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Article information:

To cite this document:

Ely Laureano Paiva Rafael Teixeira Luciana Marques Vieira Andrew Beheregaray Finger , (2014), "Supply chain planning and trust: two sides of the same coin", *Industrial Management & Data Systems*, Vol. 114 Iss 3 pp. 405 - 420

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Supply chain planning and trust: two sides of the same coin

Supply chain planning and trust

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Received 31 July 2013

Revised 28 September 2013

Accepted 4 October 2013

Abstract

Purpose – The purpose of this paper is to analyze the relationship between supply planning, trust and integration, and the influence of them on operational performance.

Design/methodology/approach – The paper used a survey with 335 respondents from three different industries. The paper analyzed the data with structural equation modeling.

Findings – The results suggest that supply planning and trust are positively related and both influence supply integration and operational performance. At the end the paper proposed a classification for supply integration based on planning use and trust.

Research limitations/implications – The sample is composed by companies from only three industries (machinery, electronics and automobile), what does not allow generalization.

Practical implications – Managers are challenged to develop simultaneously supply chain planning practices and trust-based relationship within buyers and suppliers. They must pay attention to different integration drivers and use them accordingly and in the context analyzed. The study suggests a 2×2 matrix that might help managers' decision making.

Originality/value – Despite the importance of planning in supply and manufacturing management, few papers analyzed the role of supply planning integrated to trust. The combination between these aspects brings a more realistic and pragmatic view of the supply chain management.

Keywords Trust, Operational performance, Supply chain integration, Survey, Supply chain planning

Paper type Research paper

Introduction

Rapid new product development, markets integration, e-commerce and risk related to uncertainties have been drivers for buyer-supplier integration in the last decades. As theoretical basis, this topic may follow two different approaches for buyer-supplier integration in the literature. The first approach is based on the transaction costs theory. According to Williamson (1996), contracts are able to decrease opportunist behavior in the buyer-supplier relations. The second approach is influenced by lean management, which highlights the need for close relations between buyer and suppliers (Helper and Sako, 1995). This paper tries to integrate both approaches to have a better understanding of supply chain integration.

The authors thank FAPESP e CNPq for the financial support to the High-Performance Manufacturing project in Brazil.



Industrial Management & Data Systems

Vol. 114 No. 3, 2014

pp. 405-420

© Emerald Group Publishing Limited

0263-5577

DOI 10.1108/IMDS-07-2013-0324

This study aims to explore buyer-supplier integration and its influence on operational performance. One antecedent for integration is related to the planning in supply chain. In this paper, supply chain planning is considered as those activities developed by a focal company to improve its ability to precisely match the demand for its products and/or services (Chopra and Meindl, 2007; Sodhi, 2003). Therefore, supply chain planning is able to improve operational performance (de Kok *et al.*, 2005). Because of the great demand for information, supply chain planning goes beyond the focal company, as it also involves buyers and suppliers throughout the chain (Hvolby *et al.*, 2007; Stadler, 2005).

This study also analyzes the “soft” aspects of the integration between buyer-supplier. Usually they are related to trust in a buyer-supplier relationship (Kwon and Suh, 2004). In this case, companies develop activities in order to create new knowledge, to improve quality or to reduce time to market (Dyer and Nobeoka, 2000; Dyer and Chu, 2011). One result of integration is related to superior performance (Swink *et al.*, 2007).

Adopting an empirical approach, this study focusses on measures reflecting operational employees’ perceptions that determine their daily decisions and operational tasks. This approach is distinct from others because of its empirical nature and focus on planning processes. Some studies about supply chain planning have focussed on mathematical models to reduce losses due to mismatches (de Kok *et al.*, 2005; Acar *et al.*, 2010; Schütz and Tomasgard, 2011), while other studies have focussed on antecedents that lead to improvements in supply chain planning, for example, the use of electronic marketplaces (Rudberg *et al.*, 2002), advanced planning systems (Jonsson *et al.*, 2007; Rudberg and Thumlin, 2009), information technologies use (Prajogo and Olhager, 2012) and supply chain flexibility (Kaipia, 2008; Swafford *et al.*, 2008). However, it is important to conceptualize supply chain planning and its relationship with trust and integration with suppliers, because they may enhance operational performance (Kulp *et al.*, 2004). At the same time, the results offer new possibilities of studies related to buyer-supplier integration.

The paper is organized as follows. First, it reviews the pertinent literature and present the model and hypothesis. Second, it describes the methodology used to test the proposed model. Third, a discussion of the main findings is presented. Finally, it concludes with a description about the limitations and directions for future research.

Theoretical background

Supply chain planning

Consistent with the extant literature (Chopra and Meindl, 2007; Kaipia, 2008; Oliva and Watson, 2011; Sodhi, 2003), supply chain planning is defined as the process of gathering information from buyers and suppliers to help the company plan its future actions and satisfy the demand at minimum cost. Supply chain planning has strategic and tactical levels at which the focal company plans its market and supply activities based on buyer and supplier information. This means that supply chain planning depends on efforts made by top and middle managers of the focal company to ensure information flows throughout the entire supply chain. For Yeung (2008), planning should include a strategic orientation in the supply chain management in order to allow the company to improve its competitiveness.

