

# The Effects of Unsuccessful VMI on Customer Attractiveness

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## **Abstract**

Reports on supply chain management (SCM) failure are becoming more frequent in the SCM literature, despite widespread recognition of the business potential associated with such optimizations of operational buyer-supplier interfaces. Some failures can be ascribed to imbalances in the net benefits realized by the buying and supplying company implementing SCM. Failed SCM initiatives hurt the buying company's customer attractiveness and limit opportunities for long term value creation with suppliers. Hence, an important task for the buying company is the management of SCM initiatives in a way that benefits both parties. However, SCM costs and benefits often materialise as the result of complex interactive processes between buyer and supplier actors, which makes SCM a challenging management task. To increase the understanding of these complex processes, this study identifies the various types of supplier costs and benefits resulting from the failed VMI initiative of a multinational company. While the benefits from this case turn out to be few, the costs appear in large variety and scale. More importantly, we uncover the underlying mechanisms generating these costs, thereby enabling managers to identify and avoid the costs. Based on the findings, we propose pre-project classification of supplier VMI readiness to allow more beneficial implementation as a key managerial implication.

## **Introduction**

SCM is a strategic undertaking that improves competitive advantage, due to the lowering of production and transaction costs (Matthyssens and Van den Bulte, 1994; Spekman, Kamauff, and Salmond, 1994). SCM represents a holistic business understanding as companies in the chain work in unison to optimize chain performance to deliver the most optimal product to the final customer. SCM concept covers various initiatives such as Vendor Managed Inventory (VMI), Just-In-Time (JIT), Collaborative Forecasting and Replenishment (CFR), Efficient Consumer Response (ECR), EDI (Electronic Data Interchange), and Radio Frequency Identification (RFID). These and other SCM initiatives integrate the supply chain by strengthening flows of information and material between companies in the chain. The SCM philosophy has been criticized because it assumes chain homogeneity, for instance assuming that companies are willing to forego own benefits in favour of chain benefits and not taking individual chain members' perspectives and businesses into account (Huemer, 2006; Johnsen and Ford, 2005; New and Ramsay, 1997). Many studies have demonstrated the problems with SCM initiatives where mutual benefits are not achieved (Corsten and Kumar, 2005; Dong, Carter and Dresner, 2001; Frazier, Spekman, and O'Neil, 1988;

Mukhopadhyay and Kekre, 2002; Subramani, 2004). Some of these focus on the more moderate initiative outcome where buying companies benefit to a larger extent than suppliers, creating inequitable exchanges (Corsten and Kumar, 2003; Frazier, Spekman and O'Neal, 1998). These unbalanced cost/benefit exchanges takes place despite mutual benefits being a defined success criterion in the SCM literature (Cooper and Ellram, 1993). As a result, supplier motivation for not just these specific initiatives, but indeed for all aspects of exchange with these specific customers is severely reduced (Ballou, Gilbert, and Mukherjee, 2000; Waller, Johnson and Davis, 1999). Regardless, it can be concluded that the creation of supplier benefits from supply chain initiatives is a major success criterion for SCM managers and researchers, and a challenge associated with significant difficulties.

Sometimes customers believe that suppliers will benefit simply because it will allow them to hold on to the customer account, and fail to realize the need for offering benefits in each change project in the buyer-supplier exchange. For each exchange contract or initiative, the supplier and buyer presumably negotiate an agreement that produces satisfactory benefits for both sides. Hence, any additional initiatives (SCM or other) should not be based on the cost/benefit balance of previous agreements, but produce their own sets of satisfactory outcomes. Closely related is the failure to distinguish between supplier investments and pure costs (Halinen, 1996). Buyers employing the investment philosophy will argue that any effort on the supplier side should be perceived as an investment in the customer relationships. However, suppliers may fear that considerable immediate costs will never be outweighed by future benefits. This fear is sometimes warranted as realized supplier benefits frequently cannot surpass initial costs, for instance incurred through extensive adaptations to specific customers (Kalwani and Narayandas, 1995; Larson, Carr and Dhariwal, 2005). Sometimes suppliers are unaware that rewards materialize in the future, while the costs are immediate, for instance when suppliers invest in quality improvements and are awarded larger volumes in the next contract negotiation (Cooray and Ratnatunga, 2001; Corbett, Blackburn, and Van Wassenhove, 1999). In other instances buying companies are simply inconsiderate of supplier benefits, instead relying on coercive mechanisms to force supplier compliance to SCM initiatives, effectively acting like a supply chain "bully" (Boyd, Spekman, Kamauff, and Werhane, 2007). Worst case, the buying company reaps the profits, while suppliers are left with the costs (Sanders 2005; St. John and Heriot, 1993). However, even when companies are aware and considerate, the realization of supplier benefits from SCM initiatives is apparently a challenge. It appears from the many examples in the literature that many diverse and interrelated factors influence suppliers' realized costs and benefits during SCM initiative implementation.

Failure due to lacking supplier benefits has ramifications beyond the SCM initiative. It reduces the buying firm's attractiveness, thereby reducing the possibilities for mobilizing supplier resources in the future to build competitive advantage. Indeed, strategy perspectives, such as the relational view on competitive advantage, see the mobilization of supplier resource as the key to competitive advantage (Dyer and Singh, 1998; Hung, 2002). But companies cannot access and mobilize supplier resources if they have damaged their attractiveness towards suppliers. Paradoxically, unsuccessful present SCM initiatives may inhibit opportunities for implementing future SCM initiatives, as suppliers will then prioritize other customers' initiatives. Hence, securing supplier benefits from SCM initiatives becomes imperative to corporate strategy. SCM managers must take responsibility and ensure supplier benefits in addition to its own from SCM initiatives.

