A DARK SIDE OF LONG-TERM VMI RELATIONSHIPS: SUPPLY CHAIN TRUST

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Abstract: Supply chain management literature is rich in pointing to the benefits generated by collaborative supply chain arrangements. While there is consensus that supply chain integration can improve supply chain performance, research studying relational factors in long-term collaborative buyer-supplier relationships is still scarce. Focusing on distributor-manufacturer relationships that use VMI, and based on the theory of psychological contracts, this paper investigates the relationship between the length of a VMI relationship and the supply chain trust in that relationship using survey data. While our findings confirm that average distributor trust in the manufacturer is quite high, we also shed light on a dark side of long-term VMI relationships by providing evidence that they are associated with lower levels of distributor trust in the manufacturer (relative to short-term relationships). Our findings demonstrate that in order to maintain the initially high trust levels in VMI relationships, good inventory performance may not be sufficient.

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1. INTRODUCTION

Vendor-managed inventory (VMI) has become a common supply chain collaboration mechanism. VMI service providers (i.e., companies that facilitate VMI relations) have reported strong sales growth in recent years. For example, world's largest cloud based VMI service provider Datalliance recently reported 20+ years of consecutive growth (Nasdaq 2017). Moreover, the academic supply chain management literature is quite rich in illustrating the benefits of this collaborative buyer-supplier relationship (Akhbari et al. 2014). VMI has been found to reduce demand uncertainty (Waller et al. 1999), minimize information distortion along the supply chain, increase inventory turnover and reduce stock-outs in the manufacturer-retailer channel (Chen et al. 2000). The upstream firm (for this paper, the manufacturer) benefits from synchronization of inventory and transportation decisions through long term commitment from the downstream firm (for this research, the distributor) and from increased purchase quantities, while the distributor enjoys inventory reduction, fewer stock-outs and cash flow benefits due to decision transfer (Dong et al. 2014).

Supply chain management literature also includes multiple studies of VMI failures (Corbett et al. 1999; Sheffi 2002; Sparks & Wagner 2003). VMI has been criticized as harming the long run financial performance of manufacturers, and resulting in the loss of purchasing and inventory management skills at downstream firms (Pohlen & Goldsby 2003). Some downstream firms have discontinued VMI programs due to inaccurate forecasting and to lack of collaboration from their manufacturer partners (Sheffi 2002). More recently Handfield (2013), addressing companies willing to switch to VMI to reconsider their decisions, proposes "Contrary to what many people think, companies like Toyota and Honda have moved away from VMI and simply chose to co-locate suppliers as close as possible to their facilities"

Given inconsistencies in the finding of benefits from VMI relationships, it is important to investigate underlying causes for the program's success or failure. In particular, this research postulates that relational factors may be critical to the success of collaborative supply chain programs, such as VMI. It has been argued that most enablers or inhibitors of collaborative supply chain programs are not technological, but relational in nature (Mentzer et al. 2000). One of the key enablers, as cited in the literature, is trust in the relational partner, which has a significant influence on inventory replenishment decisions as well (Hsin-Pin 2016; Darvish et al. 2014). Along the same vein, lack of trust has been cited as an inhibitor of these partnerships (Barratt 2004).

VMI was first adopted by Wal-Mart and Procter & Gamble in the late 1980s and is now considered a mature supply chain program. The technological and relational factors leading to the adoption of this supply chain initiative have been investigated thoroughly (Patterson et al. 2003; Barratt 2004). However, the impact

of the program on the supply chain relationship, itself, has been largely unexplored. Moreover, it is unclear how supply chain relationships may evolve as VMI programs mature. Filling this gap, we investigate the impact of VMI implementation on inter-organizational trust in distributor-manufacturer relationships of different durations. Using cross-sectional data from 54 VMI-using distributors, and employing multivariate regression and a 3-step mediation model, we provide evidence that in longer VMI relationships, distributors experience higher levels of psychological contract violation, which, in turn is associated with lower levels of distributor trust in the manufacturer.

Two significant contributions to the supply chain management literature are drawn from this research. First, we illustrate why some of the inconsistencies in the perceived success of VMI relationships in the trade and academic literature may have been found. While supporting the extant literature that average trust levels in collaborative supply chain relationships are quite high, we also find evidence that long term VMI relationships may be associated with lower supply chain trust. Thus, we respond to the call by Villena et al. (2011) for further research on "dark side" of highly collaborative supply chain relationships. Second, in examining the cognitive and psychological dimensions of buyer-supplier relationships (Hill et al. 2009), we contribute to the advancement of the theory of psychological contracts in the supply chain management field, which is also a response to calls for more interdisciplinary business research in supply chains (Zacharia et al. 2014).

In the following section, we synthesize the literature in supply chain trust, VMI, and psychological contract theory to provide a theoretical foundation for this research and to develop our hypotheses. Next, the research design is presented, followed by the results. Finally, we provide a discussion of the findings, as well as limitations and suggestions for future research.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Supply Chain Trust

Being trustworthy is an ethical and moral duty owed by the trustee to the trustor and to society in general (Hosmer 1995). Mayer et al. (1995, p. 712) define trust as, "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party." The authors further note that being vulnerable shows that the trustor has something important to lose, and that the trustor takes a risk by making him/herself vulnerable.

Three main factors have been found to be antecedents of one party's trust in the other: (i) characteristics of the trustee; (ii) the trustor's propensity to trust others; and (iii) situational factors (Mayer et al., 1995). In a supply chain context, Kwon and Suh (2004) investigate the factors affecting the level of trust in buyer-seller relationships and find that relationship-specific asset investments and information sharing are positively associated with trust. Morgan and Hunt (1994) provide empirical evidence that relational factors, such as shared values and high levels of communication between supply chain partners, are likely to increase trust, while opportunistic behavior is likely to reduce trust. Doney and Cannon (1997) identify two factors – suplier's size and willingness to customize, as significant drivers of a buyer's trust in the supplier. Finally, Ganesan (1994) demonstrates that in buyer-supplier relationships, a trustor's satisfaction with the trustee's performance is a key determinant of trust.

A major benefit of trustful supply chain relationships is that trust reduces the need to write complicated, costly, and difficult to enforce contracts between organizations, thereby lowering transaction costs and increasing supply chain performance (Dyer & Chu 2003). Absence of trust requires that every contingency be planned in advance and written into a contract; transactions have to be scrutinized against opportunistic behavior, all of which increase transaction costs.

The level of trust between individuals, groups or parties evolves as relationships mature. The literature on evolution of trust in buyer-seller relationships is quite mixed. Social Exchange Theory (SET) posits that longer relationships result in higher trust levels, as positive results over time increase partner trust (Blau 1964; Dwyer et al. 1987). Along these lines, Gulati and Singh (1998) use the prior history of ties as a proxy for inter-organizational trust. Studying collaborative planning, forecasting and replenishment (CPFR) projects, Barratt and Oliveira (2001, p. 289) view trust as increasing over time and conclude, "a real trust-based relationship will only prevail after a relatively lengthy period."

