.075, p<0.01]. The multiple regression analysis also was conducted to examine the relative impact of VMI elements on cost performance. The result of data analysis showed that only inventory location (with the

population of study size =101) were predictors to cost performance of VMI. However, the inventory location (β=0.292, p< 0.01) [F (1, 98) = 11.11, p<0.01] had lower contribution to cost performance at 9.3 percent of variants (R^2 0.093). The result is summarised in Table 3.

Table 3: Regression result for VMI elements – VMI performance.

VMI elements	VMI performance	
	Service performance	Cost performance
	Beta (β)	Beta (β)
Inventory location		
Visibility of demand	0.483 ***	0.319 ***
Inventory control limits	0.312 ***	
Adjusted R^2	0.298	0.093
F statistic	11.075	11.110
Sig. F	0.001	0.001

*** p-value < 0.001

6.0 DISSCUSSION AND IMPLICATIONS

The result of data analysis showed that two predictor variables, which are visibility of demand and inventory control limits were predictors to service performance of VMI. This study provide findings on type of demand shared between partner in VMI and complement the previous research that sharing information can increase performance of VMI (Irungu&Wanjau,2011; Claasen et. al, 2008; Ramayah et. al, 2005). The implications by providing information on demand in time are faster replenishments can be achieved, slow and fast moving goods can be identified, accurate demand forecasts can be made to match the inventory flow, and high level customer service through product availability (Irungu and wanjau 2011). On the other hands, a probable explanation a small contribution of inventory control limits to service performance is a tight inventory control limits imposed by buyers. Normally,setting a tight inventory control limits were due to the absence of a buyer's trust in the supplier's capabilities to replenish just-in-time (Claasen et. al, 2008). However, Kaipiaet. al (2002) argued that this action can limit the flexibility of supplier to make optimum replenishment decisions. Meanwhile, the other three dimensions which are inventory location, replenishment decision, and inventory ownership were not factored for service performance of VMI. A potential reason for this may be due to the manufacturing company has many design of VMI and they vary by industries or by market environment. In fact, there are differences among VMI systems implemented at different stages of the supply chains (Claasen et. al, 2008). Therefore, respective supplier-buyer relationship has its own design to run its VMI program, solve problems, make decisions and communicate with each others. As a result, the company with numerous relationships which lack of synchronization is difficult to pursue the success of the overall VMI process.

The finding of the study also has been proven that setting close proximity of inventory location contribute to cost performance of VMI. The result support previous arguments, where centralized and close of inventory location can minimize number of deliveries and storage (Sarpola, 2006); reduce safety stock, lower total overhead cost, lower transportation cost, and achieve economies of scale (Simchi-Levi et al., 2000). Although Simchi-Levi et al. (2000) indicated that visibility of demand is vital in decreasing the out-of-stock rate and inventory costs, the insignificant impact shows that visibility of demand does not important to cost performance.. The most probable explanation was when VMI was involved with different market interaction strategy applied by customer; the information had different value for the supplier (Vigtil, 2007). For inventory ownership, perhaps, the supplier was incapable to absorb inventory cost and they sought an alternative to sharing the cost with their customer. This alternative was found to be a way of sharing risks, whereby the customer responsibility on the risk of holding inventory such as the expense of storing, obsolescence, handling and tracking these purchased items (Wallin et. al, 2006). These conditions can consequently lead to an unimportance of inventory ownership by of the partners.Meanwhile, the probable explanation for insignificant relation between replenishment decision and cost performance was when the replenishment decisions is made mutually and has been used in a transition period going over from the traditional order process to the VMI order process (Simchi-Levi et al., 2000). Therefore, the replenishment decisions did not did not relate to cost performance nor did it able to play role as a cost reduction strategy in VMI. The impact of inventory control limits on cost performance also not significant. A potential reason for this may be due to several VMI programs have set a tight inventory control limits that vary by industries or by market environment. The inventory control limits should need to be adjusted, the identified target range should be both attainable consistently (Wild, 2002), in line with the demand. The consequence of not met this prerequisite are difficulty to plan and coordinate with other activities (Wild, 2002), a shortage of inventory or there is excess inventory (Gardner, 2004).

7.0 LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

This study implies some limitations and scarcity, logic suggests that future researchers increase the sample size, because small sample size makes it very difficult to generalise the result to manufacturing sector. Therefore, it is of great importance to include and make comparison between industries and characteristics of market environment. The result would be much better if it can represent the full picture of different setting of VMI in Malaysia manufacturing company. Apart from the five VMI elements in this study, it is recommended that future study to determine additional element that are pertinent to firms' current VMI strategies and directions, competitive advantages and missions. Future researchers should also extend their research by investigatethe integration level in VMI program. The impact of integration level can include horizontal integration and vertical integration. Further, study could be conducted to identify the measurement of VMIperformanceat different phasesof implementation.

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