The SCM literature has for some time been investigating the problems with win-lose outcomes. The focus has primarily been on the identification of these costs and benefits in various types of

initiatives and contexts. Some contributions have ventured into the underlying causes for lacking benefits, but these have been primarily occupied with the systems and technical related reasons for lacking benefits. We believe that many reasons for win-lose outcomes must be found beyond the design of the technical interface. Furthermore, this study looks beyond the mere efficiency related cost/benefits of the VMI interface, into the broader range of cost/benefits generated in the entire process of implementing the VMI in the buyer-supplier interface. Knowledge is created on the underlying behavioural and organizational causes for lacking supplier VMI benefits. VMI interfaces are generated in a process of communication and coordination between multiple actors on both sides of the buyer-supplier relationship, whose behaviour affects the outcomes of implementation. We posit that many costs and benefits are incurred because of issues related to this inter actor phenomenon (Ballou, Gilbert, and Mukherjee, 2000; Lee and Billington, 1992). Therefore, we ask *why* benefits are not being realized by suppliers and set out to map these complex underlying cost/benefit driving mechanisms. We investigate a Multinational Corporation's (MNC) failed implementation of Vendor Managed Inventory (VMI) with its key suppliers in a qualitative single case research design. Studies of this kind have been called for by multiple authors (Lambert and Cooper, 2000; Pohlen and Goldsby, 2003). VMI is one of the most widespread and archetypical SCM initiatives. Furthermore, it has frequently proved difficult to implement to the benefit of suppliers, for instance because it can easily be perceived by buying companies as a means to push inventory up-stream or in other ways shift costs and burdens onto suppliers (Disney and Towill, 2003; Vollman and Cordon, 1998).

We focus mainly on the cost side, as unexpected costs have been the Achilles heel of SCM initiative implementations. Our choice of a failure case provides the ideal opportunity to study various supplier cost types and mechanisms, while the identified supplier benefits are limited. We contribute by mapping a broad spectrum of costs and uncover the underlying cost driving mechanisms. The results aid managers in understanding not just the different types of costs but also the complex mechanisms generating these costs, leading to an improved ability to manage SCM initiatives. The results can complement other studies of SCM cost/benefit sharing, which have focused on solving this issue primarily through technology and systems improvements, improved knowledge of operational links, improved reward metrics, benefit sharing arrangements/models, and improved planning (Ballou, Gilbert, and Mukherjee, 2000; Corbett, Blackburn, and Van Wassenhove, 1999; Lamming, Caldwell, and Phillips, 2006). The paper is structured as follows. First, we discuss the need for producing supplier benefits from SCM initiatives and take a look at the literature dealing specifically with benefits from VMI interfaces. After a methodological overview we briefly describe the studied VMI initiative. Next we identify the expectations of suppliers from the project and the costs incurred and map out the cost driving mechanisms. Implications for managers are discussed in the final part.

### ***The Need for Supplier Benefits in SCM Initiatives***

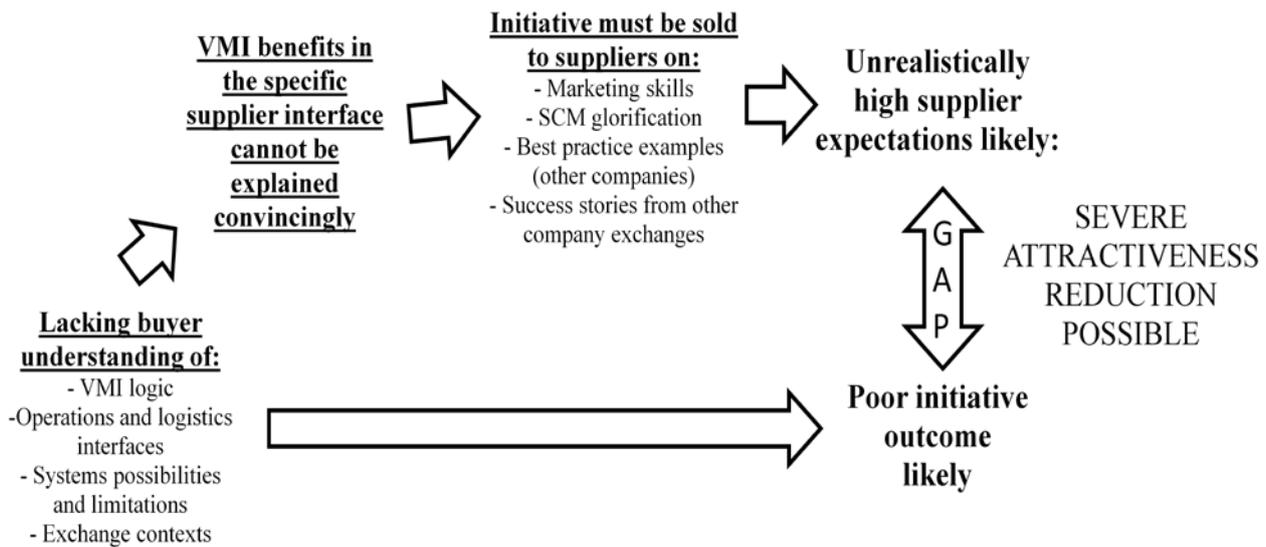
We wish to expand on SCM's inherent philosophy of achieving win-win for the SCM initiative's sake, and advance the need for achieving win-win as a strategic lever, that improves not just the operational interface, but also buying companies' ability to benefit in a broader sense, through knowledge acquisition, product and technology development, market development, quality improvements etc. Several authors on competitive advantage argue that one pillar stone of competitive advantage is the company's ability to build and utilize resources from its supply base (Dyer and Singh, 1998; Harland, Lamming, and Cousins, 1999; Håkansson and Snehota, 1990). In line with this strategy perspective, the perceived attractiveness of customers becomes a key strategic lever for attracting and benefitting from resources in the supply base (Cordon and Vollman, 2002;

Ellegaard, Drejer, and Johansen, 2003; Hald, Cordon, and Vollmann, 2009; Harris, O'Malley, and Patterson, 2003; Moody, 1992; Ramsay and Wagner, 2009; Schiele, 2009). Accordingly, companies that excel in carrying out SCM initiatives will attract the resources of the supply base and out-compete companies less adept at this type of exercise. Hence, SCM contributes to competitiveness not just through efficiency gains, but also because increased attractiveness improves and strengthens access to supplier resources relative to competitors. On the other hand, attractiveness reducing SCM initiatives will affect competitive advantage negatively. Hence, the flawless management of SCM initiatives becomes of strategic importance. Supply chain managers must manage SCM initiatives not just as individual, isolated projects, but as part of the continuous non-discrete and highly relational supplier relationship management efforts in the buying company.

