



Assessing the effectiveness of supply chain partnering with scalable partnering as a moderator

Premkumar Rajagopal

*Faculty of Business and Management, AIMST University,
Bedong, Malaysia, and*

Suhaiza Zailani and Mohamed Sulaiman

School of Management, Universiti Sains Malaysia, Penang, Malaysia

Effectiveness
of supply chain
partnering

649

Received 20 August 2008

Revised 19 March 2009

Accepted 20 April 2009

Abstract

Purpose – The primary purpose of this paper is to examine empirically the significant determinant for supply chain partnering (SCP) that can be applied by the firms to increase their effectiveness in SCP efforts. Next, the paper intends to examine the impact of scalable partnering towards the effectiveness of SCP.

Design/methodology/approach – To address the research problem, a survey instrument is developed and a structured model is hypothesized and tested using SPSS tool. Data are collected from a field research on a sample of 584 companies in Malaysia.

Findings – The result of this research indicates that resource sharing have positive influences on SCP. Increasing scalable partnering would also lead to increases in the effectiveness of SCP.

Research limitations/implications – One of the limitations of the study is that the use of a single key informant for the data collection from the respective companies. A more stringent test of the relationships between scalable partnering and its impact in SCP requires a longitudinal study.

Practical implications – Managers must also recognize the influential role of scalable partnering which actually motivates channel partners to continue their investment in SCM initiatives. Thus, managers should pay more attention to the need of channel member to generate a higher level of confidence in scalable partnering.

Originality/value – While SCP and its determinant exist in prior research, this paper contributes a new variable “Scalable Partnering” towards strengthening the relationship among the supply chain partners.

Keywords Supply chain management, Partnership, Channel relationships, Malaysia

Paper type Research paper

1. Introduction

Economic forces and technological advances have combined over the past 20 years to increase the importance of the supply chain on company profitability and long-term business success. Realizing the importance of the supply chain as a global competitive weapon, the Malaysian Government has extended the role and function of the Federation of Malaysian Manufacturers (FMM). FMM is now spearheading the effort to prepare local industries to compete globally by automating their supply chain management (SCM) processes (Yong, 2002). Besides this, the government has also



International Journal of Physical
Distribution & Logistics Management
Vol. 39 No. 8, 2009
pp. 649-668

© Emerald Group Publishing Limited
0960-0035

DOI 10.1108/09600030910996305

allocated a grant of RM5 million to realize the Tiger project[1] goals by enabling manufacturers who are involved in the local electrical and electronic sector to implement RosettaNet, an internet-based common messaging standard for global SCM.

To understand the role and position of the supply chain, the paper first discusses the economic concept of the value chain. When describing the supply chain in industrial companies, the value chain of Porter (1985) is taken as a term of reference. Porter (1985), the noted economist and author, has identified a systematic means for examining all the activities a firm performs and how those activities interact. According to Porter (1985), the value chain is a tool that disaggregates a firm into its core activities to help reduce costs and identify sources of competitiveness. Some view the concept of SCM as extending the economic concept of the value chain. On the one hand, the value chain focuses on the internal process of value adding to the product and services while on the other hand SCM looks beyond the internal process and integrate the upstream and downstream entities.

A basic purpose of SCM is to control inventory by managing the flows of materials. Managing the flow of materials is common to firms in every segment of the economy such as governments, manufacturers, retailers, and universities. In essence, manufacturers make products from materials and services they purchase from outside suppliers. Firms today, however, are relying more than ever on suppliers from around the world. Since materials comprise such a large component of sales dollars, firms can reap large profits with a small percentage reduction in the costs of materials. As mentioned by Kotler and Armstrong (1999), buyers and suppliers engage in a business relationship that happens along the channel in the supply chain. Since exchange brings together multiple buyers and suppliers, buyers can expect to pay lower prices when purchasing through the exchange. That is one reason why SCM is a key competitive weapon. A key challenge in SCM would be partnering efforts and the various factors that drive these partnering efforts. Little research has been done on the relationship between partnering efforts with the effectiveness of partnering.