However, trust does not always evolve along a positive trajectory. In their experimental study of trust erosion, Elangovan et al. (2007) observe that violations of the psychological contract between parties hurt trust. They further assert that trustors can forgive up to two trust violations of the trustee before erosion sets in, and suggest that the trustee's inability to perform obligations causes less trust erosion than the trustee's unwillingness to perform. In other studies, Grayson and Ambler (1999) provide empirical evidence that longevity in advertising service relationships is negatively related to the buyer's trust in the service provider, while Moorman et al. (1992), and Young-Ybarra and Wiersama (1999) find no link between the length of a relationship and inter-organizational trust. Overall, while the correlation between relationship maturity and trust is uncertain, trust remains an important factor, not only for buyer-supplier relationships, but also as a "public good" required for a well-functioning economic system (Hirsch 1978). Next, we discuss VMI as an example of highly collaborative supply chain relationships in which trust is a key enabler.

2.2. Vendor Managed Inventory (VMI)

Competition and shorter product cycles have pushed companies to evaluate their distribution and inventory management systems. Automatic Replenishment Programs (ARP) provide ways for firms to reduce safety stock, increase return on assets and reduce obsolete items in warehouses (Myers et al. 2001). As a type of ARP, VMI allows upstream firms to manage their inventory at the premises of their customers on the basis of shared demand information (Cetinkaya & Lee 2000).

Using information technologies as an enabler of supply chain collaboration (Soosay & Hyland, 2015), VMI can provide many benefits to its users, both upstream and downstream firms. VMI has been found to reduce information distortion along the supply chain (Chen et al. 2000), increase inventory turnover and reduce stock-outs, improve customer service and reduce costs (Claassen et al. 2008). The upstream firm can realize cost savings from VMI by being better able to synchronize production, distribution, and transportation decisions (Dong & Xu 2002). As a result, an upstream firm may realize fewer stock outs, a lower percentage of backorders and increased sales. The downstream firm can also realize savings in terms of lower inventory costs and lower purchasing expenses, and obtain higher fill rates. Kulp et al. (2004) examine the impact of VMI on manufacturer profitability and find that VMI increases manufacturer profit margins. Cachon and Fisher (1997) also report that VMI increases inventory performance, but attribute these improvements to information sharing through EDI, rather than to the unique aspect of VMI, the transfer of inventory control from buyer to supplier. In a manufacturer-distributor supply chain, Dong et al. (2014) find that distributors benefit from reduced inventory levels as a result of VMI implementation, although this benefit may decline over time.

Despite the potential benefits, collaborative supply chain relationships in general, and VMI relationships in particular, may fail, especially in the long term. MacDuffie and Helper (2005) argue that when parties in a long-term business relationship are very dependent on each other (with little threat of exit), they are likely to become both complacent and rigid, with groupthink tendencies dominating the relationship. Comparing collaborative business relationships with arms-length relationships, Wilding and Humphries (2006) introduce the "positive feedback" concept and posit that collaborative relationships are more emotional in nature, and small problems in these close relationships can be personalized and amplified resulting in serious conflicts, if not properly managed. Villena et al. (2011) suggest that building too much social capital in collaborative supply chain relationships can bring rigidities and degrade buyer objectivity, eventually hurting supply chain performance. Yao et al. (2012) show that as the learning curve flattens out, supply chain performance gains from collaborative relationships (i.e. VMI) may erode over time which could hurt the longevity of the relationships.

There are a number of reasons why VMI relationships may deteriorate over time. First, downstream VMI users have to transfer control of their materials

management function to their upstream partners. This transfer may cause loss of critical purchasing and inventory management skills for the downstream firms, leaving them vulnerable to opportunistic actions by their upstream partners (Williams 2000). Second, distributor-buyers must share proprietary data (e.g. inventory and sales information) with their manufacturer-suppliers, which may be risky. Manufacturers could, for example, leak the demand information to third parties or to the distributors' competitors (Anand & Goyal 2009). Third, lack of equity in sharing VMI benefits may lead to disputes between the manufacturer and distributor (Pohlen & Goldsby 2003). In some cases, major gains may be realized by the manufacturer, and not the distributor; for example, through reductions in the bullwhip effect contributing to production efficiencies (e.g. Cetinkaya & Lee 2000). On the other hand, distributors may experience significant cost and service gains, but not their upstream partners (Roberts 2003). Finally, some VMI relationships may fail due to lack of cooperation. Along these lines, Lee (2004, p. 9) report that, "…VMI systems have generated friction, because buyers have refused to share costs with the suppliers." Thus, it would be fair to say that relational factors play a key role in VMI failures. In the next section we discuss psychological contracts that help govern VMI relationships.

2.3. Psychological Contract Theory

Psychological contracts, as complements to formal contracts, are important aspects of exchange relationships. Psychological contracts refer to the reciprocal obligations parties have in relationships (Robinson 1996). They do not depend so much on what the other party does in a relationship, but how the actions of the other party are perceived. When one party feels that the other has not fulfilled a promise, he/she may suffer a sense of injustice, resentment or betrayal, called a "psychological contract violation" (Robinson 1996).

There are two main conditions that result in psychological contract violations: reneging and incongruence. Reneging is the unwillingness or inability of a party to fulfill a promise or an obligation. Incongruence refers to misperceptions in the understanding of the other party's obligations in a relationship. Incongruence may result when one party believes a promise was completely fulfilled, while the other party perceives that it is still unfulfilled. As indicated by Klatzky (1980), promises may become distorted in human memory, thus generating incongruence over time.

Robinson (1996) discusses three main factors leading to incongruence. The first is divergent schemata. Parties in a relationship may have different schemata or cognitive frameworks that are used to make sense of events. These discrepancies may be due to differences in experiences or to differences in underlying organizational cultures. The second factor that may lead to incongruence relates to the complexity and ambiguity of the tasks performed by the parties in the relationship. Given the bounded cognitive capacity and bounded rationality of

human beings, it is highly probable that parties will tend to simplify or understate the complexity of tasks, but in different ways that can create incongruence. Furthermore, the parties may interpret and bridge ambiguities in distinct ways based on their unique experiences, which can produce incongruence in the understanding and assignment of task responsibilities. Finally, the third factor is lack of communication between parties. In a rapidly changing business environment, regular communication between organizations is required to maintain relationships. The absence of this communication may result in incongruence in perceptions. As Mentzer et al. (2000, p. 55) states, "when communication between supply chain partners is nonexistent or inadequate, the potential for problems increases exponentially."

Evidence through our industry contacts indicates that many VMI relationships are not governed by formal contracts, but by verbal and informal agreements. Waller et al. (1999, p. 27) report that in VMI relationships buyers transfer inventory responsibility to the vendors not only by "letters" but also by the unwritten "spirit of the agreement". Given this informal understanding between supply chain partners, there may be room for psychological contracts to help govern VMI relationships.

2.4. Hypotheses Development

VMI is a partnership between two firms in a supply chain. As in any other business partnership, a degree of trust is essential for the relationship to be maintained (Pohlen & Goldsby 2003). Since the implementation of VMI requires the distributor to trust the manufacturer to manage its inventory efficiently and equitably, the maintenance and development of trust between partners is of utmost importance.