### **Expected and Realized Outcomes from SCM Initiatives**

The most basic element of customer attractiveness is the offered net benefit - the more beneficial the exchange, the more attractive the other party (Blau, 1964; Dwyer, Schurr, and Oh, 1987; Ramsay and Wagner, 2009). Customers' SCM initiatives introduce or alter a range of supplier exchange benefits and costs. Suppliers frequently evaluate these costs and benefits from exchange with specific customers and they need to perceive a net benefit to judge customers attractive and commit resources. In connection to specific SCM initiatives, a distinction can be made between evaluations made pre-implementation and post-implementation. Pre-implementation evaluations shape suppliers' expectations regarding the initiative outcome (Frazier, Spekman, and O'Neal, 1988). Expectations are based on each supplier's experience with implementing VMI interfaces, technological capabilities and understanding, and buying company efforts aimed at influencing the supplier. Suppliers will supposedly commit resources to the implementation if they expect a positive outcome, i.e. the benefits surpass the costs to generate a net benefit.

While a net expected supplier benefit forms the basis for implementing the initiative, it is also apparent from the above discussion that successful SCM should not stop here. After the implementation and during the running of the newly introduced supply chain initiative the actual realized cost/benefits are evaluated in retrospect and the resulting judgment determines not only if the supplier will be supportive of the continual operation of the initiative but also the overall attractiveness of the customer. The assessed outcome of the SCM initiative is compared to the pre-implementation expectations and attractiveness will be reduced if the outcome falls below expectations (Halinen, 1996; Van de Ven, 1976; Wilson, 1995). Our work with buyer-supplier relationships has shown us that this supplier rationale is often misunderstood by buying companies. Worst case, unrealistically high expectations coincide with a poor initiative outcome (see figure 1). Lacking understanding of the wanted VMI interface means that the initiative must be sold on various communicative efforts, which increase the probability for unrealistic expectations (Corbett, Blackburn, and Van Wassenhove, 1999). At the same time the same lacking understanding frequently produces a poor outcome. The eagerness for selling the initiative produces high expectations, which may end up being impossible to meet. The result is a severe gap between the outcome and expectations, resulting in severely reduced attractiveness.



**Figure 1:** Worst case scenario – VMI initiative damages attractiveness severely.

Paradoxically, the very same supply chain initiative designed to integrate the processes and strengthen the bonds between buyer and supplier ends up having a negative effect on these.

### ***Supplier Costs and Benefits from VMI Projects***

The main objective of VMI is to align demand and supply through increased information sharing between buyers and suppliers in the supply chain. The supplier takes over ownership of buyer inventories and is granted responsibility for replenishing these inventories. The buying company allows the supplier access to its planning systems to enable the supplier to make replenishment decisions. Typically, the supplier monitors inventory and production flow movements and set-up replenishment policies accordingly. Apart from certain guarantees, typically regarding stock out avoidance and min/max inventory levels, the buyer refrains from any inventory policy making.

Ideally, VMI implementation results in benefits for both buyer and supplier. The literature has revealed several success cases of mutually beneficial VMI implementation in companies such as Campbell Soup, Electrolux, Fred Meyer, K-Mart, Nestlé, Proctor & Gamble, and Wal-Mart (Chopra and Meindl, 2001; De Toni and Zamolo, 2005; Fisher, 1997; Lee, Padmanabhan, and Whang, 1997). The most apparent buying company benefits are increased inventory turnover, relief of the administrative burden of managing inventories and the interface (e.g. inventory monitoring and ordering), reduced bullwhip effect due to centralization of control, reduced lead-time, increased on-time deliveries, higher product availability and service levels, and improved customer loyalty and relationships (Angulo, Nachtman, and Waller, 2004; Cachon and Fisher, 1997; Disney and Towill, 2003; Sari, 2007). Reported supplier benefits are reduced bullwhip effect, improved utilization of capacity, increased inventory turnover, and improved synchronization of replenishment planning, shipment consolidation, reduced sales management costs, reduced administration costs, increase in buyer's purchase volumes, and improved ability to service the customer portfolio broadly (Kauremaa, Småroos, and Holmström, 2009; Subramani, 2004). Contrary to the success stories, the literature has more recently produced several studies of failed VMI projects where the expected benefits are not realized by one or both parties (Aviv, 2002; Corbett, Blackburn, and Van Wassenhove, 1999; Disney and Towill, 2003; Sparks and Wagner, 2003).

## Reasons for Lacking Supplier Benefits

Many papers take a mathematical science approach, modelling and testing different supply chain (mainly two stage) configurations to determine who benefits and how much. These contributions share the same basic argument that benefits from VMI initiatives do not materialize because one or both parties lack the competence to predict how VMI will perform in their specific interface setting or to react on the improved information, and hence produce a beneficial outcome (Angulo, Nachtman, and Waller, 2004; Aviv, 2002; Kulp, Lee, and Ofek, 2004). A range of technical logistics variables, which are highly context dependent, influence VMI success, including sharing of observed market signals, POS data availability, promotion plans, general demand patterns, order sizes, order placement frequencies, shipment coordination and stock rebalancing, and re-order points (Cachon and Fisher, 1997; Cheung and Lee, 2002; Kulp, Lee, and Ofek, 2004). The supplier (and buyer) comes to experience lacking benefits because they are not capable of anticipating the effects of these variables on the outcomes of their VMI set-ups, but still proceed on the implementation based on various types of faulty reasoning. Hence, they engage in VMI interfaces believing that they will provide benefits, but realize only afterwards that they do not. To alleviate these problems, the aforementioned contributions develop insights into the structural complexities of the VMI exchange and their effects on benefits, hereby offering managers opportunities to improve their VMI implementation capabilities.