Trust-based relationship

Trust is a multidimensional construct that reflects one party’s belief and/or expectation that the other party is reliable and will act according to what both parties have agreed

in terms of the established relationship (Cheng *et al.*, 2008; Dyer and Chu, 2000; Ireland and Webb, 2007; Kwon and Suh, 2004). Trust is presented as a fundamental asset for long-term relationships (Cannon *et al.*, 2010). Vijayasarathy (2010) argued that trust influences positively supply integration. Trust involves at least two agents: the trustor and the trustee (Nooteboom, 2002). Thus, it is the perception held by one party that another party is worthy of trust (Dyer, 1996). In this case, we identify an expectation of goodwill, which is related to responsibility and dependability (Mayer *et al.*, 1995).

Integration with suppliers

Integration with suppliers is the means by which companies work with suppliers seeking mutual objectives, sharing ideas, information, knowledge, risks, rewards and solutions to common problems (Cohen and Roussel, 2004; Benton, 2007). For Lambert (2006), the term partnership is still the most descriptive term for closely integrated and mutually beneficial relationships that enhance supply chain performance.

Ranging from the simple arm's length relationship to the more complex long-term strategic alliances, firms can choose the relationship they wish to establish with their buyers and suppliers in their supply chain from among a range of different strategic choices. Integration is a multidimensional concept (Bellmont and Torres, 2013), which encompasses tight relationships with suppliers and emphasizes direct, long-term associations, encouraging planning and problem-solving efforts (Benton, 2007). What characterizes advanced integration between buyers and suppliers is the presence of a collaborative relationship and respect for other companies' cultural and organizational differences.

Operational performance

Operational performance is a multidimensional construct that captures how a company performs according to some competitive criteria relative to its main competitors (Skinner, 1969; Wheelwright, 1984): low costs, quality, flexibility and dependability. Although other authors have complemented this initial set of criteria by including aspects, such as, innovativeness and delivery (Vereecke and Muylle, 2006), other empirical studies have identified the initial four criteria as the main competitive criteria to assess performance of strategic operations (Boyer and Lewis, 2002). This study follows the same rationale adopted by these previous studies, and conceptualizes operational performance as that which a company displays in terms of the competitive criteria.

Theoretical model

The theoretical model proposed in this study is presented in Figure 1. The model shows the buyer-supplier relationship, their integration with planning and in trust-based

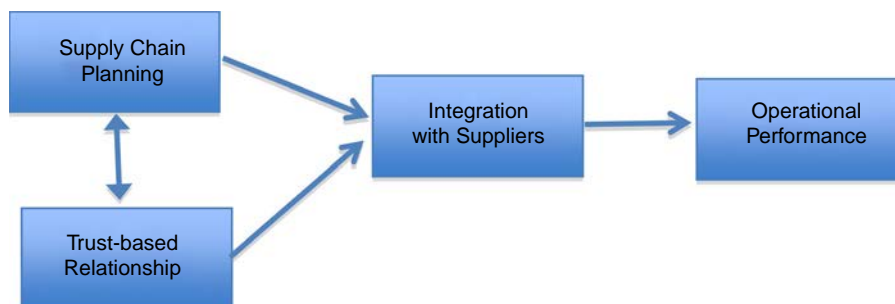


Figure 1.
The proposed theoretical model

aspects, and their influence on operational performance. Briefly, supply chain planning and trust are the starting points for the development of integration with suppliers, which, in turn, is going to impact the operational performance of the focal company. The focal company is defined as the company that develops the supply chain planning.

The rationale underlying the model proposed in Figure 1 is that supply chain planning provides benefits, not only for the focal company, but also for its suppliers, which, in turn, become incentives for suppliers to engage in closer, more continuous, and regular interaction with the focal company, reinforcing the whole supply chain planning process. At the same time, supply chain planning is an opportunity for companies to get to know each other and obtain a better sense of what type of behavior one can expect from the other, setting the basis for the development of trust. In addition, supply chain planning and trust-based relationship work together for the purpose of creating a more solid collaborative partnership in which companies can cooperate to achieve better operational performance outcomes.

The effect of supply chain planning on trust-based relationships and integration with suppliers

Supply chain planning is assumed to foster trust between the focal company and its buyers and suppliers. It involves activities related to demand forecasting, production, capacity, and inventory levels, reducing mismatches between production and demand (Chopra and Meindl, 2007), and demand information variability (Lee *et al.*, 1997). By gaining indirect benefits, buyer and supplier may feel encouraged to interact which, in turn, enhances the planning process and reinforces the benefits, creating a cycle of positive interaction in the chain. Here there is clearly an idea of shared competence (Mayer *et al.*, 1995). Nyaga *et al.* (2010) and Wagner *et al.* (2011) showed that collaborative activities, such as information sharing, joint relationship effort, and dedicated investments may create trust and commitment in a long term. Trust can be also based on competence. In this case, there is a presumption of technically capable performance (Mayer *et al.*, 1995). In our study, we consider that trust-based competence is more present in the supply planning process. One company will only formalize plans with a supplier when technical trust is present. Otherwise, the company will look for alternative suppliers. On the other hand, we consider that trust in the form of goodwill is present in a more informal relationship based on trust. In this case, the existence of personal and organizational relationships will allow openness of information and other aspects between the parties:

H1. Trust-based relationship is positively related to a supply chain planning.

Nakano (2009) stated that internal collaborative forecasting and planning has a positive effect on logistics and production performance. Akkermans *et al.* (2004) mentioned what they called “collaborative planning” that is an “advanced form of supply chain collaboration, in which multiple independent companies take joint decisions on production and shipments for large parts of their collective supply chain.” Richey *et al.* (2009) showed that in an integrated supply chain, internal planning failure influences the overall performance. Thus supply chain planning is related to integration with suppliers, since the planning process and resulting outcomes make the focal company interact more often and regularly with its suppliers:

H2. Supply chain planning is positively related to integration with the suppliers.