However, there are three key aspects of a VMI relationship that could lead to an erosion of trust as the relationship matures. First, VMI is a unique collaborative process that requires a distributor to transfer inventory decision-making to its manufacturer. As Yao et al. (2012) state, the manufacturer may initially perform this task well, but performance may erode over time, as practices become obsolete and as the supplier's best personnel are transferred to new projects. As a result, the distributor's belief that future performance by the manufacturer will meet expectations (i.e., trust in the manufacturer to perform its tasks properly) may be diminished. Second, as Williams (2000) has observed, buyers may become increasingly dependent on their suppliers as their relationship matures. At the outset of a VMI relationship, the distributor may have personnel with the skills to monitor the manufacturer's inventory and purchasing decisions (i.e., personnel who recently performed these tasks themselves). However, over time, these individuals will leave the organization, move to new positions, or just forget how to perform their previous functions. As a result, the distributor's ability to monitor the

manufacturer may diminish over time. Since trust is best bred in an environment of mutual dependency (Emerson 1962), the development of a one-way dependent relationship could diminish a distributor's trust in its manufacturer. Actually, analyzing the antecedents of supply chain project success, Brinkhoff et al. (2014) provide empirical evidence that asymmetric supply chain dependence leads to lower supply chain trust and Roldan Bravo et al. (2016) show that power asymmetry in supply chain relationships influences innovation and competence. Finally, after implementing VMI, the traditional ordering process ceases. This change may result in lower levels of contact and communication between distributor-manufacturer dyads. As the VMI program matures, personal relationships between buyer and supplier staff may be lost. Hirakubo et al. (2000, p. 90) suggest "direct and frequent contact between buyers and suppliers is indispensable for building a trusting relationship." Therefore, reduced communication between the distributors and manufacturers could negatively affect trust levels. Considering all three attributes of a VMI relationship, we hypothesize the following:

H1. Longer VMI relationships are associated with lower levels of distributor trust in the manufacturer.

In addition to contributing to the erosion of trust, long term VMI relationships may also lead to psychological contract violation. Mentzer et al. (2000) observe that VMI relationships may develop over a long period of time. Given the high rate of employee turnover in many firms, it is common for the staff that implemented the VMI program at both the buyer and supplier firms to move to new positions. As the functioning of a VMI program often relies on unwritten and informal agreements, changes in personnel may result in the loss of tacit knowledge and the disruption of personal relationships. As a VMI relationship matures, conflicts between the distributor and manufacturer may more easily develop leading to violations of the psychological contract.

In addition, Mentzer et al. (2000, p. 55) suggest that, "Clear expectations are required in any lasting relationship." Informal VMI relationships make the clarification of responsibilities between the two organizations challenging, and these challenges will be compounded as the environment changes and the business relationship evolves.

Moreover, asymmetry in sharing VMI benefits between manufacturers and distributors may contribute to psychological contract violation. Nyaga et al. (2010) suggest that perceptual inequity in the sharing of benefits from collaborative supply chain relationships could hurt the relationship outcomes. Corsten and Kumar (2005) argue that manufacturers often feel greater inequities in the sharing of these benefits. Along the same lines, Roberts (2003) and Lee (2004) assert that distributors get the larger share of supply chain benefits from adopting VMI. A perception of inequity may cause a manufacturer to renege on the informal agreement surrounding a VMI relationship by limiting performance, creating violations in the distributor's psychological contract.

Mentzer et al. (2000) demonstrate that employee-oriented relational factors compose a significant portion of the enablers and inhibitors in VMI relationships. Since relationships may deteriorate over time, the maturing of a VMI contract may lead to greater possibilities of psychological contract violation. Thus we have the following hypothesis:

H2: Longer VMI relationships are associated with higher levels of psychological contract violation experienced by distributors.

Broken promises erode the perceived benevolence and integrity of the violator and are often associated with the violation of psychological contracts. In an organizational context, Robinson (1996) demonstrates that an employee's feelings of psychological contract violation lead to loss of trust towards his/her employer. In a buyer-seller context, Hill et al. (2009) investigate the link between psychological contract violation and two dimensions of trust: dependability and benevolence. According to the authors, suppliers that experience psychological contract violation in their relationship with buyers tend to evaluate the dependability and benevolence of those buyers negatively, thereby eroding the perceived trustworthiness of the buyers. Similarly, in a VMI context, we expect that a distributor's feelings of psychological contract violation will lead to loss of trust in the manufacturer.

H3: Higher levels of psychological contract violation experienced by distributors are associated with lower levels of distributor trust.

Erosion of trust in a buyer-supplier relationship may take place over time. A distributor that observes a partner manufacturer underperform in a relationship may, (i) forgive the manufacturer by acknowledging its own limited efforts in the relationship, (ii) forgive the manufacturer by considering the hostile environmental factors that could have prevented the manufacturer from better fulfilling its performance obligations, or (iii) give signals of frustration, anger and disappointment to the manufacturer (Elangovan et al. 2007). Only if the manufacturer does not address the distributor's perception of a contract violation may the distributor adjust downwards the level of trust placed on that manufacturer. Therefore, psychological contract violation may at least partially mediate the relationship between length of VMI relationship and trust; that is, it may be through psychological contract violation that the length of a VMI relationship will influence trust, as stated in the following hypothesis:

H4: Psychological contract violation is a mediator between length of VMI relationship and distributor trust
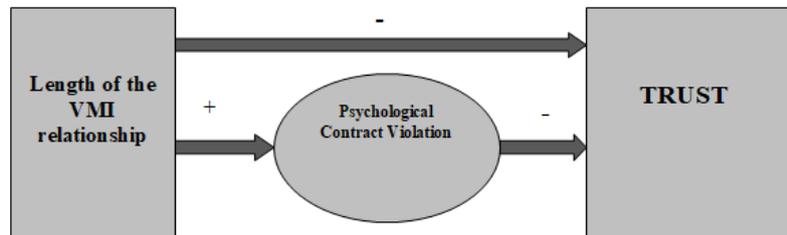
Fig. 1. The Research Framework

Figure 1 provides a visual description of our four hypotheses.

3. RESEARCH DESIGN

3.1. Data and Methodology

Cross-sectional data were collected using a survey format from 200 distributors that have their inventories managed by manufacturers through VMI arrangements. Our sample was obtained from a leading third party VMI platform service provider that serves thousands of retailer, distributor and manufacturer locations with millions of SKUs and billions of dollars in sales orders. All of their customers operating as a distributor in North America were included in the sample. Key informants are executives/senior managers from unique distributors overseeing these VMI relationships. All informants in our sample represent distributors operating in the U.S. (96 percent) and Canada (4 percent). Each informant is asked to answer survey questions concerning the distributor firm's relationship with the manufacturer with which the firm has VMI agreement (largest one if the firm is supplied by multiple manufacturers). The unit of analysis is, therefore, a distributor-manufacturer VMI relationship. Similar to Dyer and Chu (2003) who define trustors and trustees in supply chain relationships based on their perceived authority, we consider distributors as trustors and manufacturers as trustees, since the distributors are made vulnerable to the actions of their manufacturers under VMI.

In all of the VMI arrangements, regular communications between the distributor and the manufacturer occur through electronic data interchange (EDI). The third party VMI services provider facilitates the EDI arrangements. Daily, the distributors share item-level point-of-sales data and inventory levels with their manufacturer-suppliers using the Product Activity Data document (EDI 852). The manufacturers replenish the distributor inventories based on these data. Despite its critical role, the information services provider does not intervene in VMI management decisions (i.e., inventory levels and order decisions), but only

provides the technical expertise to allow communications to take place between the two parties. In addition, the information services provider holds annual conferences for its manufacturer and distributor customers to facilitate the sharing of best practices. None of the distributors are subsidiaries of the manufacturers; all are independent entities that own the inventories at their premises (i.e., consignment is not used).