A few authors have focussed on explanations of costs and benefits that are not connected to the technical and structural interface. Incomplete information sharing by involved actors is stressed as a particularly challenging task. Even if suppliers have access to POS data, manufacturing plans, and inventory levels electronically, much additional information may still be required to provide a full picture of demand. Otherwise, suppliers are reacting on the wrong grounds and cannot reap the benefits. Buying company actors frequently fail to convey critical information such as promotion plans, sales of competing products, and non-standard inventory movements, most often because of confidentiality, lack of trust or differences in performance measures (Angulo, Nachtman, and Waller, 2004; Aviv, 2002). Hence, with the VMI introduction follows behaviour that actually enforces the effects (bullwhip etc.) it was supposed to decrease. Other reasons why VMI projects do not produce supplier benefits are related to the resource consumption associated with implementing the initiative. In many instances, significant costs are associated with setting up the interface, including additional personnel and man-hours, organizational restructuring, IT-systems and software, logistics, and services (Disney and Towill, 2003; Kalwani and Narayandas, 1995). Furthermore, the supplier must up-date knowledge and capabilities related to production planning and forecasting to match or exceed the customer's level. Although VMI solutions are often set up in standard systems such as ERP modules, they still have to be adapted to the companies' particular replenishment and exchange processes. These costs of adaptation clearly affect the perceived net supplier benefits from VMI initiatives. Some authors find that suppliers are sometimes unable or unwilling to use the offered information, preventing the optimisation benefits from materialising (Holweg, Disney, Holmström, and Småroos, 2005; Kulp, Lee, and Ofek, 2004). Lack of operations management competence, as well as ability to overview how the VMI set-up will function in specific contexts, mean that managers cannot predict post-implementation net benefits and embark on the implementation hoping for benefits. Also, the customer running the project and demanding integration is almost always only one of many customers for the supplier. Hence, setting up an interface that caters for the specificities of each customer is an overly demanding task for most suppliers.

## **Methodology**

To obtain a rich picture of the underlying cost mechanisms for suppliers delivering to customers implementing VMI, we decided to investigate the implementation of one such initiative in detail. Concentrating on just one case allowed us to reach the level of depth and detail required to investigate the complex cost/benefit producing mechanisms. Since the knowledge of cost/benefit drivers associated with VMI initiatives is still limited, we found such an exploratory design most beneficial. We studied a multinational, which had recently gone live with its ERP-based VMI interface with a group of core suppliers and thus represented an ideal opportunity for studying supplier benefits of VMI initiatives. Other characteristics of this specific VMI implementation made it an ideal study object. First, the SCM initiative was widely believed to be a failure in the involved buyer and supplier organizations, and suppliers' realization of costs and benefits played a major role in the failure. Failure cases tend to display the studied phenomena clearly and strongly and represent strong learning opportunities (Baumard and Starbuck, 2005; McCarter and Northcraft, 2007). Second, the buyer-supplier interfaces could be studied from right after the go live date and forwards through the subsequent critical and difficult early operational period. We could investigate both the expected and the realized costs and benefits as they became apparent to actors in the company and by suppliers. Third, we were granted full access to all involved actors, systems, documents, meetings etc., which meant that we could reach the required level of detail and triangulate our data inquiry. Fourth, the case company was operating a collaborative approach to supply chain management, incorporating attractiveness towards suppliers as a cornerstone of its supply strategy, including the need for taking the supplier's business into account. Hence, the realized lacking net supplier benefits of the VMI project could not be ascribed to a fundamental lacking buying company concern for supplier benefits or a competitive power-based approach to supply management. The company was indeed trying hard to carry out any up-stream directed activities in a relational manner. That the initiative still went wrong underscores the complexity of SCM initiatives and the connected costs and benefits, and emphasizes the need for knowledge on SCM initiative implementation.

We found a critical realist approach ideal for our study for several reasons (Archer, Bhaskar, Collier, Lawson, and Norrie, 1998; Reed, 2005; Sayer, 2000). First, we wanted to extend on existing SCM knowledge by looking beyond the technical or knowledge related drivers of costs and benefits into the more complex interaction related explanations for lacking net supplier benefits. Based on indications from earlier research, we expected that many reasons for lacking supplier benefits were to be found in the complex interplay between key actors in the VMI implementation process. We wanted to illuminate the complex interplay between the structured buyer-supplier interface and the actors occupying key positions in this interface and its effects on benefit distribution. Second, we wanted to open up the complexities of interorganizational buyer-supplier interaction and their effects on supplier benefits. We were not just looking for the how, but for the why, in other words the explanations for lacking supplier benefits of VMI initiatives. We were not trying to generate insights into individual and isolated cause-effect connections, but rather to provide knowledge of the complex clusters of interrelated causes of supplier net benefits. These generative underlying mechanisms are to be found in the deeper properties of the buyer-supplier interface (Reed, 2005). Third, we were investigating the phenomenon as it unfolds in the intermediate level of analysis, positioned in between large scale social processes and structures, and microanalysis of human interaction.

The data gathering commenced right after the inception date and ended 28 months later. 21 in-depth, open-ended interviews were carried out. We interviewed core actors broadly in the key MNC

functions, including purchasing, operations, and process development, and in one key supplier organisation to gain insights into the supplier perspective. In addition, we made document studies and meeting observations to improve validity. The supplier was specifically chosen, on one hand because it was among the most important suppliers, and on the other because the VMI difficulties here had been among the most severe. We also decided to observe two key meetings between the MNC and supplier 1. First, a full-day “clean-up” meeting at the supplier premises, where the aim was to resolve the encountered difficulties connected to the VMI initiative. Later a second meeting reviewing the business propositions for a new contract period, also involving a retrospective discussion of some of the earlier encountered difficulties and the present state of the logistics interface. We studied various documents connected to the VMI initiative such as e-mails, power point presentations, strategy formulations, planning documents etc. Our access to the VMI implementation status log, which showed the VMI progress for each supplier, including identified problems, allowed us to gauge the cost and benefit generating issues in each supplier relationship.

