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THE IMPACT OF TRUST ON VENDOR MANAGED INVENTORY (VMI) PERFORMANCE

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ABSTRACT

Lack of trust among partners can lead to failure of VMI program. Since, many study emphasized that trust has significant roles in VMI program, companies that involved in VMI program must well understood the role trust on their performance. However, there is still lack of study on to what extend trust can influence VMI performance. Therefore, the aim of this paper is to examine the impact of trust towards VMI performance. Questionnaire was the main instrument for the study, and it was gathered from 101 of suppliers in manufacturing companies. The findings show that trust contributes to service and cost performance of VMI program. Although, literature suggest that trust has significant impact on both cost reduction and service improvement in VMI program, this study shows that there is a limited effect on cost and service performance. This study recommends that trust should be enhanced through the sharing of demand information in order to increase benefits of VMI program.

Keywords: Trust, cost performance, service performance, manufacturing companies

INTRODUCTION

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 practice does not only belong to a particular industry, but variety of industries, which comprises of products, accessories, and raw materials (Elvander, Sarpola & Mattson, 2007).

Although many studies indicated that VMI programs significantly improved a company's performance, actual results of these studies are disappointing (Muckstadt et al., 2001). Kaurema et al. (2009) conducted five cases of VMI program and reveals that all the customers experienced an increase in material availability, but two of the suppliers had increased and no impact on inventory levels. The cases also revealed that only one supplier experienced production efficiency from implementation of VMI.

Similarly, Claasen, Van Weele, and Van Raaij (2008) study indicated that there were improved in services when implementing VMI, but with finding on cost reduction were mixed. Some had the advantage of reduced transportation costs while others benefited more from reduced inventory costs. However only one buyer mentioned a reduction in administration costs.

In VMI program, , trust can be a major barrier to the success of VMI (Kuk, 2003) due to supply chain collaboration always depends on trust between the parties (Simchi-Levi et al. 2000, Childe 1998). Trust facilitates more effective and efficient relationships, directly affecting the outcomes and hence the satisfaction achieved (Handfield and Betchel, 2002). Trust is believed can minimize the transaction cost (Ryu et al., 2008) and increase satisfaction between parties involved (Redondo & Fierro, 2005). Many study had include trust in their study in supply chain relationship. Recently, Claasen et al. (2008) had conducted exploration study by interviewing 3 suppliers and 3 customers. They find that all participants, except one, mentioned trust was extremely important in achieving VMI effectiveness. A study by Thankdenchai and Pasawat (2015) also noted that element of trust in VMI could enhance the company's best practices. However, there is still lack of study on to what extend trust can influence VMI performance. Therefore, the purpose of this research is to examine the impact of trust on VMI performance in the Malaysia manufacturing company from supplier perspective.

TRUST AND VMI PROGRAM

As VMI program requires member to share information, confidential information must be entrusted, unfortunately, some companies may also be unwilling to share information and lack of trust often exists (Fraza, 1998). Therefore, the absent of trust can be a major barrier to the success of VMI (Kuk, 2004).

Childe (1998) refers to three types of trust in business partnerships;

- *Goodwill trust*
  Honesty, a partner is trusted to take decisions without unfairly exploiting the other party.
- *Contractual trust,*
  Keeping promises, maintaining confidentiality and intend to act as agreed.
- *Competence trust,*
  Believing that the other party is capable of performing as agreed.

He argues that arm's length contractual agreements only depend on contractual and competence trust, while long-term relationships build on goodwill trust. Therefore, trust here is defined as the willingness to rely on a partner in whom one has confidence (Ganesan, 1994).

Gandhi (2003) proposed that in order to establish trust, a company need to demonstrate to the trading partner the benefits of shifting to VMI. Stank et al. (1999) also gave an example on how trust should be developed. They stated that Wal-Mart could trust the manufacturer would ship and deliver the product on time as requested. While Warner Lambert could depend on the fact that the retailer would accept the product in the quantities and at the time agreed on.

In the Beccerra and Gupta (1999) study, the negative aspects result from a lack of trust was emerged on higher transaction costs and agency costs. For example, a manager's time and energy spent on dealing with low-trust relationships are higher than those spent in dealing with high-trust relationships. Meanwhile, a partnership with high-trust would enjoy open communication and willingness to take risks. They also indicated that the overall performance would enhance if the problems of distrust were reduced.

Riddalls, Icasati-Johanson, Axtell, and Clegg (2002) quantified the effects of trust in supply chains during promotional periods. They found that trust has great influence on supply chains in terms of inventory costs and production costs and in certain circumstances, low levels of trust can increase total supply chain costs considerably. They also stated that trust is one of the determinants of supply chain performance.