The effect of a trust-based relationship on integration with suppliers

Trust is one of the key factors for the development of partnerships because it sets the basis for mutual confidence that each company is going to behave according to what is expected. Without such mutual confidence, it is difficult for companies to interact, communicate, and share information and knowledge on a regular basis (Lambert and Gardner, 2004). Because of higher levels of interaction, relationships based on trust naturally tend to evolve toward a consolidated partnership developed through a more informal process. From a transaction cost perspective, it is also possible to argue that companies may pursue their self-interest goals by forming relationships with other companies to economize on transaction costs (Sako, 1992; Lindgreen, 2003). For instance, sharing information on bad payers helps to reduce the need to check creditworthiness and/or organize payment upon delivery. In addition, multiple studies have shown empirical evidence supporting the positive relationship between trust and integration with suppliers (Kwon and Suh, 2004; Chu and Fang, 2006):

H3. Trust-based relationship is positively related to integration with suppliers.

The effect of integration with suppliers on operational performance

Partnership between companies in the supply chain is likely to produce increased operational performance for companies because collaborative business relationships improve companies' ability to respond to new business environments (Mentzer *et al.*, 2007). Cooperative behavior in a dyadic relationship (buyer-supplier) improves flexibility and joint responsibility in actions taken by partners in the chain (Chu and Lee, 2006; Kristal *et al.*, 2010). For Pyke and Johnson (2003), companies have used integration with suppliers to reduce variability and enhancing operational performance. Similarly, the increasing pressure for cost reduction and product development has led companies to search for regular supply chain partners in order to share project ideas and anticipate problems (Sheth and Sharma, 2007). Vereecke and Muylle (2006) concluded that collaboration between buyers and suppliers results in high levels of performance improvement. In addition, there is a positive effect of integration with suppliers on operational performance (Flynn *et al.*, 2010) and business performance (Kim, 2009; Cao and Zhang, 2011). We used the traditional view of manufacturing strategy (Skinner, 1969; Wheelwright, 1984) based on the four competitive criteria (cost, quality, flexibility and delivery) to analyze operational performance:

H4. Integration with suppliers is positively related to performance.

Method*Data*

The data collection used a survey methodology. The database belongs to the High-Performance Manufacturing project (Schroeder and Flynn, 2001), a systematic international study of manufacturing plants. The project was initiated in 1989. Since then, there have been two revisions of the scales, translations to allow their application in different countries, as well as consolidation of the database with information from all the participating countries. In each round, the members of the research group have discussed the constructs, their ranges and data gathering procedures.

The project is in its third round. As part of the data collection, the questionnaires have also been refined and revised based on measurement studies used in the previous rounds. Scales that were not reliable or valid have been dropped or modified to improve their reliability and validity. Some new scales have been added to measure new concepts. Over the years, the project has been broadened, both in terms of topic areas and country participation. Global coordinators from USA invited researchers from different countries to participate in the project. These invitations were based on the importance of the country's industrial sector in the global economy. Each country that agreed in participating has a local coordinator. The questionnaires are applied with the local language directly in the companies. The regional coordinator in Brazil participated in the last revision of the scales. The group of Brazilian researchers started its participation in the third round of the project. All the data input was centralized. Chinese coordination located in Hong Kong was the responsible for the data input.

Sample

The sample contains 339 plants from three different industrial sectors: electronics, machinery and automotive suppliers. These sectors were chosen since they represent a variety of product characteristics as well as being examples of industries in transition, in which the plants may exhibit a broad variety of practices and different performances. The identification of the companies is not randomly because in some cases the questionnaires were applied in companies that had a previous contact with the researcher. All have more than 100 employees. The respondents were inventory managers, plant engineers and plant superintendents. The items were originally written in English and afterwards translated into different languages using reverse translation. The data already collected involve a wide range of companies from different countries (see Table II). The items present the focal company's answers, and this is the reason we have only analyzed the policies related to the buyer in the supply planning and its relationship with suppliers (Table I).

Measuring instrument

The measuring instrument was developed, based on the Operations Management literature and in the research interests of the international group of researchers that participated in the third round. The themes explored by the questionnaires explore some of the most relevant topics present in the leading journals on Operations

Country	Total
Austria	21
Brazil	22
China	51
Finland	30
Germany	41
Italy	27
Japan	35
South Korea	31
Spain	28
Sweden	24
USA	29
Total	339

Table I.
Countries and
number of plants

Management, including also operations strategy, operations performance, cross-functional integration, quality management, among others. A set of items and combined scales were developed in each round. Wherever possible, combined scales with previously established reliability and validity were used.

The project questionnaires have been pilot-tested and a thorough reliability and validity analysis of this data has been conducted. Analysis of item correlation matrices and Cronbach's α were used to determine the internal consistency (reliability) of the individual and combined scales. Content validity was provided by thorough literature reviews. Construct validity is partially demonstrated using factor analysis. The combined scales were found to have strong internal consistency, construct validity and criterion-related validity throughout the previous rounds and in the papers published using the database. The measuring items used in our study will be presented in "Results".