The triangulation of the inquiry methods enabled us to establish a valid overall impression of the costs and benefits of the VMI project for each involved supplier. Also, it provided valid detailed evidence of the various costs and benefit generating mechanisms. We did not attempt to measure the exact size of the costs and benefits, primarily because of the sheer complexity of the range of cost driving factors, making precise measurement largely impossible (Corbett, Blackburn, and Van Wassenhove, 1999). Moreover, it was clear that the involved companies had imprecise measures of several costs and benefits tied specifically to this initiative. However, all the involved actors could provide us with their qualitative evaluations of the costs and benefits and the overall aggregate outcome of the VMI initiative. This inquiry process allowed us to establish their subjective perception of the cost/benefit outcome and resulting effect on MNC attractiveness. In the final stage, three seminars were held at the MNC to present and discuss the findings in order to strengthen the managerial implications. Names of companies and individuals have been concealed due to confidentiality.

### ***Case – The VMI Initiative***

In the summer of 2004, the MNC decides to implement ERP based VMI in the interfaces between its largest plant and 30 key suppliers. The MNC produces in several sites world-wide and sources materials and components globally. A wish for reducing inventories along with streamlining processes and limiting the administrative work load drives this decision. The initiative, including the possible benefits for both the MNC and the supplier, is presented for each supplier by the responsible category manager aided by a process development employee. During the fall, the MNC carries out successful pilot implementations with two small local and volunteering suppliers. All target suppliers are invited for a day’s training at the plant during December 2004, where they test the system and are trained by the MNC process development department. Soon after, the MNC informs the suppliers that the VMI interface is being brought into operation March 2005.

Immediately after this date, the MNC employees start experiencing a range of problems all related to getting the VMI interface to work as intended with the suppliers. Although some issues have been expected due to the scale of the change, the massive amount of problems appearing take the MNC employees by surprise. Almost all suppliers experience some degree of difficulty delivering via the new VMI. Suppliers complain that the interface and functionality of the webpage cannot be operated, the system performance is inadequate, and the demand information cannot be read with sufficient accuracy. Consequently, the MNC experiences massive delivery problems, which causes rescheduling, production changes (MNC group wide), and production stops. Many of these

problems persevere, although in decreasing magnitude, until the end of this study almost three years later. Stock outs causing production stops are experienced as late as 2006. In some instances, the production stops affect the MNC delivery capability. A wave of problem solving activities is carried out by the MNC employees, drawing heavily on company resources. Moreover, in many instances, the MNC has to change the interface back to the pre-VMI set-up, drawing further on company resources. By 2007 most of the interfaces are functioning although problems appear occasionally. The immediate considerable benefits of transferring inventory to suppliers and reducing administrative work has seemingly been eaten up by the costs caused by production and delivery problems combined with the massive resource consumption in the MNC.

### **Supplier Expectations of Costs/Benefits**

Looking back to the time before the implementation, the MNC had successfully been implementing VMI with a few major customers. This story was shared with suppliers at the pre-project VMI meetings along with a power point presentation demonstrating the potential supplier benefits of VMI. This initial presentation was meant as a discussion basis and collaborative review of suppliers' perceived opportunities. The process leader at the time explained: *"we agreed to do this only when suppliers would benefit also"*. However, the successful implementation with customers, a solid belief in systems integration and SCM logic, as well as confidence in own and suppliers' VMI execution capabilities resulted in an overly optimistic view of the opportunities, which affected suppliers' expectations. The MNC project manager view mirrored this attitude: *"Handling the system is very simple – I could teach a MNC employee to do this in ½ day... - everything else equals the VMI ought to generate a smaller inventory – in principle they could reduce their working capital"*. The process leader later admitted that the core MNC people lacked the complete understanding of the complex VMI cost/benefit mechanisms at the time. Combined with the wish for realising the inventory and administrative savings, they pressed on for the implementation and thereby build high supplier expectations with the majority of suppliers. The presentation material and communication came to work as a sales exercise aimed at convincing suppliers of the benefits. In retrospect, most MNC interviewees indicated that supplier expectations had been raised to an unrealistic level for most suppliers. CM 1: *"Perhaps we have promised too much without really knowing enough about the system before spreading it out among our suppliers... – they were expecting benefits that were not possible"*.

Looking at the specific expectations it appears that the suppliers can be categorized in four groups, roughly distributed with two 10% groups and two 40% groups (of the suppliers). First, a few distributors were confident that they would benefit and did not need much convincing. With significant experience in successful VMI and specializing in logistics and systems interfaces as well as flexibility in customer interfaces, this solution fit their business model well. The second small group firmly rejected the idea early in the process and the MNC decided not to implement VMI in these supplier exchanges. Category Manager (CM) 4 remembered a meeting with one of these suppliers: *"We clearly didn't sell the idea – they could already plan from our very stable demand for their products and used another system successfully – they were clearly in favour of doing what they were already doing - they stated that taking over responsibility for our inventory and administration would increase the price for their products"*. The third larger group was somewhat critical, but accepted VMI mainly because they wanted to please the MNC as a key customer. They had varying degrees of negative expectations (of costs) but hoped that some benefits would materialize and costs could be kept low. CM 2: *"They have tried to live up to our demands because we are a big customer – it is a lot of money to them – but I could sense that they did not believe this to be the future"*. The negative expectations of these suppliers were fuelled by satisfaction with the

present interface, operating other competing systems successfully, and prior negative experiences with similar projects with other customers. The final group was positive and motivated by the discussions with the MNC employees to initiate the implementation and expected benefits that would more than outweigh moderate implementation costs. As a result of this pre-implementation understanding this group: “*expected savings and then we would sit down afterwards and split the savings*“ (CM 1).