The survey was designed primarily by using tested measures from previous studies. Survey items measuring a single construct were grouped together in the questionnaire with each section starting with a brief description of its content. The survey was pre-tested by both researchers and industry professionals. An early draft was reviewed by three logistics and supply chain researchers for content, clarity, flow and coherence. The survey was then sent to two industry professionals and was pre-tested, resulting in further improvements. The final survey has a total of 32 questions, well below 125 – the upper threshold suggested by Dillman (1978) to achieve a good response rate.

A pre-notification email was sent by our sponsor to the distributors before the survey was launched in order to encourage their participation. A week after the pre-notification letter, a link to the survey was emailed to each distributor. This first email was followed by two subsequent communications separated by a week. To encourage responses, the invitation emails were always sent on Tuesdays (to avoid busy Mondays after the weekend) at 10:00 AM (after the early morning email traffic). In addition, an offer was made to potential informants to donate $2 to the National Wildlife Federation for the return of a completed survey. The first communication wave produced 38 responses, the second wave 17 responses, and the third wave 2 responses, for a total of 57.

Table 1. Profile of Key Informants

Key Informant's		
Position Held in the Distributor Firm	**Frequency**	**Percent**
Director / CEO / President / Vice President	21	39%
Manager / Department Head	23	43%
Analyst / Specialist	10	18%
Duration of Employment with the Distributor Firm		
Less than a year	1	2%
1-2 years	4	7%
3-4 years	8	15%
5-6 years	4	7%
7 years or more	37	69%
Total	54	100%

Following the recommendation of Kumar et al. (1993), the key informants to our survey are senior managers/executives working for the distributor; individuals

who are in charge of overseeing the day-to-day VMI relationship with the manufacturer. The profiles of the key informants to our survey are illustrated in Table-1. Thirty nine percent of the respondents hold positions at the director level or higher, including Director of Purchasing, Vice President of Operations, and Director of Supply Chain Management. Forty-three percent occupy managerial roles, such as Procurement Manager, Alliance Manager and IT Manager. The remaining 18 percent of the respondents are specialists, such as IT Analysts and EDI Administrators.

Table 2. Profile of Distributors

	Frequency	Percent
Number of Employees		
Fewer than 50	7	13%
51-200	20	37%
201-500	18	33%
501-1000	3	6%
1001 or more	6	11%
Total Revenue Last Year (Million Dollars)		
Less than 1	2	4%
1-4.99	0	0%
5-19.99	12	22%
20-49.99	14	26%
More than 50	26	48%
Industry		
Electrical	26	48%
Auto	19	35%
Plumbing	6	11%
Consumer Goods	2	4%
Industrial Products	1	2%
Length of the VMI Relationship		
Less than a year	9	17%
1-2 years	8	15%
3-4 years	17	31%
5-6 years	10	19%
7 years or more	10	19%
Total	54	100%

We also asked our key informants about the length of their employment with the distributor firm. 65 percent were employed for 7 years or more, 7 percent for 5–6 years, 16 percent for 3–4 years and 9 percent for 1–2 years. Only 3 percent of our respondents have been working for the distributor firm for less than a year.

Thus, based on the profiles of our key respondents and the length of their employment with the distributor firm, we are confident that our key respondents are competent and knowledgeable to complete our survey.

Finally, we provide information about the profiles of distributors in our sample. Table 2 shows that majority of the distributors are small to medium-sized enterprises representing a range of industries including Electrical Supplies, Auto Parts and Supplies, Plumbing, and Consumer Goods.

Out of the 200 distributors we contacted, 5 had opted out of the online survey system that was employed and, therefore, could not be surveyed, 4 answered that they did not use VMI anymore, and 29 email addresses bounced back. Of the remaining 162 distributors, 57 completed the survey. Three responses were further deleted because respondents either mentioned that they were not familiar enough with the VMI relationship to complete the survey or left many questions unanswered. Eventually, we had 54 usable responses and a response rate of 33.3 percent. Although the reasonably high response rate could alleviate some concerns, we tested for non-response bias by comparing the early and late waves of the completed questionnaires based on the suggestion of Armstrong and Overton (1977) that late responses proxy for non-respondents. Sorting the questionnaire by completion date, a subset of 21 responses completed on the first day were tagged as "early". This was compared with the late wave – another subset of 21 which were received the latest, between days 6 and 15 after emailing the survey. The t-test did not yield any significant difference between early and late respondents for three key variables: Trust (t=-0.44), Length of VMI relationship (t=-0.69) and Number of employees (t=0.66), thus lending support to the absence of non-response bias in our survey.

Given all questions were answered by only one key respondent from each distributor, it is important to address potential common method bias concerns. In order to reduce the potential for common method bias, in designing the survey, we did the following: (i) included a variable for propensity-to-trust (PTT) in our model to control for potential respondent biases, as per Podsakoff et al. (2003, p. 889)'s suggestion to "use a measure of the assumed source of the method variance as a covariate in the statistical analysis"; and (ii) used reverse-coded items in three of the constructs to alleviate potential response pattern biases. At the statistical analysis phase, we used Harmon's single-factor test to conduct an exploratory factor analysis using all items in our study (Aulakh and Gencturk 2000). We found that four different factors emerged with eigenvalues greater than one, and these four factors together accounted for 78.1 percent of the variance. Because, neither a single factor emerged, nor a single variable accounted for majority of the covariance among items (Podsakoff & Organ 1986), we conclude that common method variance is not a significant issue for our study.

3.2. Measures

The measures have been adapted from the extant trust and supply chain literatures. In order to capture the VMI context of this study, minor modifications have been made to some items based on feedback from industry professionals. While a majority of our survey questions use a five-point Likert scale (1: Strongly disagree; 5: Strongly agree), a few questions have open-ended (i.e. "What position do you hold in your firm") and Yes/No (i.e. "Is your firm an independent distributor") type of answers as well.

Our dependent variable, TRUST, captures a distributor's trust in its largest VMI manufacturer. Three dimensions of trust related to the distributor's perception of the manufacturer – benevolence, integrity, and ability to perform, are assessed using a total of six items. Two items measuring the perceived benevolence of the manufacturer are adapted from Dyer and Chu (2003) and Doney and Cannon (1997). Perceived integrity of the manufacturer is measured by two items adapted from Zaheer et al. (1998) and Dyer and Chu (2000). Perceived ability of the manufacturer is measured by the competence scale from Yilmaz et al. (2005). Finally, as a reliability check on the Trust construct, as suggested by Dyer and Chu (2000), we include an item assessing the "manufacturer's reputation for trustworthiness".

The key independent variable in our model, LENGTH_VMI, assesses the length of the VMI relationship between the distributor and the manufacturer and is measured by a direct question in the survey: "How long has your firm been using VMI with this supplier? (Round to the nearest year)" Five choices include "Less than a year", "1-2 years", "3-4 years", "5-6 years" and "7 years or more".

The mediating variable in our model is PCV (Psychological Contract Violation). This variable captures the degree of psychological contract violation experienced by a distributor in its VMI relationship with the manufacturer and the items in this construct are adapted from Hill et al. (2009) with minor changes to fit the VMI context.

We include five control variables to increase the reliability of our results. PTT, or Propensity-to-Trust, is adapted from Mayer and Davis (1999). It is included in the model for two reasons: (i) to better ensure that the key informant's inherent trust propensity does not confound our results; and, (ii) to control for potential common method bias created by the key informant's affective states. SIZE of the distributor is included to control for unobservable distributor heterogeneity that may be correlated with the independent variable, or influence the mediating or dependent variable. Two items are used to assess size – number of employees at the distributor and total revenue of the distributor in the most recent year. A variable assessing supply chain performance improvement– PERFORMANCE – Is included in our model since performance may be a significant predictor of trust. It is measured by three items: (i) the reduction in inventory related costs; (ii) increase in inventory turnover; and, (iii) improved fill rate – after implementing

VMI. Finally, we include two dummy variables – Industry Auto and Industry Electrical, to control for unobservable industry effects. The other industries serve as the base case.