With regard to scales, the Likert was used with seven levels from (1) totally disagree to (7) totally agree. In our study, we used a confirmatory factor analysis (CFA) to verify the validity and reliability of the measuring items and well-accepted reliability measures, like composite reliability and average extracted variance. As the cut-off point, we considered those indices that were able to adjust to model complexity (Hair *et al.*, 2006). For this research, we used five constructs based on several scales. The supply chain planning construct is based on scales that attempt to capture how a manufacturing plant plans, coordinates and controls its supply chain. The integration with suppliers construct seeks to capture the level of integration between a manufacturing plant and its suppliers. The trust-based relationship construct captures the informal aspects in the integration between a buyer and its suppliers. Finally, operational performance is based on a second order construct and measures the focal company's performance (buyer). Two scales compose operational performance and are related to Porter's generic strategies and traditional competitive criteria (Wheelwright, 1984): differentiation criteria (quality, flexibility and delivery) and cost-based criteria. The discriminant validity was evaluated using the test of the difference in χ^2 when the correlation was fixed at 1.0 and when the value was not fixed (confirmed by the difference among the degrees of freedom).

Results

The results from CFA indicate the measuring instrument have a good fit, as shown in Table II.

Table III presents the construct reliability through extracted variance and composite reliability. The average extracted variance for constructs are all above the 0.4 cut-off.

Goodness-of-fit statistics

χ^2	135.38
Degrees of freedom (df)	94
Probability level	0.003
RMSEA	0.036
Normed fit index (NFI)	0.920
Non-normed fit index (IFI)	0.966
Comparative fit index (CFI)	0.974

Table II.
General statistics
for goodness-of-fit

Convergent validity of constructs was assessed through the factor loadings of each measuring item and its correspondent construct. All factor loadings are above 0.50, providing evidence of convergent validity (Hair *et al.*, 2006) (see Table IV).

The χ^2 difference test was used in order to check discriminant validity (Koufteros, 1999). All the models indicated statistically significant differences, when one of their scales had its correlation fixed at 1. Repeating this procedure for all the pairs of scales in the instrument, all the differences between the fixed and free solutions in χ^2 were significant (Table V).

Rungtusanatham *et al.* (2008) show that it is possible to find differences when a group of constructs is tested across different samples. Two groups of countries were analyzed using structural equation modeling: western countries (Europe, Brazil and the USA) and eastern countries (Japan, South Korea and China). In total, 224 plants are located in western countries and 115 in eastern countries (Asia). To identify this potential problem, we tested configural invariance, as shown in Table VII. We found acceptable values for fit indices, as reported in Table VII, for the two samples. Both cases indicate the same number of latent variables and close loadings in each item

Table III.
Reliability of the constructs

Constructs	Average extracted variance	Composite reliability
Supply chain planning	0.46	0.85
Trust-based relationship	0.63	0.83
Integration with suppliers	0.68	0.85
Differentiation criteria	0.51	0.75
Cost-based criteria	0.60	0.81

Table IV.
Convergent validity

Constructs	Questions	Loadings
Supply chain planning	We actively plan supply chain activities	0.71
	We consider our customers' forecasts in our supply chain planning	0.60
	We monitor the performance of members of our supply chains, in order to adjust supply chain plans	0.78
Trust-based relationship	We gather indicators of supply chain performance	0.72
	We are comfortable sharing problems with our suppliers	0.87
	We believe that cooperating with our suppliers is beneficial	0.64
Integration with suppliers	We emphasize openness of communications in collaborating with our suppliers	0.55
	We maintain relationships with our suppliers	0.85
	We help our suppliers to improve their quality	0.68
Differentiation criteria	We maintain close communications with suppliers about quality considerations and design changes	0.44
	Conformance to product specifications	0.69
	On time delivery performance	0.71
Cost-based criteria	Flexibility to change product mix	0.53
	Unit cost of manufacturing	0.66
	Inventory turnover	0.79
	Lead time	0.42

Note: Correlation

Construct scale pairs	Unconstrained		Constrained		Difference χ^2
	χ^2	g.l.	χ^2	g.l.	
<i>Supply chain planning</i>					
Trust-based relationship	32.524	13	141.809	14	109.285*
Integration with suppliers	42.179	13	257.120	14	214.941*
Cost-based criteria	20.164	13	252.051	14	231.887*
Differentiation performance	17.838	13	249.683	14	231.845*
<i>Trust-based relationship</i>					
Integration with suppliers	14.354	8	214.650	9	200.296*
Cost-based criteria	3.829	8	216.129	9	212.300*
Differentiation criteria	3.981	8	211.078	9	207.097*
<i>Integration with suppliers</i>					
Cost-based criteria	4.412	8	311.727	9	307.315*
Differentiation criteria	6.864	8	276.086	9	269.222*
<i>Cost-based criteria</i>					
Differentiation criteria	11.563	8	227.609	9	216.046*

Note: *Significant at $p < 0.01$

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Table V.
Results of the
confirmatory factor
analysis test of
discriminant validity

comprising the latent variables, apart from a few exceptions (λ_{31} and λ_{51}). Therefore, the results suggest that configural invariance is supported for the western and Asian groups (Table VI).