1.1 Problem identification

The supply chain is seen to play a positive role in the growth of business performance because many literature reviews have proved that supply chain principles can improve the competitive position (Ganeshan and Harrison, 1995; Harland, 1996; Anderson *et al.*, 1997; Spekman *et al.*, 1998; Elliman and Orange, 2000; Jayanth *et al.*, 2000; Lee, 2000; Christopher and Lee, 2001; Lee, 2001; Lee and Whang, 2001; Muzumdar and Balachandran, 2001; Fynes and Voss, 2002; Lee, 2002; Pyke and Johnson, 2002). In other words, many studies have often concluded that companies can improve business performance simply by adopting SCM. Fynes and Voss (2002), however, stressed that adopting supply chain orientation requires establishing relationships among the channel partners. Consequently, successful partnering with suppliers and buyers is actually important for companies in order to improve their business performance. This is confirmed by Wong (2002) in his study on "Sustaining company performance through partnering with suppliers." He has discovered that one of the roots of success in company performance is that they work closely with the suppliers.

Considering the partnering strategy in the supply chain as a method to improve business performance, there has been considerable analysis of a buyer-seller relationship development in the literature (Bejou and Palmer, 1998; Parvatiyar and

Sheth, 2000; Fynes and Voss, 2002). Much of the discussion on partnering, however, focuses on the processes by which relationships are developed. Nonetheless, the subject of partnering practice, such as infrastructure partnering and its building blocks is less well researched and less documented in the literature. Waller (1999) lays out his observation on the interconnected coordination of the flow of materials, information and finance and he has realized that the vision of a fully integrated and efficient supply chain, partners in a supply chain need to have partnering structure and capability across their channels. Even though the contribution of supply chain partnering (SCP) is not proven, its adoption of SCP necessitates further research. This paper is primarily to investigate the significant determining factors of SCP that can be applied in the firms to increase the firms' effectiveness in SCP. The research questions are:

RQ1. What is effective SCP?

RQ2. What are the determining factors of effective SCP in the context of Malaysia?

RQ3. Does scalable partnering moderate the effectiveness of SCP in the country?

2. Literature review

2.1 Supply chain management

Christopher (1998), Shapiro (2001), Larson and Halldorsson (2002) and Coyle *et al.* (2003) have defined SCM in a broader concept, which includes the management of the entire supply chain. The SCM framework consists of three closely interrelated elements: the supply network structure, the supply chain business process, and supply chain channel management (Lambert, 2001). Veen and Venugopal (2000), on their part, have defined SCM as:

[...] management activities focused on the (voluntarily) co-ordination of several entities in the supply chain in order to optimize the entire supply chain as if it were one unit, rather than optimizing each entity separately.

Basically, the concept of SCM emphasizes co-ordination and collaboration within the firm and between the firms to achieve a win-win situation for all the firms involved. There is widespread consensus, especially among companies, that there is a need for co-ordination and collaboration within the firm and between the firms. In other words, the partnering efforts among the channel members in the business system are absolutely important.

2.2 Supply chain partnering

When considering the question of partnering in supply chain practices, it is important to consider why firms behave in the way that they do. Deutsch (1980) has suggested that the way in which firms believe their goals are related to an important variable affecting the dynamics and outcomes of their interactions. The firm is willing to work on a cooperative basis with customers and provide them with all the information they require to perform their duties (Handfield and Nichols, 1999). Besides that, getting all functions to operate and incorporate employee, manager, customer and supplier input into all work-related decisions is another form of partnering. The nature of partnering between channel members varies among industries; SCM solutions focus on providing more data from all links of the chain.