Descriptive statistics for the key variables are provided in Table 3. The TRUST construct has a mean score of 4.09. Given that the item scores range from "lowest trust: 1" to "highest trust: 5" on a 5 point Likert scale, it is evident that the average trust level that distributors have in their manufacturers is quite high. The PCV construct has a mean of 1.66 showing that perceived psychological contract violation among distributors is relatively low, but the standard deviation of 0.55 indicates that there is a significant amount of variation in PCV among distributors. The PTT variable has a mean of 3.18, implying the average key informant's inherent disposition to trust is moderate. In other words, our key informants neither blindly trust, nor suspect every action, of their partners. The PERFOMANCE variable has a mean of 3.64 out of 5.00 which points to reasonable satisfaction about performance improvement after adoption of VMI. The SIZE construct has a mean of 3.61, indicating that our dataset is comprised of small-to-medium sized firms as previously discussed in section 3.1. The independent variable LENGTH_VMI has a mean of 3.91 years and a standard deviation of 2.56, which indicates the presence of firms with a diverse set of new and mature VMI relationships. Finally, the two industry dummies (Industry Auto and Industry Electrical) show that 45 percent of the respondent distributors are in the electrical supplies industry while 35 percent come from the automotive parts and supplies industry, and the remaining 20 percent comprise the base category of other sectors (Consumer Goods, Plumbing, Industrial Products and Utility).

Table 3. Descriptive Statistics

Variable	Mean	SD	Minimum	Maximum
TRUST*	4.09	0.47	2.5	5.0
PCV*	1.66	0.55	1.0	3.0
PTT*	3.18	0.52	2.0	4.0
PERFORMANCE*	3.62	0.72	2.0	5.0
SIZE*	3.61	1.02	1.5	5.0
LENGTH_VMI	3.91	2.56	0.5	8.0
Industry Auto DUMMY	0.35	0.48	0	1
Industry Electrical DUMMY	0.45	0.50	0	1

* Item sums in these constructs have been normalized to 5 points scale in calculating descriptive statistics.

3.3. Measure validation

We conduct Confirmatory Factor Analysis (CFA) to check the internal consistency of the factors. Although model fit statistics are very sensitive to sample size (Gerbing & Anderson 1985), our model provides a reasonable fit for the survey data: Chi-Square = 232.12, d.f. = 142, P = 0.01, CFI = 0.90, RMSEA = 0.10 (Bogozzi & Yi 1988; Hu & Bentler 1999).

Table 4. Item Loadings on the Factors

Responses are on a 5 point Likert Scale: 1 = Strongly disagree, 3 = Not sure, 5 = Strongly agree	Standardized loading	Standard error	t-Value
TRUST			
When making important decisions, this supplier considers our firm's welfare as well as its own.	0.69	0.09	6.97
Based on past experience, we can rely on this supplier to keep promises made to our firm.	0.87	0.03	26.07
If given a chance, this supplier could take unfair advantage in our business relationship. (R)	-0.59	0.09	6.11
We receive fair treatment from this supplier.	0.79	0.05	15.94
This supplier is competent and capable of providing us with required products according to our specifications in a timely fashion.	0.61	0.14	4.50
This supplier has a reputation for trustworthiness in the business world.	0.80	0.05	16.23
PERFORMANCE			
Use of VMI has improved our fill rate to our customers	0.87	0.05	17.67
Use of VMI has allowed us to reduce our inventory related costs	0.91	0.03	34.64
Use of VMI has increased our inventory turnover	0.91	0.03	32.67
PCV: When I think about what our firm contributed to the relationship with this supplier and what we received in return, I feel			
pleased (R)	-0.89	0.03	35.43
angry	0.88	0.05	18.77
frustrated	0.92	0.01	99.81
satisfied (R)	-0.80	0.04	20.59
cheated	0.79	0.03	26.91
PROPENSITY TO TRUST (PTT)			
Most business partners can be counted on to do what they say they will do.	0.62	0.16	3.79
These days, our business should be alert; otherwise some other firms are likely to take advantage of us. (R)	-0.66	0.16	3.99
In dealing with our suppliers and customers, each and every aspect of the relationship should be written in a contract to prevent opportunistic behavior. (R)	-0.68	0.15	4.64

* Items marked (R) are reverse coded

In addition, as shown in Table 4, all item loadings onto the respective constructs are highly significant and above the 0.6 threshold (Nunnaly, 1978), except for the second item of the TRUST construct that had a 0.59 coefficient. As this particular item was previously tested in the seminal work of Dyer and Chu (2003), we have kept it in the model. The inter-factor correlations provided in Table 5 are all below the 0.85 threshold (Brown, 2006) and the pairwise correlation between items of different constructs are all below 0.6, extending further support to the discriminant validity of our constructs.

Table 5. Discriminant Validity

	1	2	3	4	5	6
1 TRUST	1					
2 LENGTH_VMI	-0.33	1				
3 PERFORMANCE	0.22	0.13	1			
4 PCV	-0.59	0.42	-0.32	1		
5 PTT	0.43	-0.24	0.02	-0.22	1	
6 SIZE	0.23	0.16	0.37	-0.21	0.22	1

4. RESULTS

4.1. Overview

Before formally testing our hypotheses, we provide summary statistics of the distributor trust levels over three phases of VMI relationships. The average trust level of distributors that have been using VMI for less than a year is 0.47 standard deviations above the mean trust level for all distributors in our sample. For distributors that have been using VMI between one and seven years, the trust level is only 0.11 standard deviations above the mean. Finally, for distributors which have been using VMI for at least seven years, the trust level is 0.74 standard deviations below the mean. The difference of the mean trust levels between new (<= one year) and mature (>= seven years) VMI relationships is statistically significant (p= 0.003).

4.2. Estimation Results

We use Ordinary Least Squares (OLS) regression to analyze the survey data, following two similar studies by Hill et al. (2009) and Villena et al. (2011). Results are presented in Table 6.

In column 1, the dependent variable TRUST is regressed solely onto the independent variable LENGTH_VMI and coefficient of -0.36** shows that there is

a significant negative relationship between the length of a VMI relationship and distributor trust in the manufacturer. With an R2 value of 0.11, length of a VMI relationship explains around 11 percent of the variability in TRUST. In column 2, TRUST is regressed onto the control variables in the absence of LENGTH_VMI. While the coefficients of this model are not among our primary interests, an R2 value of 0.24 indicates that the control variables explain a significant portion of the variability in the dependent variable TRUST and merit inclusion in the model. Merging the independent and control variables in a single model, we observe again in column 3 that LENGTH_VMI is negatively associated with TRUST (coefficient of -0.32**). This provides support for our Hypothesis-1 that longer VMI relationships are associated with lower distributor trust in the manufacturer. The results show that for a distributor at the sample's mean trust level (4.09 out of 5.00), all else equal, a year increase in the length of the VMI relationship results in a 1.31 percent reduction in distributor's trust of its VMI manufacturer.