Table VI shows the coefficients for each path analysis tested in the proposed model. The results show that supply chain planning and trust are positively related, thus providing support for *H1*. Supply chain planning is also related to integration with suppliers in the sample. These results provide support for *H2*. On the other hand, the results show that trust does not exert a significant impact on integration with suppliers. Surprisingly, *H3* was not completely confirmed. Finally, integration with

	χ^2	df	p	<i>Model Fit</i>			RMSEA
				CFI	NFI	NNFI	
Sample 1 – western ($n = 222$)	105.73	94	0.19	0.90	0.89	0.98	0.02
Sample 2 – eastern ($n = 117$)	113.39	94	0.01	0.97	0.85	0.96	0.04
<i>Outcomes</i>		λ_{ij}		<i>Model 1 (western)</i>		<i>Model 2 (eastern)</i>	
Supply chain planning		λ_{11}		0.76		0.73	
		λ_{12}		0.53		0.72	
		λ_{13}		0.72		0.72	
		λ_{14}		0.73		0.84	
Trust-based relationship		λ_{21}		0.81		0.93	
		λ_{22}		0.58		0.50	
		λ_{23}		0.76		0.46	
Integration with suppliers		λ_{31}		0.41		0.83	
		λ_{32}		0.80		0.59	
		λ_{33}		0.86		0.72	
Differentiation criteria		λ_{41}		0.55		0.55	
		λ_{42}		0.67		0.73	
		λ_{43}		0.80		0.85	
Cost-based criteria		λ_{51}		0.49		0.31	
		λ_{52}		0.66		0.71	
		λ_{53}		0.77		0.77	

Table VI.
Configural invariance –
western countries vs
eastern countries

suppliers has a positive significant impact on operational performance. Therefore, this result provides support for *H4*.

Discussion

The results indicate supply chain planning is positively related to trust. More specifically, this result suggests that, by gathering buyer and supplier information, and using this information to develop a supply chain plan, the focal company can foster trust among its buyers and suppliers. A supply chain planning may be an indicator of future commitment between buyer and supplier and it is related to trust, what is related to the concept of technical trust. It may suggest that the future buyer behavior is in accordance with the present relationship between buyer and supplier (Table VII).

The effects of supply chain planning on integration with suppliers are also positive. Consequently, there is a clear commitment of the part of the focal company to its long-term performance as well as to its buyers' and suppliers' performance, making buyers and suppliers comfortable to exchange information and willing to engage in future transactions. By developing a plan for the main supply chain activities, companies may indicate that they want and believe in close continuous interaction with their buyers and suppliers.

H3 was not confirmed by the results. The loading is positive, but it is not statistically significant. In the sample analyzed, integration with suppliers seems to depend on a combination of planning and trust. The results suggest that these companies are possibly also concerned with tangible outcomes, such as, reduced supply and demand mismatches combined with intangible aspects of trust. Perhaps, some cultural aspects of these companies make them more pragmatic and results oriented, when a plan and its benefits may provide the necessary signals for continuous deeper interaction. In addition, it may be possible that even trust is relevant for a long-term relationship with suppliers, other formalized aspects such as a planning may strength trust in a relationship buyer-supplier.

Based on these findings, it is possible to argue that the companies in the sample develop supply chain partnerships seeking a more integrated supply chain based also on planning and trust. By establishing a formal process like supply chain planning that is based on objective measures, the buyer is able to manage the supply chain according to more precise information. Because trust is based on perception of people involved in a relationship, values, beliefs, and legal and competitive constrains may

	χ^2	df	Model Fit				
			<i>p</i>	CFI	NFI	NNFI	RMSEA
	147.48	98	0.001	0.97	0.91	0.96	0.039
<i>Outcomes</i>	<i>Predictor</i>		<i>Loadings</i>				
Integration with suppliers	Supply chain planning		0.29**				
	Trust-based relationship		0.08				
Operational performance	Integration with suppliers		0.24**				
Differentiation criteria	Operational performance		0.59**				
Cost-based criteria	Operational performance		0.44**				
Covariance	Trust-based relationship and supply chain planning		0.29**				

Note: ** $p < 0.001$

Table VII.
Path analyses results:
regression weights and
general statistics for
goodness-of-fit

drive the perception of such people (Sako, 1992; Cannon *et al.*, 2010). Therefore, companies operating in a global scale may not be able to afford such perceptions to influence performance of suppliers and may need also objective indicators to drive their businesses.

The results also suggest that when a buyer combines formal processes like planning with trust-based relationship in its supply chain, operational performance is higher. In our sample, companies with these characteristics are close to the world class performance curve, i.e., they achieve superior performance simultaneously under different competitive criteria (Flynn and Flynn, 2004), as tested in *H4*. Similar results were also identified in other studies related to supply chains like Prahinski and Benton (2004).

Table VIII confirms all the findings above. It shows also that supply integration influences performance. Additionally to a supply planning, buyers and suppliers need to develop integrated activities in order to achieve future goals. The same situation is present for trust and planning. Buyers and suppliers will be effectively integrated when trust and planning are present simultaneously.

Based on these findings it is proposed a 2×2 matrix with four types of buyer-supplier integration (Figure 2).

Indulgent integration occurs when trust is present but there is a lack or unclear definition for future goals and activities. The well-known case of Nissan in the last decade illustrates a situation like that. Long-term relationships between Nissan and suppliers have led the company to a complacent situation with decreasing results (Ghosn, 2002). One-sided integration occurs when one of the two parts impose goals and future activities based mainly in its bargain power or opportunism. In this case, shared activities are not present leading consequently to the absence of trust and decreasing results (Baiman and Rajan, 2002). Finally, Advanced integration is present when companies develop shared activities based on planning with clear and feasible goals. Trust is present based on mutual expectations and long-term view. Potentially the results are better and more sustainable in a long-term view especially

Effect on	Integration w/suppliers			Performance			Differentiation			Cost based		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Trust	0.08	0.00	0.08	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00
SC planning	1.29**	0.00	0.29**	0.00	0.07	0.07	0.00	0.10*	0.10*	0.00	0.07	0.07
Integration w/suppliers				0.24**	0.00	0.24**	0.00	0.00	0.00	0.00	0.00	0.00
Performance							0.59**	0.00	0.59**	0.44**	0.00	0.44**