Authors and practitioners from many different disciplines and functions are highlighting an increasing dependence on relationships with channel partners. Historically, Porter (1980) has noted an economic reasoning on alliances, in which, he proposed that cooperation among partners will enable them to achieve a stronger position. Christopher (1992), Chen (1999), La Londe and Ginter (2000) and Beth *et al.* (2003), have claimed that closer long-term relationships are evident in some industries as compared to others. According to Abdul Aziz (2001), partnering is an approach to reduce cost and is an increasing management tool aimed at reversing the negative effects of adversarial relationships. Partnering provides participants with a win-win orientation towards problem resolution and fosters synergistic teamwork. According to him, partnering between companies may be on the rise but it is much misunderstood. To increase the competitiveness, therefore, companies need to have a shared view of the purpose of a relationship.

2.3 Effective SCP

Before embarking on a long-term strategy of SCP, most managers would want to know the expected outcomes that will make their efforts worthwhile. Identifying and quantifying expected outcomes are important parts of any effort to evaluate the attractiveness of initiatives. If the benefits are viewed as sizable and managers believe that the firms can realistically achieve them, it makes sense to thoroughly evaluate the SCP and its factors. In general, most researchers agree that approaches such as the balanced scorecard (BSC), the SCOR model, the logistics scoreboard, and other measurements provide excellent guidance when developing a supply chain performance measurement system. By using references to the three models for supply chain measurement (BSC, SCOR, and the logistics scoreboard) and their strengths and weaknesses, this study will focus on improved procurement processes, cost reductions, and inventory reductions.

2.3.1 Cost reduction. The most recognized benefit of SCP is in the area of cost reduction. Rich and Hines (1997) have contended in their empirical study that the structure process of information exchange between an organization and its supply chain can further reduce cost performance. Managing and reducing costs throughout the pipeline are among the most important elements for survival.

2.3.2 Procurement. Organizations have deploying leading-edge approaches in the management of materials are put into practice integrative ideas, which are, at least in part, based on a strategic and integrated role for purchasing (Baily *et al.*, 1994). According to Kevin (2002), developing and achieving procurement best practices are never easy. However, with an effective procurement process, administrative costs can be lowered from a reduction of employees required to support the purchasing function, streamlining the approval process for purchases and enabling managers to make purchasing decisions directly by using the partnering efforts (Sanjiv, 2002).

2.3.3 Inventory reduction. Raw materials, goods in process and finished goods all represent various forms of inventory. A recent Inventory Reduction Report (IRR) (2002) reader survey has found that slightly more than half of all respondents (50.9 percent) have identified inventory turn as their matrix of choice. The remainders have chosen days on hand (32.3 percent) or used both measurements routinely (16.8 percent). Good inventory management can help a company lower its costs even as reduction and demand increase.

2.4 Factors of effective SCP

The most frequently mentioned factors of partnering relations seem to be two-way information-sharing, joint problem-solving, the partners' ability to meet performance expectations, clearly defined and mutually agreed goals, and mutual involvement in relationship development and planning (O'Toole and Donaldson, 2002, Brinkerhoff, 2002, Whipple and Frankel, 2000 and Juhantila, 2002). These factors should be taken into account when implementing and managing partnering relations. Analyzing the data and information derived from secondary literature search as well as the input from supply chain practitioners, the study has developed the following list of factors of SCP:

- information flow;
- supply chain infrastructure;
- organizational linkage; and
- resource sharing.

2.4.1 Information flow. Supplier information flow is defined as the extent to which the supplier openly shares information about the future that may be useful to the customer relationship. The supplier provides the basis for cooperating in ways to lower the customer's costs. Open communication can also foster functional conflict (Anderson and Narus, 1990), which can be the basis for identifying and solving problems related to lowering costs. Viswanadham (2002) has emphasized the importance of information flow within an organization using the intranet which will allow stakeholders within a company to gain an integrated view of the core business processes of the enterprise.

2.4.2 Supply chain infrastructure. The supply chain infrastructure is associated with the logically and physically connected support among the various business processes, including the systems. The supply chain infrastructure provides a more effective solution based on smart material flow for the global supply chain enabling the management to be efficient and effective. The supply chain infrastructure is associated with the logically and physically connected support among the various business processes, including the systems. According to Zhao *et al.* (2002), there are two classes of infrastructure systems, enterprise resource planning systems and SCM systems that are widely used to support the coordination of activities across major organizational components and supply chain partners.