In columns 4–6, we report the results when PCV is the dependent variable. Similar to our approach above, we regress PCV onto LENGTH_VMI in column 4 and see that there is a significant positive relationship (coefficient of 0.45***) and a R2 value of 0.17. In column 5, we regress PCV only onto the control variables and observe that the control variables explain 22 percent of the variability in PCV. Finally, we put all variables in a single model and report the results in column 6. The coefficient of the independent variable LENGTH_VMI slightly increases to 0.46***. Overall, we observe that longer VMI relationships are associated with higher levels of psychological contract violation which offers support to Hypothesis 2.

In column 7, we regress the dependent variable onto the independent variable LENGTH_VMI, mediating variable PCV and all control variables. The PCV variable has a significant and negative coefficient of -0.47*** indicating that higher psychological contract violation is associated with lower levels of distributor trust in the manufacturer, supporting Hypothesis 3.

To test the fourth hypothesis, we follow Baron and Kenny (1986) approach of three-step mediation model. Mediation is demonstrated if the inclusion of PCV in the estimation of TRUST in column 7 (i) reduces the significance of the LENGTH_VMI to TRUST relationship reported in column 3, and (ii) results in a significant coefficient for the newly added PCV variable in column 7. We observe that the mediating variable PCV has a significant effect (-0.47***) on the dependent variable TRUST, while the coefficient for LENGTH_VMI (-0.10) turns to be insignificant (p > 0.10) in column 7. As a result, the relationship between LENGTH_VMI and TRUST can be said to be fully mediated by PCV, supporting Hypothesis 4.

Table 6. OLS Results

	Dependent Variable (Column #)						
	TRUST (1)	**TRUST (2)**	**TRUST (3)**	**PCV (4)**	**PCV (5)**	**PCV (6)**	**TRUST (7)**
LENGTH _VMI	-0.36** (0.14)	-	-0.32** (0.14)	0.45*** (0.14)	-	0.46*** (0.14)	-0.10 (0.14)
SIZE	-	0.10 (0.24)	0.20 (0.23)	-	0.01 (0.25)	-0.15 (0.23)	0.13 (0.22)
PERFOR MANCE	-	0.22 (0.18)	0.25 (0.17)	-	-0.34* (0.18)	-0.38** (0.16)	0.07 (0.16)
PTT	-	0.75** (0.23)	0.59** (0.23)	-	-0.42* (0.23)	-0.18 (0.22)	0.51** (0.21)
Industry Auto	-	-0.59 (1.14)	-0.12 (1.12)	-	1.91 (1.16)	1.23 (1.07)	0.46 (1.03)
Industry Electrical	-	-0.73 (0.95)	-0.33 (0.93)	-	1.73* (0.96)	1.15 (0.88)	0.21 (0.86)
PCV	-	-	-	-	-	-	-0.47*** (0.14)
CONSTA NT	25.91*** (0.67)	14.79*** (3.14)	16.13*** (3.07)	6.55*** (0.63)	14.50*** (3.16)	12.52*** (2.91)	22.05*** (3.29)
R^2	0.11	0.24	0.32	0.17	0.22	0.38	0.45
Adjusted R^2	0.09	0.16	0.23	0.16	0.14	0.30	0.37
Number of observati ons	54	54	54	54	54	54	54

Significance levels: * $p < 10\%$, ** $p < 5\%$, *** $p < 1\%$

Interpreting the control variables, we see from the results in columns 3 and 7 that higher propensity to trust (PTT) is associated with higher levels of trust (coefficients of 0.59** and 0.51**). This result is to be expected as theory shows that propensity to trust is a major driver of the trustor's level of trust (Mayer et al., 1995). Interestingly, improvements in performance (PERFORMANCE) contribute to significant reductions in psychological contract violation (column 6) but have no direct impact on the level of trust. Finally, we observe that distributor SIZE has no significant association with either PCV or TRUST and that industry sector is not a significant factor either.

5. DISCUSSION

This study enhances the literature by showing that there is a dark side to long-term VMI relationships with respect to supply chain trust. Previously, Villena et al. (2011) showed the dark side of highly collaborative buyer-supplier relationships such that too much social capital could decrease a buyer's objectivity and increase

a supplier's opportunistic behavior – thus hurting supply chain performance. In this study, we demonstrate another dark side of highly collaborative supply chain relationships in a VMI context: longer VMI relationships are associated with higher levels of psychological contract violation, which in turn leads to lower levels of distributor trust.

For our research, we adopted the psychological contract theory as a lens to explain the dynamics of this relationship, similar to Hill et al. (2009), who used the same theory to explain the relationship between unethical activities and supply chain trust. The common use of informal VMI agreements between manufacturers and distributors allows psychological contracts to form in this supply chain relationship. This development, coupled with the idiosyncratic attributes of VMI (notably, the relinquishment of control over inventory and purchasing decisions by the distributor to the manufacturer, the potential loss of distributor competencies, and the unequal sharing of costs and benefits), may be the factors that increase the distributors' experience of psychological contract violation in long-term VMI relationships, in turn resulting in lower trust levels on the distributor side.

A primary reason for manufacturers to participate in VMI programs is to retain customers. This requires the manufacturers to nurture trustful relationships with their distributors. The bad news for manufacturers using VMI is that after implementing VMI, distributor trust is subject to erosion over time. Psychological contract violation, which is strongly related to supply chain trust, comes with feelings of anger, resentment, injustice and even betrayal on the distributor side. Manufacturers that meet regularly with their distributors at multiple levels should be able to observe these signals of frustration, and act on them to prevent the loss of trust. Elangovan et al. (2007) suggest that "post-violation analysis" could reduce the extent of the damage in the case of a trust violation. Therefore, listening to their distributor-customers and jointly bridging gaps in the understanding of reciprocal obligations from a VMI program could help manufacturers avoid trust erosion. In addition, Elangovan et al. (2007) show that the extent of trust erosion is higher if the distributor believes that a manufacturer is not willing to perform duties (rather than not being able to perform the duties). Manufacturers should clarify reasons for failing to meet the expectations of the distributors and underline the external disturbances preventing them from fulfilling these duties, whenever possible.

Our findings have important implications for VMI users. First, manufacturers should not let the implementation of VMI restrict communications with their distributors. Reciprocal inter-organizational communication is essential to sustain a trustful and collaborative relationship (Bstieler et al., 2017). As discussed above, lack of communication is an important factor in generating incongruence between supply chain partners. Since VMI programs may reduce the opportunities for regular communication between distributors and manufacturers (i.e., since manufacturers take over the ordering process), it is important that manufacturers find other ways to maintain communications. Therefore, the implementation of regular meetings with distributors, along with other forums for communication,

such as industry-wide VMI conferences, could also be helpful in maintaining a trusting relationship. It may also be helpful for VMI partners to rely more heavily on written contracts in governing their relationships to limit the extent to which the relationships are ruled by psychological contracts. Third party VMI technology providers could be instrumental in facilitating formalized VMI contracts between manufacturers and distributors. Finally, in supply chain relationships, trust may play a larger role in the satisfaction and commitment of buyers than suppliers, given the dependency that buyers have on suppliers (Nyaga et al. 2010). Therefore, it is incumbent on manufacturers to continuously strive to build and maintain a trusting, cooperative relationship in their VMI partnerships with distributors.

Finally, this paper contributes to the supply chain management literature in the area of collaborative supply chain relationships. To the best of our knowledge, this is the first paper to investigate how the duration of a VMI relationship impacts supply chain trust. Moreover, we make a theoretical contribution by showing the mediating role of psychological contract violation between length of a VMI relationship and supply chain trust. Given the need for interdisciplinary research in supply chain management (Zacharia et al. 2014), our study is an initial effort to investigate cognitive and psychological aspects of buyer-supplier relationships.