A study conducted by Handfield and Bechtel (2002) stated that trust was positively improved supply chain responsiveness, including on-time delivery and lead time. They also argued that even in cases when buyers do not have a great deal of control over their suppliers, works in building the trust within the relationship could improve supplier responsiveness. Conversely, a low level of trust can make the supplier less responsive in logistics services such as order cycle time and delivery reliability. In the other study, reveals that there are positive relationships between trust and long term orientation (Sheu et al., 2006). They argued that high-trust was encouraged the retailer to share information and uses IT applications. Subsequently, retailers with a high level of trust have shown a slightly high positive effect on satisfaction level, inventory cycle, fill rate, and goods return than retailers with a low level of trust.

Claasen et al. (2008) found that all participants, except one, mentioned trust was extremely important in achieving VMI performance. However, they also have not disclosed on how trust affect VMI performance. Further, they investigate the performance of VMI program from a buyer's perspective on the variety of industries. They used relationship quality as a proxy to trust. The study shows that a significant and positive impact of quality relationship on perceived VMI success. However, the failures of many VMI programs due to the lack of mutual trust as well as a lack of adequate information technology can results in sharing of outdated or inaccurate sales and inventory data (Sari, 2008). Thus, this study recognizes that trust play important roles in achieving VMI performance (as depicted in Figure 1).

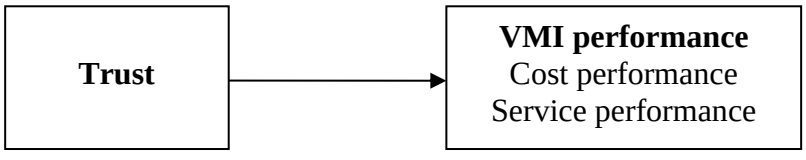

Figure 1. *Research framework of the impact of trust on VMI performance*

The following hypotheses are proposed:
H1: Trust has a significant impact on service performance of VMI.
H2: Trust has a significant impact on cost performance of VMI.

RESEARCH METHODOLOGY

Sample size and measurement scale

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 trust as independent variables and performance of VMI as dependent variable. Few empirical data have 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). FMM members are likely to be involved in the inventory management of the firm. The total numbers required sample size was 330 out of 2227 manufacturing companies. However, 495 companies were included in the sample size in order to increase the response rate.

A survey instrument was developed and pretest 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 panel's suggestions, 495 of the companies were recognized through the random sampling. The surveys were then sent to these companies, with reminder cards being sent two weeks later. After reminding, only 114 questionnaires were returned. However, 13 were excluded due to incomplete questionnaires, not engage with the VMI program, and reluctant to answer. Thus, this study had achieved 20 percent of respondent's rate from the total amount distributed and 31 percent of the sample size required.

Data analysis

Before testing the hypotheses, the data were evaluated in terms of missing values, normality, multivariate outlier, linearity, and homoscedasticity test. All the constructs in the research variables have a skewness value lower than 2.0 and kurtosis value smaller than 7.0. Therefore, the variables were normally distributed (Cohen & Cohen, 1983). The other test also was performed in order to comply with the assumptions under multiple regressions. To assess multivariate multicollinearity, this study used tolerance or VIF (variance influence factor) (Hair et al., 1998). The VIF shows less than 10 while tolerance value should not be 0.01 or less to indicate that independent variables were not highly correlated each other.

Meanwhile, the scatter plot also shows an oval shape as an indicator of linearity and homoscedasticity. In addition, to test the autocorrelation of the model, the Durbin-Watson coefficient results were ensured within the acceptable range of 1.5-2.5 (Cohen & Cohen, 1983), while the condition index should not be more than or equal to 30. The above assumptions were checked and the data was complied with the assumptions.

Factor analysis

Factor analysis was conducted to group the items related to each other under the same construct (Hair et al., 2006). A Varimax rotation method was applied to all variables. The selected factors were based on eigenvalues equal to or greater than 1.00. Within a factor, the cut-off point for significant factor loading were at least 0.55 to be considered necessary for the practical significance (Hair et al., 2006). Factor analysis was performed on 5 items in the trust dimension's scale. The result is shown that KMO was 0.670 and Bartlett's test of sphericity was significant at the 0.01 level for trust dimension scales. The anti-image correlation matrix ranged from 0.620 to 0.730 (> 0.50), so there were sufficient correlations among the items. Only one factor was extracted consist of items that measure on trust-related element include goodwill, contractual and competence. These factors accounted for 73.03% of the variance. Then, the factor analysis also was performed on 25 items in the VMI performance scale. The KMO was 0.874 and Bartlett's test of sphericity was significant at the 0.01 level. The anti-image correlation matrix ranged from 0.787 to 0.891 (> 0.50), so there were also sufficient correlations among the items.