2.4.3 Organizational linkage. Terms such as downsizing, flattening, networking, clustering, right sizing, delivering, reengineering, and nonhierarchical are abundant in the popular managerial press (Donald and David, 1996). The model that has been suggested by Rich and Hines (1997), argues that a "lean" internally integrated company has the competitive advantage to be derived from the enterprise itself; it therefore, attempts to exploit the advantages of integrating suppliers and uses the continuous improvement of quality, cost and delivery performance to the focal organization as a means of exploiting market changes. With the establishment of the formal linkage between firms externally and an interdepartmental linkage within firms internally, organizations are able to facilitate interesting frameworks for working in teams and participating in existing as well as new product development. Firms can be seen as active players in developing business processes on a win-win situation and jointly developing incentives, which are aligned against their task.

2.4.4 Resource sharing. Ahuja (2000) tested resource based linkages between organizations on a longitudinal data set of 97 leading firms from the global chemical industry over a period of 1979-1991. He has concluded that a firm's inducement to form linkages can be related to its need for resources. Through interfirm linkages, firms can obtain access to assets that create value; thus, if a firm lacks competitive resources, it can use interfirm linkages to overcome this deficiency. He has further stated that the most value that a firm can provide to its partners will occur when a firm can make available assets that are difficult for the partners to create on their own.

2.5 Scalable partnering

Many supply chains focus on how they can do better to meet their customers' needs. Some of them have adopted the total quality management principle as a panacea to their problems (Wong, 2002) while Morgan and Hunt (1994) and Lambert *et al.* (1996) together with others have focused on trust and commitment. While trust and commitment have been frequently cited as antecedents of the process of the relationship development, they have also been seen as outcome measures (Morgan and Hunt, 1994). Meanwhile others have argued that trust and commitment are the moderators for the degree of relationship in a chain. Lee (2004), however, has discussed the levels of partnering by means of scalable as the moderator for effective supply chains. The scalable partnering model stresses on the importance of channel partners seeing the potential of expanding the existing business in the near future. Next, the partners also see that there is value associated with their involvement and work closely to expand their resource utilization. While they scale up, partners are willing to invest resources and time. On the aspect of process improvement, they are committed to continuous improvement in automation and integration of the key functional systems of a business between the channel partners, inventory visibility, e-procurement, e-commerce and customer relations management. Scalable partnering also refers to the ability of channel partners to expand the scope of conducting business. The scope involves committing to larger volumes, discussing on demands and material flow while negotiating on the price as their basic function.

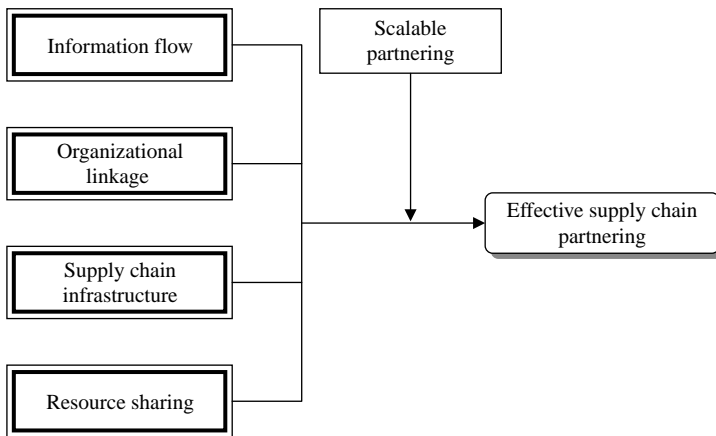
2.6 Framework

From the review, it is suggested that effective SCP can be achieved through the factors of information flow, the supply chain infrastructure, organizational linkages, and resource sharing (Figure 1).