6. LIMITATIONS AND FUTURE RESEARCH

Our analysis of distributor trust levels must be interpreted in the light of VMI relationship survival bias. We have surveyed only those distributors that have maintained VMI relationships with their manufacturers. However, some VMI relationships could have been terminated due to lack of trust. The exclusion of these failed VMI relationships could bias our results.

Trust goes both ways in supply chain relationships and investigation of how the manufacturers' (upstream party) trust level changes as a VMI relationship matures merits researchers' attention as well. The cross-sectional nature of the data only allows us to confirm associative relationships between the variables. In the future, it will be helpful to validate the causal links using longitudinal data. Future research could employ time series data to track VMI relationships as they progress in order to determine how trust may erode over time. Surveying manufacturers to investigate their perspective on relational factors in VMI relationships would be an important enhancement to our study as well.

We have proposed that long-term VMI relationships are subject to lower distributor trust because of idiosyncratic attributes of VMI. However, we do not make generalizations from this conclusion to all buyer-supplier relationships (including those not using VMI). In the future, our model could be tested on users of other collaborative programs to determine whether inter-organizational trust evolves differently under non-VMI relationships. Finally, upon collection of

a larger set of observations, structural equation modeling could be used to model the relationship between our multiple constructs in a single model in order to better account for error variance and intricate relationships.

7. CONCLUSION

Trust is important for survival and development of supply chain relationships as it leads to commitment and satisfaction. Our findings shed light on a dark side of VMI relationships, such that long-term VMI relationships are associated with lower levels of distributor trust in the manufacturer. Manufacturers that use VMI to replenish their distributors' inventories should ensure that adoption of VMI does not decrease communication with distributors. Bilateral communication with distributors could help manufacturers ensure that any violation of the psychological contract with a distributor is realized before it breaks down a trusting relationship. Both the distributors and manufacturers should be explicit and clear in designing the terms of their VMI relationship, and if possible use a formal contract to limit the potential of psychological contract violation. Grayson and Ambler (1999, p. 139) conclude "If the sustainable competitive advantage enjoyed by long-term relationships carries the seeds of its own destruction, then it is important to understand why, so that managerial strategies can be developed specifically to fend off this policy." We agree. It is incumbent on manufacturers and their distributors to act in ways that maintain a trusting relationship for the good of both parties.

REFERENCES

Akhbari M., Zare Mehrjerdi Y., Khademi Zare H. & Makui A. (2014), VMI-type Supply Chains: a Brief Review", Journal of Optimization in Industrial Engineering, Vol. 7(14), pp. 75–87.

Anand K. S. & Goyal M. (2009), "Strategic Information Management under Leakage in a Supply Chain", Management Science, Vol. 55(3), pp. 438–452.

Armstrong J. S. & Overton T.S. (1977), "Estimating Non-response Bias in Mail Surveys", Journal of Marketing Research Vol.14 (3), Special Issue: Recent Developments in Survey Research: pp. 396–402.

Aulakh P. S. & Gencturk E.F. (2000), "International principal-agent relationships – control governance and performance", Industrial Marketing Management, Vol.29, pp. 521–538.

Baron R.M. & Kenny D.A. (1986), "The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations", Journal of Personality and Social Psychology Vol. 51(6), pp.1173–1182.

Barratt M. (2004), "Unveiling Enablers and Inhibitors of Collaborative Planning", International Journal of Logistics Management, Vol. 15 (1), pp.73–90.

Barratt M. & Oliveira A. (2001), "Exploring the experiences of collaborative planning initiatives", International Journal of Physical Distribution and Logistics Management, Vol. 31(4), pp. 266–289.

Blau P.M. (1964), "Exchange and power in social life", New York: Wiley.

Bogozzi R. & Yi Y. (1988), "On the Evaluation of Structural Equation Models", Journal of the Academy of Marketing Science, Vol. 16, pp.74–94.

Brown T.A. (2006), "Confirmatory Factor Analysis for Applied Research", Guilford Press, NY.

Bstieler L., Hemmert M., & Barczak G. (2017), "The changing bases of mutual trust formation in inter-organizational relationships: A dyadic study of university-industry research collaborations", Journal of Business Research, Vol. 74, pp. 47–54.

Cachon G.P. & Fisher M. (1997), "Campbell soup's continuous replenishment program: evaluation & enhanced inventory decision rules", Production and Operations Management, Vol. 6(3), pp. 266–176.

Chen F., Drezner E., Ryan J. & Simchi-Levi D. (2000), "Quantifying the bullwhip effect in a simple supply chain: the impact of forecasting, lead times, and information." Management Science, Vol. 46(3), pp.436–443.

Cetinkaya S. & Lee C. (2000), "Stock Replenishment and Shipment Scheduling for Vendor Managed Inventory Systems", Management Science, Vol. 46(2), pp. 217–232.

Corbett C.J., Blackburn J.D. & Van Wassenhove L.N. (1999), "Partnerships to improve supply chains", Sloan Management Review, pp. 71–82.

Corsten D. & Kumar N. (2005), "Do suppliers benefit from collaborative relationships with large retailers? An empirical investigation of efficient consumer response adoption", Journal of Marketing, Vol. 69 (3), pp. 80–94.

Darvish M., Kaboli A., Cheikhrouhou N. & Glardon R. (2014), "On the role of trust types and levels on inventory replenishment decision", Information Systems, Logistics and Supply Chain, ILS 2014 (No. EPFL-CONF-201982)

Doney P.M. & Cannon J.P. (1997), "An Examination of the Nature of Trust in Buyer-Seller Relationships",Journal of Marketing Vol. 61, pp. 35–51.

Dong Y. & Xu K. (2002), "A supply chain model of vendor managed inventory." Transportation Research Part-E, Vol. 38, pp. 75–95.

Dong Y., Dresner M. & Yao Y. (2014), "Information Sharing and Beyond: An Empirical Analysis of Vendor Managed Inventory", Production and Operations Management, Vol.23 (5), pp. 817–828

Dwyer F.R., Schurr P.H. & Oh S. (1987), "Developing Buyer-Seller Relationships", Journal of Marketing, Vol. 51, pp. 11–27.

Dyer J.H. & Chu W. (2003), "The Role of Trustworthiness in Reducing Transaction Costs and Improving Performance: Empirical Evidence from the United States, Japan, and Korea", Organization Science, Vol. 14(1), pp. 57–68.

Elangovan A.R., Auer-Rizzi W. & Szabo E. (2007), "Why don't I trust you now? An attributional approach to erosion of trust", Journal of Managerial Psychology, Vol. 22(1), pp. 4–24.

Emerson R.M. (1962), "Power-dependence relations", American Sociological Review, Vol. 27(1), pp. 31–41.

Ganesan S. (1994), "Determinants of Long Term Orientation in Buyer-Seller Relationships", Journal of Marketing, Vol. 58, pp. 1–19.

Gerbing D.W. & Anderson J.C. (1985), "The effects of sampling error and model characteristics on parameter estimation for maximum likelihood confirmatory factor analysis", Multivariate Behavioral Research, Vol. 20, pp. 255–271.

Grayson K. & Ambler T. (1999), "The Dark Side of Long-Term Relationships in Marketing Services", Journal of Marketing Research, Vol.36, pp.132–141.