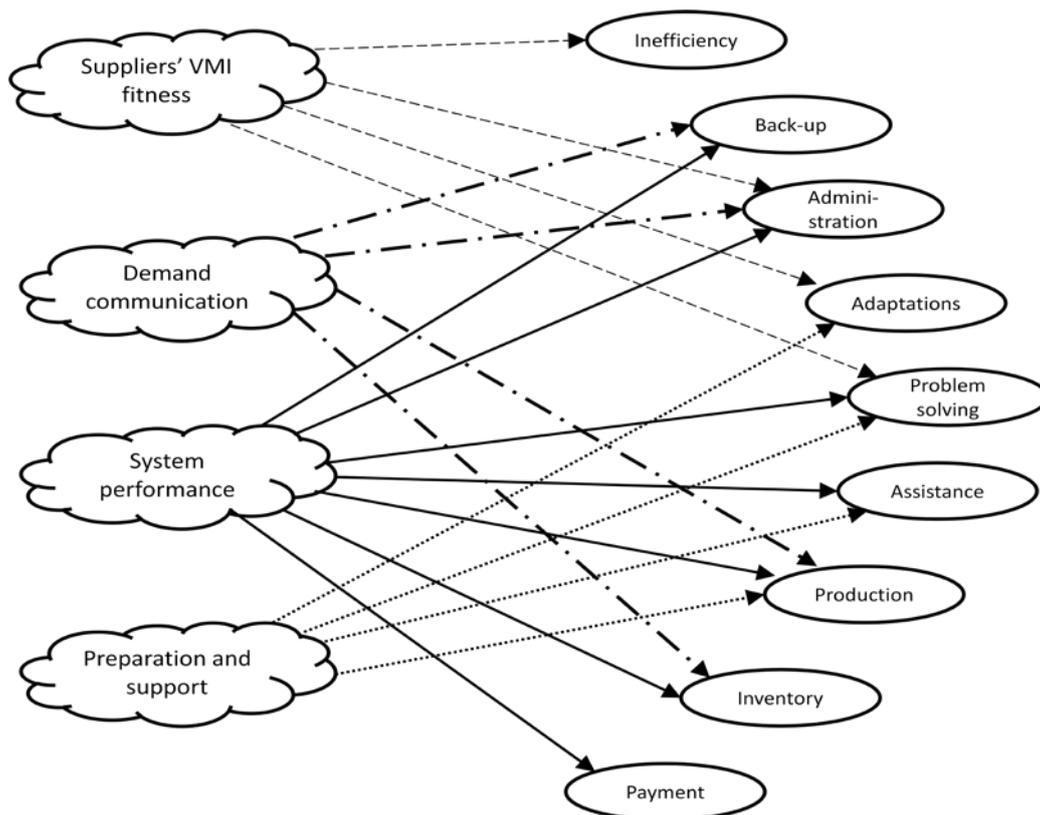
### Identified Supplier Costs

The investigation revealed nine types of supplier costs (see table 1), generated by a range of complex and interrelated cost mechanisms.

Some costs were continuous, meaning that the supplier will incur these as long as the VMI set-up is in operation, whereas others were just one-time costs connected to the implementation. A large part of the costs were unexpected by suppliers, adding to the gap between what suppliers expected and what they realized from the VMI initiative.

### VMI Supplier Cost Mechanisms

Four VMI supplier cost mechanisms were identified from the analysis. Figure 2 shows the mechanisms and the types of cost they affect.



**Figure 2:** The mechanisms and the resulting supplier costs.

The mechanisms represent sets of interrelated components that cause the supplier costs. VMI fitness covers the supplier’s ability and readiness to engage in a VMI interface. Components of this mechanism include manufacturing strategy, IT systems maturity, and knowledge level. Demand communication covers the ability and willingness of the MNC to convey demand information to suppliers. These are all non-systems related factors that up-date suppliers on different types of

demand variability, especially unusual events and changes. Preparation and support covers the ability of the MNC to prepare and support suppliers before, during, and after the VMI implementation. The mechanism “system performance” is described in more detail below.

## **System Performance**

Much additional supplier uncertainty was caused by system errors and inadequate system performance, which added further to the above mentioned costs of inventory, back-up, additional administration, and production. In addition, considerable problem solving and assistance costs were incurred. First of all, the systems interface was extremely heavy to handle. The project manager explained: *“There is a pure performance problem with the system – it runs on a standard internet browser application – it is too slow”*. This was unexpected on both sides since the two pilot implementations had revealed no such problems. Later, one MNC process development actor explained that the reason probably was that both pilot implementations had been with smaller suppliers and only with tests involving few part numbers and limited information transfer needs. However, several suppliers delivered as many as 250 item numbers, which necessitated switching between several screens, each showing a plethora of detailed information, with many buttons to push, and with inventory warnings going off frequently. Logistics engineer: *“With many part numbers it takes a while to load – they push go and are waiting for a long time – then they can only see 50 lines at a time – so they push next and it takes forever again!”*. The inadequate system performance also meant that the MNC employees were incapable of feeding the entire MNC demand into the system. Project manager: *“Due to the file size we cannot send sufficient data on all items – we can only feed the system with adequate information on 85% of the total part numbers – with the remaining ones it simply cannot be done and we cannot find out why – it is too complex!”*. At a more general level the logistics engineer admitted that: *“We don’t have plans for all demand in the VMI system – we are working on that now”*. Lacking a complete picture of demand obviously added to the supplier’s perceived uncertainty.

A few suppliers experienced system defects. CM 1 provided an example: *“One supplier had problems with many items disappearing in the system – then when they entered the system the following day they were there again – there have definitely been systems errors – this has really caused mistrust”*. The logistics engineer offered an explanation: *“The demand figures are up-dated three times a day – if the system has been disrupted for some reason then there are no numbers – and then when this has gone wrong our IT specialist receives no indications or warnings from the system – we only learn about it if suppliers call and tell us”*. However, in most instances, the parties did not communicate regarding the system problems and suppliers remained highly uncertain. Supplier 1 continuously experienced wrong numbers for the pallets in the consignment stock. Supplier 1 service employee: *“They don’t give me the right consignment stock movements – for instance one pallet might be shown available in the system – but the consignment stock shipped it in to the factory a month ago!”*. In addition to the demand related problems, several suppliers were incurring costs of problem solving and adaptation because of inadequate system flexibility. Examples were the inability of the VMI system to assign exact pallet numbers for invoicing, inability to deal with varying sizes and weights of delivered components, and time lags between when consumption was reported to suppliers and when it was invoiced by suppliers. Supplier employees had to spend time and resources trying to solve these problems, either alone or in collaboration with MNC employees. CM 1: *“They have spent many resources – meetings, getting the systems to talk together, finding out what is in inventory, why the variations are there, why are components disappearing, invoicing issues etc.”*. Frequently, suppliers even had to provide various types of technical and systems assistance to the MNC, adding further to the costs.