3. Research design

The sampling methods used will be those commonly accepted in contemporary research methodology. The research design is defined as follows:

- Population frame – Directory of Malaysian Industries.
- Population – firms in Malaysia (627 firms).
- Unit of analysis – firms.
- Respondents – procurement or purchasing managers.
- Sample – population as sample.
- Study design – cross-sectional basis.

**Figure 1.**
Framework

3.1 Measurement of variables

Wherever possible, existing measures from previous research will be used to measure the constructs. Table I shows the findings of previous researchers in this measurement of the variables. A five-point Likert scale has been used to measure the managers' views on the extent of the factors being practiced in the firms. The scale ranged from "very little" to "a great extent". The scale that has been used to measure the effectiveness of SCP ranged from "highly disagree" to "strongly agree".

4. Analysis

4.1 Respondents and companies profile

The response rate is 22.08 percent. This response rate is good for this type of survey given the complexity of the survey instrument. The questionnaires have been answered mostly by procurement managers themselves (73 percent) or by assistant procurement manager (6 percent) and only 4 percent by junior officers. All the respondents are either professionally qualified or have an extensive background in quality as evidenced by their degree in engineering or work experience of for more than

	Sources
<i>Independent variables</i>	
1. Organizational linkage	Speakman <i>et al.</i> (1998), Cousins (2003) and Lee (2000)
2. Supply chain infrastructure	Marien (2001), Chopra and Meindl (2001) and Zhao <i>et al.</i> (2002)
3. Resource sharing	Kamalini and Spekman (2000)
4. Information flow	Kamalini and Spekman (2000), Boddy <i>et al.</i> (2000), Cousins (2003) and Lee (2000)
<i>Dependent variables</i>	
1. Cost reduction	Kamalini and Speakman (2000) and Supply-Chain Council (2002)
2. Inventory reduction	Fawcett and Magnan (2001), Leenders and Johnson (2000), Lambert <i>et al.</i> (1998) and Supply-Chain Council (2002)
3. Improved procurement	Olorunniwo and Hartfield (2001) and Davila <i>et al.</i> (2003)
<i>Moderator variables</i>	
Scalable partnering	Lee (2000) and Lee (2004)

Table I.
Measurement of variables

ten years. The work experience for the respondents ranged from 2 to 25 years with an average of approximately six years. Generally, the respondents have considerable years of working experience that enable them to understand their companies and consequently, give reliable answers. Of the survey's respondents, 82 percent were men. The presence of a small number of female respondents in the survey is not surprising since key positions in companies are normally male in Malaysia. Out of the 129 manufacturing companies sampled, 55 percent are involved in electrical products while the rest deal with electronics products. Foreign-owned companies make up the majority of 55.8 percent, with Malaysian-owned companies constituting the remainder 57 companies. Firm size as reflected by the number of employees, indicating that a significant majority lie within the range of above 250-5,000 employees, i.e. 67.5 percent. Approximately, equal number of multi-national corporations (MNCs) and non-MNCs were surveyed.

4.2 Goodness of fit measures

4.2.1 Factor analysis. In this study, three factor analyses were run to verify the postulated dimensionality of the independent, dependent and moderating variables, respectively. The examination of the four-factor solution of the independent variables (IVs) revealed a combined total variance explained of 62.1 percent. A big percentage of the variation was taken up by Organizational Linkage (20.49 percent), followed by information flow (18.16 percent), Resource sharing (12.57 percent) and finally, supply chain infrastructure (10.88 percent) (Table II).

A set of 22 items measuring the effectiveness of SCP has been carefully developed to represent improvement in procurement, and cost and inventory reduction. In addition, a one component factor has been sought; resulting in a one-factor solution explained 49.36 percent of the variation (Table III).

The moderating variable of scalable partnering has also been subjected to an option for a one component factor. The nine items accounted for 46.72 percent of the variation (Table IV).