Finally, only two factors of VMI performance were extracted. These factors accounted for 64.544% of the variance. The first component focused more on cost performance and the second component focused on service performance. During the factor analysis process, a few items were removed for several reasons. Among the reasons was due to low communalities, low factor loading, and load few items on the component. During the factor analysis process, two items deleted due to low of communalities (<0.5) and cross-factor loading.

FINDINGS

Respondent profile

In this study, most of the respondents were involved in the electronic industry. The findings shown that electronic industry consist of 22.8% of the number of respondents. Meanwhile food related industry represent at 18.8% of respondent, and followed by automotive (15.8%), chemicals and plastics (13.9%), building materials (7.9%), appliance (6.9%), pharmaceutical (6.9%), petroleum (3%), metal (3%), textile (1%) and paper and packaging (1%). Obviously, most of VMI program practiced in electronic industries.

In terms of position held by respondent, 41.6% are executive, 36% are senior managers, 13% are manager and 13% are assistant managers. Only 9.9% among the respondents are directors of the firms.

Regression analysis results

A simple regression analysis was conducted to examine the relative impact of organizational factors on VMI performance. The result of data analysis showed that trust variables is (with the population of study size =101) predictors to cost and service performance of VMI. The result showed that trust (β=0.235, $p< 0.01$) was a primary indicator to the cost performance.

The trust factor [$F (1, 99) = 5.777$, $p<0.01$] significantly contributed a total of 4.6 percent of variance (R^2 0.046) to the cost performance of VMI. Meanwhile, trust [$F (1, 99) = 22.005$, $p<0.01$] significantly contributed a total of 17.4 percent of variance (R^2 0.174) to the service

performance of VMI. Therefore, the trust (β=0. 426, p< 0.01) was also an indicator of cost performance of VMI in this study.

Table 1.

Model parameter estimates of VMI performance

	Cost performance	Service performance
Constant (β)	3.351 (t=7.597**)	1.918 (t=3.601**)
Trust (β)	0.235 (t=2.404*)	0.426 (t=4.691**)
Adj R^2	0.046	0.174

Notes: *p value <0.05, **p value <0.01

As a conclusion, the results of regression analysis supported the hypotheses H1 and hypotheses H2. The regression analysis shows that trust only can explain 17.4 percent of the variance in service performance, but it only explains 4.6 percent of the variance in cost performance.

DISCUSSION

Previous studies argued the importance of trust on VMI performance as one of the organizational factors, particularly in shaping the success of collaboration program. Although, trust had shown a positive and significant relationship with service and cost performance, the findings indicate that firm's ability to increase VMI performance is minimally influenced by the trust. This study has proven that element of trust does not have large impact on VMI performance, especially in term of cost performance. Suppliers in manufacturing company regard trust as pre-requisite to their VMI program. In other words, they are not treating trust as one important organizational factor that can influence their VMI performance.

The surprising results of this study may be triggered by several plausible reasons. Customers tend to treat trust as very important role when they doubt the supplier's capability in managing their inventory. As consequences, customer can replace the role of trust with tight inventory control limits, which requires supplier to maintain a continuous stock level within the predefined limits.

The impact of trust on VMI performance also can be enhanced through the sharing of information in VMI program (Chandra & Kumar, 2001). However, a simple information sharing may not be enough to overcome barriers and suspicions inherent in the information sharing process (Kwon & Suh, 2004). Each of the partners must be willingly providing critical information needed for an effective management of VMI. Besides sharing the demand data, other critical data may be included but not be limited to, operational data (utilization rate, productivity goals, production and distribution systems), financial data (activity cost, cost of goods sold per unit, return on capital, carrier cost, and profit structure), forecasting data (market strategy) and supply chain data (cost and value added propositions) (Henderson, 2002). Only then, supplier can plan their production schedule based on real demand information accurately.

CONCLUSION

Although, the significant impact of trust on VMI performance is relatively small, the manufacturer should focus on trust among partners in the VMI program in order to benefit of service and cost improvement. Therefore, this study also recommends that trust should be enhanced through the sharing of demand information. Information provided by customer that is accurate, easily to use, timeliness, and updated would increase the accuracy of supplier's replenishment decisions on customer's inventory. Since, supplier is capable to make right decision on inventory replenishment, the level of trust of customer on their supplier also would increase. In addition, to ensure customer and supplier get the benefits of VMI program, they need to believe on their partner competencies and always comply with the inventory control policy as agreed.

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