In some instances, problem solving changes produced new derivative costs. For instance, when the systems performance problem was solved by moving a number of items from the VMI back onto normal direct ordering (from 250 to 100 with one supplier), employees lost overview of which items were direct and which were VMI, increasing the suppliers' uncertainty of demand. Moreover, invoicing now became an issue, since suppliers had to be invoiced in two different ways. Since the MNC employees had not been carefully assigning which components were VMI and direct order, some items that were actually delivered via direct order were actually invoiced as VMI. This mix-up in many instances meant that the MNC finance department could not get the invoiced number to match the consumption. As a result they did not pay the invoices and the suppliers had to wait for their money, generating an additional cost. At one point the MNC crossed the 1 million EUR mark for supplier 1 invoices not paid. Several other reported problems had an effect on the invoicing, delaying the suppliers' receipt of money for delivered products. One supplier employee noted dryly: "Perhaps they like it when we are not capable of invoicing properly because of the VMI interface problems – then they can save money".

### **Net Supplier Outcome**

The range and size of the overall costs were to some extent unexpected by all suppliers. Specific costs of extra production, inventory, assistance, back-up, and payment were largely unexpected (see table 1). Costs of adaptations, problem solving, and administration were expected, but the magnitude of these costs came as a surprise to most suppliers. Looking at the difference between expected and realized net benefits provide insights into the effect of the VMI initiative on MNC attractiveness (see table 2).

	The critical, determined, and dismissive suppliers	The positive, experienced, and flexible suppliers	The critical, conforming, and hoping suppliers	The positive, motivated, and naive suppliers
App. percentage of suppliers	10%	10%	40%	40%
Expected benefits	None to few	Few to moderate	None to few	Moderate to high
Expected costs	High	Few	Few to moderate	Few to moderate
Realized outcome	<i>N/A – never implemented</i>	Small net benefit	Moderate to high net cost	Moderate to high net cost
Attractiveness	Unchanged	Unchanged	Moderately reduced	Moderately or highly reduced

**Table 1:** Expected and realized outcomes of the four supplier groups (see section "Supplier expectations of costs/benefits").

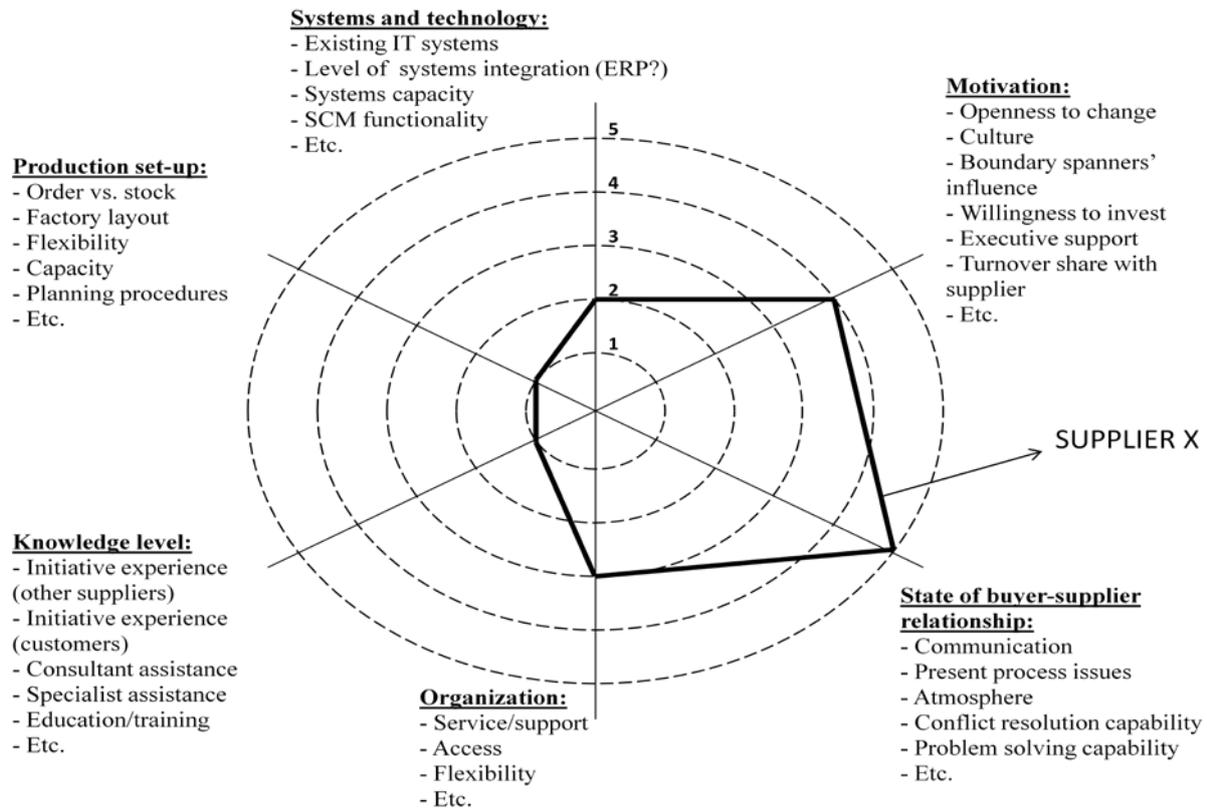
Only the few distributors (second column) realized net benefits within the study period. Due to extensive logistics service knowledge, experience with VMI implementation, high systems capabilities, high flexibility, and low product and process costs they were capable of keeping costs low, while utilizing the VMI benefits. They knew almost exactly what to expect from the outset – indeed the VMI initiative fit their business model perfectly. For the two largest groups of suppliers, the VMI implementation generated negative outcomes. Within the study period, not one of these suppliers realized a net benefit. By 2007 a few of these suppliers were realizing some limited production benefits. However, the massive one-time costs of the implementation would take a long time to recover and the costs of administration and inventory were continuous. Especially the positive, motivated, and naive suppliers suffered (column 4). These suppliers had expected significant net benefits but realized only significant net costs. As a result, the MNC damaged its attractiveness significantly as a customer towards these suppliers.