4.2.2 Descriptive analyses. Out of the four IVs, supply chain infrastructure is rated highest ($M = 3.74$), while organizational linkage is the lowest ($M = 3.52$). The moderating (scalable partnering) and dependent variables' (SCP) mean values are also within the range of 3-4 in the five-point Likert scale. All variables are exhibiting a standard deviation of less than 1 (Table V).

4.2.3 Predictive and discriminant validity. All independent and moderating variables have been found to be significantly correlated with the dependent variable of SCP. Both information flow and organizational linkage have similar and high-correlation values ($r = 0.68, p < 0.01$) as IVs with SCP. This is followed by supply chain infrastructure ($r = 0.52, p < 0.01$) and resource sharing ($r = 0.48, p < 0.01$). It is also important to note that all the IVs are not highly correlated, as this is a necessary condition to ensure that strong multicollinearity effects are not present in this study. Table VI presents the results of this test.

4.3 Hierarchical regression analyses

A three-step hierarchical regression has been applied to study the differences with respect to the main effects, moderating direct effects and interaction effects. Sets of variables have been entered consecutively, where variables on the first step consist of all the IVs. It has been discovered that all the IVs but Resource Sharing have not

Effectiveness of supply chain partnering				
Items	I	Factors II	III	IV
<i>I. Organizational linkage</i>				
Members of my organization and partnering firms engage in developing business processes	0.61	0.56	0.09	0.06
My organization and its supply chain partners are involved in capacity management	0.74	0.40	0.08	0.20
Through the organizational linkage, the supply chain partner can obtain access to assets that create value	0.82	0.29	0.06	0.15
Through the organizational linkage the supply chain partners can avoid purchase of assets (software, machines and technology) which can be time consuming	0.68	0.44	0.09	0.16
My firm adds value to supply chain partners through the attractiveness of organizational linkage	0.69	0.48	0.08	0.16
Performances are jointly measured with my firm and channel partners	0.81	0.35	0.02	0.21
Performance measurements are shared among supply chain partners	0.80	0.30	0.13	0.13
Communication occurs at all levels; sharing of both praise and criticism among the supply chain partners ^a	0.49	0.41	0.12	0.06
<i>II. Information flow</i>				
Supply chain partners are involved in planning, production and shipment through information flow in my organization	0.30	0.71	0.13	0.12
Information are exchanged between supply chain partners in the suitable format	0.20	0.72	0.30	0.04
Internally resources are coordinated through information flow	0.30	0.72	0.04	-0.01
Adequate and quality of information are shared on a timely manner between supply chain partners	0.23	0.65	0.18	0.27
Supply chain partners have the visibility on information related to material demand and supply for decision making	0.26	0.57	0.26	0.22
Accurate forecasts of demand are made available through information flow which smoothen production	0.21	0.53	0.29	0.42
The facilities required for information flow are sufficient and available	0.22	0.66	0.23	0.14
Order fulfillment from supply chain partners are communicated through information flow	0.27	0.68	0.25	0.17
<i>III. Resource sharing</i>				
Efforts are taken to increase inter-functional coordination between supply chain partners	0.43	0.42	0.34	0.14
Knowledge and technology with supply chain partners	0.08	0.30	0.80	0.21
My firm and supply chain partners are allowed to work as teams to resolve problems	0.09	0.22	0.83	0.16
My firm believes in a healthy relationship with supply chain partners as a critical element	0.08	0.26	0.70	0.16
Joint activities are organized to improve quality indicators	0.19	0.22	0.78	0.18
Both my firm and supply chain partners are engaged early in the product development phase ^a	0.55	0.16	0.45	0.08
(continued)				

657

Table II. Factor loadings for factors of SCP (IVs)