Gulati R. & Singh H. (1998), "The architecture of cooperation: Managing coordination costs and appropriation concerns in strategic alliances", Administrative Science Quarterly, Vol. 43 (4), pp. 781–814.

Handfield R. (2013), "Vendor Managed Inventory? Think twice and consider the risks", https://scm.ncsu.edu/blog/2013/08/28/vendor-managed-inventory-think-twice-and-consider-the-risks/#comments, Accessed on 9/21/2017

Hill J.A., Eckerd S., Wilson D. & Greer B. (2009), "The effect of unethical behavior on trust in a buyer-supplier relationship: The mediating role of psychological contract violation", Journal of Operations Management, Vol. 27, pp. 281–293.

Hirsch F. (1978), "Social limits to growth", Cambridge, MA: Harvard University Press.

Hosmer L.T. (1995), "Trust: The Connecting Link between Organizational Theory and Philosophical Ethics", Academy of Management Review, Vol. 20(2), pp. 79–403.

Hu L. & Bentler P. (1999), "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis. Conventional Criteria vs. New Alternatives", Structural Equation Modeling Journal, Vol. 66(1), pp. 1–55.

Kumar N., Stern L.W. & Anderson J.C. (1993), "Conducting Inter-organizational Research Using Key Informants", Academy of Management Journal, Vol. 36(6), pp. 1633–1651.

Kulp S.C., Lee H.L. & Ofek E. (2004), "Manufacturer benefits from information integration with retail customers", Management Science, Vol. 50(4), Vol. 431–444.

Kwon I.G. & Suh T. (2004), "Factors Affecting the Level of Trust and Commitment in Supply Chain Relationships", The Journal of Supply Chain Management, Vol. 40(2), pp. 4–14.

Lee H. (2004), "The Triple–A Supply Chain", Harvard Business Review.

MacDuffie J.P. & Helper S. (2005), "Collaboration in Supply Chains: With and Without Trust. Collaborative Community", Editors: Charles Heckscher and Paul S. Adler, Oxford University Press.

Mayer R.C. & Davis J.H. (1999), "The Effect of the Performance Appraisal System on Trust for Management: A Field Quasi-Experiment", Journal of Applied Psychology, Vol. 84(1), pp. 23–136.

Mayer R.C., Davis J.H. & Schoorman F.D. (1995), "An Integrative Model of Organizational Trust", The Academy of Management Review, Vol. 20(3), pp. 709–734.

Mentzer J.T., Foggin J.H. & Golicic S.L. (2000), "Collaboration: The Enablers, Impediments, and Benefits", Supply Chain Management Review, September/October.

Morgan R.M. & Hunt S.D. (1994), "The Commitment–Trust Theory of Relationship Marketing", The Journal of Marketing, Vol. 58(3), pp. 20–38.

Moorman C., Zaltman G. & Deshpande R. (1992), "Relationships between Providers and Users of Market Research: The Dynamics of Trust Within and Between Organizations", Journal of Marketing Research, Vol. 29, pp. 314–328.

Myers M.B., Daugherty P.J. & C.W. Autry. (2001), "The Effectiveness of Automatic Inventory Replenishment in Supply Chain Operations: Antecedents and Outcomes", Journal of Retailing, Vol. 76(4), pp. 455–481.

Nasdaq Globenewswire. (2017), Accessed on 6/20/2017, https://globenewswire.com/news-release/2017/02/10/916110/0/en/Datalliance-Continues-Global-Growth-in-2016.html,

Nyaga G.N., Whipple J.M. & Lynch D.F. (2010), "Examining supply chain relationships: Do buyer and supplier perspectives on collaborative relationships differ?", Journal of Operations Management, 28, pp. 101–114.

Podsakoff P.M. & Organ D.W. (1986), "Self reports in organizational research: problems and prospects", Journal of Management, 12, pp. 531–544.

Podsakoff P.M., MacKenzie S.B., Lee J. & Podsakoff N.P. (2003), "Common method biases in behavioral research: A critical review of the literature and recommended remedies", Journal of Applied Psychology, Vol. 88 (5), pp. 879–903.

Pohlen T. & Goldsby T.J. (2003), "VMI and SMI programs. How economic value added can help sell the change", International Journal of Psychical Distribution and Logistics Management, Vol. 33(7), pp. 565–581.

Roberts C. (2003), "The Rise of VMI." Asia Pacific Development, pp. 99–101.

Robinson S.L. (1996), "Trust and Breach of the Psychological Contract", Administrative Science Quarterly, Vol. 41, pp. 574–599.

Roldan Bravo M.I., Moreno A.R. & Llorens-Montes J. (2016), "Supply Network-Enabled Innovations. An analysis based on dependence and complementarity of capabilities", Supply Chain Management: An International Journal, Vol. 21 Iss: 5, pp. 642–660.

Sheffi Y. (2002), "The value of CPFR" Proceedings of RIRL Conference, Lisbon Portugal. Available at: http://web.mit.edu/sheffi/www/selectedMedia/genMedia.theValueOf-CPFR.pdf Accessed 8/8/2016.

Snapp S. (2010), Accessed 7/8/2017 http://www.scmfocus.com/supplychaincollaboration-/2010/10/why-vendor-managed-inventory-never-made-any-sense/

Soosay C.A. & Hyland P. (2015), "A decade of supply chain collaboration and directions for future research", Supply Chain Management: An International Journal, vol. 20 Iss: 6, pp. 613–630.

Sparks L. & Wagner B.A. (2003), "Retail exchanges: A research agenda", Supply Chain Management: An International Journal, Vol. 8(3), pp. 201–208.

Villena V.H., Revilla E. & Choi T.Y. (2011),"The dark side of buyer supplier relationships: A social capital perspective", Journal of Operations Management, Vol. 29(6), pp. 561–576.

Waller M., Johnson M.E. & Davis T. (1999), "Vendor-Managed Inventory in the Retail Supply Chain", Journal of Business Logistics, Vol. 20(1), pp. 83–203.

Wilding R. & Humphries A.S. (2006), "Understanding collaborative supply chain relationships through the application of Williamson Organizational Failure Network", International Journal of Physical Distribution & Logistics Management, Vol. 36(4): pp. 309–329.

Williams M.K. (2000), "Making Consignment & Vendor-Managed Inventory Work for You", Hospital Material Management Quarterly, Vol. 21(4), pp. 59–63.

Yao Y., Dong Y. & Dresner M. (2012), "Supply Chain Learning and Spillovers in Vendor Managed Inventory", Decision Sciences, Vol. 43(6), pp. 979–1001.

Yilmaz C., Sezen B. & Özdemir O. (2005), "Joint and interactive effects of trust and (inter) dependence on relational behaviors in long-term channel dyads", Industrial Marketing Management 34, pp. 235–248.

Young-Ybarra C. & Wiersama M. (1999), "Strategic flexibility in information technology alliances: The influence of transaction cost economics and social exchange theory", Organization Science, Vol. 10(4), pp. 141–159.

Zacharia Z.G., Sanders N.S. & Fugate B.S. (2014), "Evolving Functional Perspectives within Supply Chain Management", Journal of Supply Chain Management, Vol. 50, Issue 1, pp. 73–88

Zaheer A., McEvily B. & Perrone V. (1998), "Does Trust Matter? Exploring the Effects of Interorganizational and Interpersonal Trust on Performance", Organization Science, Vol. 9(2), pp. 141–159.

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