Notes: * $p < 0.05$; ** $p < 0.001$

Table VIII. Effects of exogenous and prior endogenous variables on model constructs

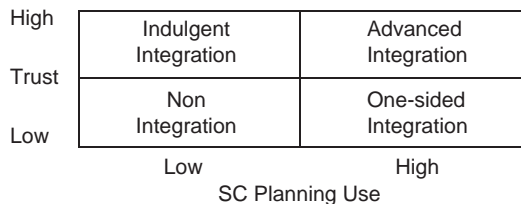


Figure 2. Proposed model for buyer-supplier integration

when compared to the other integration types presented in the Figure 2. In the last decades Japanese companies have been cited as pioneer example for advanced integration. A current example is Natura. This company has a sustainability-oriented strategy and an advanced proposal of integration with suppliers that includes local communities in Brazil. These suppliers have clear goals and planned supply activities. At the same time the company develops relationship with long-term view, investments in training and shared activities for quality improvement.

Conclusions

The results highlighted the understanding that supply planning combined with trust are potential drivers for supplier integration and performance. Even that these aspects are not studied in past studies in an integrated approach, our findings showed that they are complementarily. By relying on more accurate information and detailing companies' future actions, a supply planning process seems to be appealing for highlight an expected competence and enhance integration between focal companies and their suppliers. At the same time, supply chain planning is positively related to a trust-based relationship, even that this second aspect was not a direct antecedent for integration with suppliers in the sample analyzed. Nevertheless both need to be present for integration and for improved performance, i.e., they are different sides of the same coin.

As managerial implication of this study is that it may help the managing of international supply chains that involve companies from different groups of countries (e.g. supply relationships between Chinese and foreign companies). Thus managers are challenged to develop simultaneously supply chain planning practices and trust-based relationship with local suppliers. However, they must pay attention to different integration drivers and use them accordingly and in the context analyzed. Developing a more formalized tool such as supply chain planning might foster trust-based relationships in the long term and vice-versa.

Moreover, we may highlight that higher levels of integration may lead to superior performance. In this case, the results suggest that companies may adopt a more pragmatic view of integration based on the combination of planning activities with trust-based relationship as showed by capital social theory regarding complex transactions and the role of trust and incomplete contracts. This aspect also has a link with the transaction costs theory, which argues that formal contracts help to avoid opportunistic behavior. Therefore we named this situation as advanced integration. On the other hand, indulgent integration and one-sided integration may erode performance, trust and long-term view.

As limitations of the study, we may mention that the study focusses on only three industries, and, therefore, any generalization needs caution. These industries also present distinct features, such as, frequency and uncertainty that may influence the integration with suppliers. It is also important to mention that only the focal company answered the questions, creating a possible bias in the responses. Also, some differences in questions, in understanding, or other influences of cultural aspects, are potentially present. Given the time and content limitations of this study, other avenues of future research are suggested. All these aspects deserve to be investigated in depth in a study that explores the role of other formal aspects that may influence trust like formalized supply contracts. Future studies may explore regional differences in depth. Furthermore, other studies should investigate trust and the relationship between buyer and supplier of services.

References

- Acar, Y., Kadipasaoglu, S. and Schipperjin, P. (2010), "A decision support framework for global supply chain modelling: an assessment of the impact of demand, supply and lead-time uncertainties on performance", *International Journal of Production Research*, Vol. 48 No. 11, pp. 3245-3268.
- Akkermans, H., Bogerd, P. and Van Doremalen, J. (2004), "Travail, transparency and trust: a case study of computer-supported collaborative supply chain planning in high-tech electronics", *European Journal of Operational Research*, Vol. 153 No. 3, pp. 445-456.
- Baiman, S. and Rajan, M.V. (2002), "The role of information and opportunism in the choice of buyer-supplier relationships", *Journal of Accounting Research*, Vol. 40 No. 2, pp. 247-278.
- Bellmunt, T.V. and Torres, P.R. (2013), "Integration: attitudes, patterns and practices", *Supply Chain Management: An International Journal*, Vol. 18 No. 3, pp. 308-323.
- Benton, W.C. (2007), *Purchasing and Supply Chain Management*, McGraw-Hill, New York, NY.
- Boyer, K.K. and Lewis, M.W. (2002), "Competitive priorities: investigating the need for trade-offs in operations strategy", *Production and Operations Management*, No. 1, pp. 9-20.
- Cannon, J.P., Doney, P.M., Mullen, M.R. and Petersen, K.J. (2010), "Building long-term orientation in buyer – supplier relationships: the moderating role of culture", *Journal of Operations Management*, Vol. 28 No. 6, pp. 506-521.
- Cao, M. and Zhang, Q. (2011), "Supply chain collaboration: impact on collaborative advantage and firm performance", *Journal of Operations Management*, Vol. 29 No. 3, pp. 163-180.
- Cheng, J.H., Yeh, C.H. and Tu, C.W. (2008), "Trust and knowledge sharing in green supply chains", *Supply Chain Management: An International Journal*, Vol. 13 No. 4, pp. 283-295.
- Chopra, S. and Meindl, P. (2007), *Supply Chain Management: Strategy, Planning, and Operation*, 3rd ed., Pearson Prentice Hall, Upper Saddle River, NJ.
- Chu, S.Y. and Fang, W.C. (2006), "Exploring the relationships of trust and commitment in supply chain management", *The Journal of American Academy of Business*, Vol. 9 No. 1, pp. 224-228.
- Chu, W.H.J. and Lee, C.C. (2006), "Strategic information sharing in a supply chain", *European Journal of Operational Research*, Vol. 174 No. 3, pp. 1567-1579.
- Cohen, S. and Roussel, J. (2004), *Strategic Supply Chain Management: The Five Disciplines for Top Performance*, McGraw-Hill, New York, NY.
- De Kok, T., Janssen, F., van Doremalen, J., van Wachem, E., Clercx, M. and Peeters, W. (2005), "Philips electronics synchronizes its supply chain to end the bullwhip effect", *Interfaces*, Vol. 35 No. 1, pp. 37-48.
- Dyer, J.H. (1996), "Specialized supplier networks as a source of competitive advantage: evidence from the auto industry", *Strategic Management Journal*, Vol. 17 No. 4, pp. 271-291.
- Dyer, J.H. and Chu, W. (2000), "The determinants of trust in supplier-automaker relationships in the US, Japan and Korea", *Journal of International Business Studies*, Vol. 31 No. 2, pp. 259-285.
- Dyer, J.H. and Chu, W. (2011), "The determinants of trust in supplier-automaker relations in the US, Japan and Korea: a retrospective", *Journal of International Business Studies*, Vol. 42 No. 1, pp. 1-7.
- Dyer, J.H. and Nobeoka, K. (2000), "Creating and managing a high-performance knowledge-sharing network: the Toyota case", *Strategic Management Journal*, Vol. 21 No. 1, pp. 345-367.
- Flynn, B.B. and Flynn, E.J. (2004), "An exploratory study of the nature of cumulative capabilities", *Journal of Operations Management*, Vol. 22 No. 5, pp. 439-457.