Items	Factors			
	I	II	III	IV
Business processes are transparent to each other (within supply chain partners) ^a	0.60	0.16	0.40	0.12
<i>IV. Supply chain infrastructure</i>				
My firm uses a software in managing its business in manufacturing and warehouse ^a	− 0.04	0.16	0.20	0.56
Automated material handling systems are used in production and warehouse ^a	0.25	0.26	0.20	0.57
Product/material information at manufacturing and warehouse are recorded based on bar coding and using keyboard ^a	0.37	− 0.10	0.46	0.41
Radio frequency equipment is used at warehouse and logistics for order processing ^a	0.48	0.02	0.28	0.31
Demand management is available through management report form systems	0.40	0.12	0.09	0.71
Specific systems are used in recording escalation and monitoring of quality issues	0.25	0.05	0.15	0.77
My firm's inventory is managed based on FIFO and fast-moving items	0.03	0.13	0.09	0.75
Eigenvalue	6.15	5.45	3.77	3.26
Percentage of variance explained (62.10)	20.49	18.16	12.57	10.88
Reliability (α)	0.95	0.90	0.89	0.89
KMO measure of sampling adequacy		0.78		
X^2 (df)		2,705.04		

Note: ^aItems with insufficient communalities (i.e. < 0.5) and/or cross-loaded were eliminated from subsequent analysis

Table II.

exhibited an influence on SCP. Information flow and organizational linkage had identical estimated values ($\beta = 0.29$, $p < 0.01$). All the three statistically significant predictors (information flow, organizational linkage and supply chain infrastructure) account for approximately 66 percent of the variation in SCP.

In the second step of the analysis, scalable partnering (moderating variable) has been introduced into the regression equation, with an additional increase of 3 percent in the explained variance of SCP. The third step of the hierarchical regression analysis has introduced the interaction effects between the moderator and IVs on SCP as the dependent variable. After discounting the main effects and moderating variable's direct effect, only two out of the four interaction effects have explained an additional variance of 4 percent in SCP. They are organizational linkage \times scalable partnering ($\beta = -0.33$, $p < 0.01$) and resource sharing \times scalable partnering ($\beta = 0.15$, $p < 0.05$). The results are as shown in Table VII. At this juncture, it can be observed that scalable partnering have exhibited joint effects on SCP with organizational linkage and resource sharing, respectively. However, the form and/or magnitude of their relationships (i.e. moderating effect) have not been evident until further interactions have been plotted.

4.4 The moderating effect

Therefore, the two statistically significant interaction effects have been plotted as shown in Figures 2 and 3. The demarcations of “Low” and “High” for the variables

Items	Factor I	Effectiveness of supply chain partnering
<i>Supply chain partnering</i>		
Partnering has reduced the number of suppliers and lessened management complexity and problems ^a	0.66	659
Partnering has increased mutual dependence and lowered the risk of losing supply source and created greater stability ^a	0.55	
Partnering has increased the potential for sharing knowledge and technology with suppliers and reduced the operation cost ^a	0.70	
Partners offer cost-saving opportunities in business processes and delivery ^a	0.68	
Partnering has improved cash flow and shortened lead time for payment (cash-to-cash) ^a	0.57	
Joint problem solving had led to commitment and shortened the overall throughput time	0.77	
Partnering has increased attention from suppliers and further reduce the execution errors ^a	0.71	
Outsourcing is considered an opportunity in SCP ^a	0.40	
Partnering has created desire to focus on core competency with the intention to outsource other activities ^a	0.41	
Major types of inventory-related costs and their relationships to inventory decisions are discussed with partners in supply chains	0.71	
Analysis is conducted to understand trade-offs between large purchases qualifying for quantity discounts and costs of storing inventory	0.73	
Information flow among partners can be used in the supply chain to reduce inventory	0.72	
Bar coding and the internet have led to a reduction in uncertainty in demand management	0.71	
The overall inventory management performance has improved over the past five years	0.73	
Priority is set in times of scarcity to avoid stock-out situations ^a	0.65	
Significant benefits are obtained in the form of reductions to purchasing costs by using the procurement process	0.79	
Transaction costs are avoided/minimized by using e-procurement	0.79	
E-procurement is easier to get suppliers to adopt to information flow through internet-based e-procurement technologies	0.79	
E-procurement systems are well integrated with other enterprise systems	0.79	
E-procurement and inventory decisions are coordinated with supply chain partners	0.82	
Well-coordinated information with suppliers has improved procurement efficiency	0.76	
Increased inventory visibility via information flow has reduced procurement costs	0.83	
Eigenvalue	10.86	
Percentage of variance explained	49.36	
Reliability (α)	0.91	
KMO measure of sampling adequacy	0.93	
χ^2 (df)	1,959.55	
Note: ^a Items with insufficient communalities (i.e. <0.5) and/or cross-loaded were eliminated from subsequent analysis		