## ***Managerial Implications***

The need for effective and coordinated project planning stands out from the findings. Following a tight, well-structured, and realistic project plan, carried out by an adequate size project group, perhaps aided by SCM consultants or systems specialists, could have prevented some of the obvious issues in the implementation (see for instance Corbett, Blackburn, and Van Wassenhove, 1999). The need for improved communication is also obvious. Companies implementing SCM initiatives must optimize communication internally and relative to suppliers, both horizontally between all implicated functions and employees and vertically to reach executives and decision makers. However, the demonstrated issues cannot be solved merely through improved project planning and communication. We therefore suggest a classification and differentiation scheme that can assist companies in making improved pre-initiative predictions regarding SCM costs and benefits thereby building a foundation for determining who to run VMI with and how to implement it.

## **Supplier Readiness Classification and Differentiation**

The SCM literature holds many examples of supplier segmentation models (see for instance Bensaou, 1999 or Dyer, Cho, and Chu, 1998). These models are applied to analyze supplies or suppliers and differentiate SCM strategies accordingly. We propose that the differentiation philosophy could be brought to advantage in SCM initiative implementations. Interviews and seminar discussions at the MNC revealed a pronounced recognized need for differentiation in future SCM initiatives. Choice of SCM initiative candidates should not be based only on importance to buying company operations (e.g. volumes and product criticality). Pre-implementation evaluation must map the characteristics of suppliers to determine their readiness for initiative implementation. Idiosyncratic supplier characteristics determine the opportunities and barriers to benefitting from specific SCM initiative. Based on the results, we therefore propose a supplier readiness classification chart, which can be used early in the process to surface particular supplier characteristics that affect SCM initiative benefits (see figure 3).



**Figure 3:** Supplier readiness chart with an imaginary supplier profile.

Each potential SCM initiative supplier should be rated to determine the readiness to engage in a specific initiative. Requirements for total and individual category scores above a defined minimum should be defined. The chart could be used as a basis for determining suppliers that are ready, suppliers where efforts are needed to bring them level, or suppliers where SCM initiatives are simply not going to be successful. Supplier X for instance may turn out to be problematic. The key actors are motivated to embark on the initiative, the social relationship provides a strong foundation for the effort, and the supplier X organization is structured to support the required communication and coordination. However, the systems and technologies are not adequately developed to implement VMI. The high level of supplier actor motivation could spur the required investments and adaptations, closing the technology gap. However, the poor knowledge level and production set-up readiness pose a serious challenge that cannot be solved merely through high motivation of core actors. When the production set-up fits poorly with VMI the majority of manufacturing benefits cannot be realized. Hence, typically this type of supplier must either carry through a fundamental strategic manufacturing transformation, which requires top management decision making, or the supplier must be compensated somehow for the additional costs. A low level of SCM knowledge means that the buying company must educate and support supplier personnel to a high extent and that problem solving in the implementation will become an issue. Lacking knowledge and production set-up readiness by supplier X might generate buying company costs that eliminate the net benefits. Hence, the buying company should think twice before engaging in VMI with this supplier, even if core supplier actors show a high level of motivation. Carrying out this pre-implementation analysis across the relevant suppliers would obviously require more resources initially compared to the case implementation process. However, a large part of the identified costs could be avoided and the likelihood of success on both sides of the buyer-supplier relationship would be increased.

## **Conclusion**

Looking back at the VMI initiative, one SCM trained MNC employee stated: “*Competition is between supply chains today – we at the MNC are thinking this way – but perhaps the suppliers do not*”, indicating that the VMI failure could be ascribed to suppliers’ lack of supply chain philosophy adoption and understanding. But win-win and benefit sharing is as much a part of supply chain thinking as methods of technical integration. Hence, buying companies that fail to take supplier benefits into account can be argued to lack the complete supply chain vision. As these results show, this task may be as complicated and challenging as the technical integration itself, which is why particular attention from managers is required here. To help buying company managers, we have identified a range of costs of VMI implementation and the complex mechanisms causing these costs. Our focus on the in-depth research of one major VMI initiative has entailed certain limitations of the findings. First of all, the findings are of an explorative and theory building nature and cannot be generalized analytically beyond this single case. Additional qualitative and quantitative investigations are needed to enable broader generalization. Second, the findings are limited to a VMI initiative as an exemplar of SCM. Although VMI is an archetypical SCM initiative, future research could investigate other types of SCM initiatives.

We believe that our study contributes by offering insights into the complex network of mechanisms causing the costs/benefits of suppliers. Insights into these mechanisms should help managers make a stronger analysis of suppliers’ likely costs/benefits of SCM initiatives. Furthermore, the created knowledge should assist in building expectations that are more in line with realizable benefits. Making sure that supplier realize benefits from SCM initiatives and simultaneously ensuring that these are in line with or surpassing supplier expectations can make SCM initiatives a means of building attractiveness instead of reducing it. If companies can manage this process, and at the same time master the dense social interaction between the parties during implementation, SCM initiatives can be successfully implemented and at the same time become a vehicle for building attractiveness, which can be used to mobilize supplier resources in the future. As such, SCM can provide the company with competitive advantage not just through the logistical efficiency benefits of a streamlined and integrated supply chain, but also because the interactive implementation process is managed in a way that caters for suppliers, thereby building the foundation for long-term mobilization of supplier resources. SCM is a very valuable tool for operations and supply chain managers, but needs to be implemented only where it benefits the implicated parties.

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