- Flynn, B.B., Huo, B. and Zhao, X. (2010), "The impact of supply chain integration on performance: a contingency and configuration approach", *Journal of Operations Management*, Vol. 28 No. 1, pp. 58-71.
- Ghosn, C. (2002), "Saving the business without losing the company", *Harvard Business Review*, Vol. 80 No. 1, pp. 37-45.
- Hair, J., Anderson, R., Tatham, R. and Black, W. (2006), *Multivariate Data Analysis*, 6th ed., Pearson Prentice Hall, Upper Saddle River, NJ.
- Helper, S.R. and Sako, M. (1995), "Supplier relations in Japan and the United States: are they converging?", *Sloan Management Review*, Vol. 36 No. 3, pp. 77-84.
- Hvolby, H.H., Trienekens, J. and Steger-Jensen, K. (2007), "Buyer-supplier relationships and planning solution", *Production Planning & Control*, Vol. 18 No. 6, pp. 487-496.
- Ireland, R.D. and Webb, J.W. (2007), "A multi-theoretic perspective on trust and power in strategic supply chains", *Journal of Operations Management*, Vol. 25 No. 2, pp. 482-497.
- Jonsson, P., Kjellsdotter, L. and Rudberg, M. (2007), "Applying advanced planning systems for supply chain planning: three case studies", *International Journal of Physical Distribution & Logistics Management*, Vol. 37 No. 10, pp. 816-834.
- Kaipia, R. (2008), "Effects of delivery speed on supply chain planning", *International Journal of Logistics: Research and Applications*, Vol. 11 No. 2, pp. 123-135.
- Kim, S.W. (2009), "An investigation on the direct and indirect effect of supply chain integration on firm performance", *International Journal of Production Economics*, Vol. 119 No. 2, pp. 328-346.
- Koufteros, X.A. (1999), "Testing a model of pull production: a paradigm for manufacturing research using structural equation modeling", *Journal of Operations Management*, Vol. 17 No. 4, pp. 467-488.
- Kristal, M.M., Huang, X. and Roth, A.V. (2010), "The effect of an ambidextrous supply chain strategy on combinative competitive capabilities and business performance", *Journal of Operations Management*, Vol. 28 No. 5, pp. 415-429.
- Kulp, S.C., Lee, H.L. and Ofek, E. (2004), "Manufacturer benefits from information integration with retail customers", *Management Science*, Vol. 50 No. 4, pp. 431-444.
- Kwon, I.W.G. and Suh, T. (2004), "Factors affecting the level of trust and commitment in supply chain relationships", *Journal of Supply Chain Management*, Vol. 40 No. 2, pp. 4-14.
- Lambert, D.M. (2006), *Supply Chain Management: Processes, Partnerships, Performance*, 2nd ed., SCM Institute, Sarasota, FL.
- Lambert, D.M. and Gardner, J.T. (2004), "Integration with suppliers: model validation and implementation", *Journal of Business Logistics*, Vol. 25 No. 2, pp. 21-42.
- Lee, H.L., Padmanabhan, V. and Whang, S. (1997), "Information distortion in a supply chain: the bullwhip effect", *Management Science*, Vol. 43 No. 4, pp. 546-558.
- Lindgreen, A. (2003), "Trust as valuable strategic variable in the food industry: different types of trust and their implementation", *British Food Journal*, Vol. 105 No. 6, pp. 310-327.
- Mayer, R.C., Davis, J.H. and Schoorman, F.D. (1995), "An integrative model of organizational trust", *Academy of Management Review*, Vol. 20 No. 3, pp. 709-734.
- Mentzer, J.T., Myers, M.B. and Stank, T.P. (2007), *Handbook of Global Supply Chain Management*, Sage Publications, Thousand Oaks, CA.
- Nakano, M. (2009), "Collaborative forecasting and planning in supply chains", *International Journal of Physical Distribution & Logistics Management*, Vol. 39 No. 2, pp. 84-105.
- Nooteboom, B. (2002), *Trust Forms, Foundations, Functions, Failures and Figures*, Edward Elgar, Cheltenham.

- Nyaga, G.N., Whipple, J.M. and Lynch, D.F. (2010), "Examining supply chain relationships: do buyer and supplier perspectives on collaborative relationships differ?", *Journal of Operations Management*, Vol. 28 No. 2, pp. 101-114.
- Oliva, R. and Watson, N. (2011), "Cross-functional alignment in supply chain planning: a case study of sales and operations planning", *Journal of Operations Management*, Vol. 29 No. 5, pp. 434-448.
- Prahinski, C. and Benton, W.C. (2004), "Supplier evaluations: communication strategies to improve supplier performance", *Journal of Operations Management*, Vol. 22 No. 1, pp. 39-62.
- Prajogo, D. and Olhager, J. (2012), "Supply chain integration and performance: the effects of long-term relationships, information technology and sharing, and logistics integration", *International Journal of Production Economics*, Vol. 135 No. 1, pp. 514-522.
- Pyke, D.F. and Johnson, M.E. (2003), "Sourcing strategy and supplier relationships: alliances versus eprocurement", in Harrison, T.P., Lee, H.L. and Neale, J.J. (Eds), *The Practice of Supply Chain Management: Where Theory and Application Converge*, Kluwer Academic Publishers, Boston, MA, pp. 33-53.
- Richey, R.G. Jr, Chen, H., Fawcett, S.E. and Adams, F.G. (2009), "The moderating role of barriers on the relationship between drivers to supply chain integration and firm performance", *International Journal of Physical Distribution and Logistics Management*, Vol. 39 No. 10, pp. 826-840.
- Rudberg, M. and Thumlin, J. (2009), "Centralised supply chain master planning employing advanced planning systems", *Production Planning & Control*, Vol. 20 No. 2, pp. 158-167.
- Rudberg, M., Klingenberg, N. and Kronham, K. (2002), "Collaborative supply chain planning using electronic marketplaces", *Integrated Manufacturing Systems*, Vol. 13 No. 8, pp. 596-610.
- Rungtusanatham, M., Zhao, X. and Lee, T. (2008), "Pooling data across transparently-different groups of key informants: measurement equivalence and survey research", *Decision Sciences*, Vol. 39 No. 1, pp. 115-145.
- Sako, M. (1992), *Prices, Quality and Trust*, Cambridge University Press, Cambridge.
- Schroeder, R.G. and Flynn, B.B. (Eds) (2001), *High Performance Manufacturing: Global Perspectives*, John Wiley & Sons, New York, NY.
- Schütz, P. and Tomasgard, A. (2011), "The impact of flexibility on operational supply chain planning", *International Journal of Production Economics*, Vol. 134 No. 2, pp. 300-311.
- Sheth, J.N. and Sharma, A. (2007), "E-services: a framework for growth", *Journal of Value Chain Management*, Vol. 1 Nos 1/2, pp. 7-12.
- Skinner, W. (1969), "Manufacturing – link in corporate strategy", *Harvard Business Review*, Vol. 46 No. 3, pp. 1-10.
- Sodhi, M.S. (2003), "How to do strategic supply-chain planning", *Sloan Management Review*, Vol. 45 No. 1, pp. 69-75.
- Stadler, H. (2005), "Supply chain management and advanced planning: basics, overview and challenges", *European Journal of Operational Research*, Vol. 163 No. 3, pp. 575-588.
- Swafford, P.M., Ghosh, S. and Nagesh, M. (2008), "Achieving supply chain agility through IT integration and flexibility", *International Journal of Production Economics*, Vol. 116 No. 2, pp. 288-297.
- Swink, M., Narasimhan, R. and Wang, C. (2007), "Managing beyond the factory walls: effects of four types of strategic integration on manufacturing plant performance", *Journal of Operations Management*, Vol. 25 No. 1, pp. 148-164.
- Vereecke, A. and Muylle, S. (2006), "Performance improvement through supply chain collaboration in Europe", *International Journal of Operations and Production Management*, Vol. 26 No. 11, pp. 1176-1198.

- Vijayasathy, L.R. (2010), "Supply integration: an investigation of its multi-dimensionality and relational antecedents", *International Journal of Production Economics*, Vol. 124 No. 2, pp. 489-505.
- Wagner, S.M., Coley, L.S. and Lindemann, E. (2011), "Effects of suppliers' reputation on the future of buyer-supplier relationships: the mediating roles of outcome fairness and trust", *Journal of Supply Chain Management*, Vol. 47 No. 2, pp. 29-48.
- Wheelwright, S.C. (1984), "Manufacturing strategy: defining the missing link", *Strategic Management Journal*, Vol. 5 No. 1, pp. 77-91.
- Williamson, O. (1996), *The Mechanisms of Governance*, Oxford University Press, New York, NY.
- Yeung, A.C.L. (2008), "Strategic supply management, quality initiatives, and organizational performance", *Journal of Operations Management*, Vol. 26 No. 4, pp. 490-502.

Further reading

- Bowersox, D.J., Closs, D.J. and Cooper, M.B. (2002), *Supply Chain Logistics Management*, McGraw-Hill, New York, NY.

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1. Yi Li, Gang Li, Taiwen Feng. 2015. Effects of suppliers' trust and commitment on customer involvement. *Industrial Management & Data Systems* **115**:6, 1041-1066. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]