Table III.
Factor loadings for SCP
(dependent variable)

have been conducted based on the criteria of being outside ± 1 . Both low and high values of partnering and organizational depict a similar positive trend towards SCP. For the same values of organizational linkage, a higher extent of scalable partnering has had a larger influence on SCP than at a low level (Figure 2).

In Figure 3, it can be discerned that high values of scalable partnering would exhibit higher SCP effectiveness as opposed to when at low levels. Contrastingly, sharing of resources seems to be more highly related to SCP effectiveness when scalable partnering is at a low level.

Items	Factor I
<i>Scalable partnering</i>	
My organization and its supply chain partners emphasize on expanding its existing business	0.77
My organization and its partners value keeping commitments	0.71
My firm and its partners display a high level of professionalism ^a	0.64
When selecting partners, we look into a combination of factors (price, quality, delivery, reliability, etc.), rather than price alone ^a	0.49
My organization and its supply chain partners work closely to expand resource utilization	0.76
We have pre and post implementation review meetings on our expansion project/programs ^a	0.68
We have phases/versions of upgrades on our business processes	0.74
We use the web enabling inventory management system ^a	0.61
We look at each other's value adding process in our business integration ^a	0.70
Eigenvalue	4.21
Percentage of variance explained	46.72
Reliability (α)	0.78
KMO measure of sampling adequacy	0.81
χ^2 (df)	463.78
Note: ^a Items with insufficient communalities (i.e. < 0.5) and/or cross-loaded were eliminated from subsequent analysis	

Variables	Minimum	Maximum	Mean	SD
Information flow	1.00	5.00	3.62	0.71
Organizational linkage	1.00	5.00	3.52	0.88
Resource sharing	2.00	5.00	3.71	0.70
Supply chain Infrastructure	1.67	5.00	3.74	0.77
Scalable partnering	1.50	5.00	3.71	0.66
Supply chain partnering	1.00	5.00	3.64	0.74

Variables	1	2	3	4	5	6
Information flow (1)	0.90					
Organizational linkage (2)	0.72 *	0.95				
Resource sharing (3)	0.56 *	0.39 *	0.89			
Supply chain infrastructure (4)	0.42 *	0.45 *	0.39 *	0.81		
Scalable partnering (5)	0.60 *	0.54 *	0.52 *	0.43 *	0.78	
Supply chain partnering (6)	0.68 *	0.68 *	0.48 *	0.52 *	0.63 *	0.91

Notes: *Correlation is significant at the 0.01 level (one-tailed); diagonal entries are Cronbach alpha values

Dependent variables	Step 1	Supply chain partnering Step 2	Step 3
<i>Main effects</i>			
Information flow	0.29**		
Organizational linkage	0.29**		
Resource sharing	0.08		
Supply chain infrastructure	0.16**		
<i>Moderator (direct effect)</i>			
Scalable partnering		0.23**	
<i>Interaction effects</i>			
Information flow × scalable partnering			0.21
Organizational linkage × scalable partnering			−0.33**
Resource sharing × scalable partnering			0.15*
Supply chain infrastructure × scalable partnering			0.09
R^2 change	0.66	0.03	0.04
F change	56.80**	9.98**	3.77**
Durbin-Watson statistic	1.88		

Note: * $p < 0.05$; ** $p < 0.01$

Table VII.
Hierarchical regression
analyses

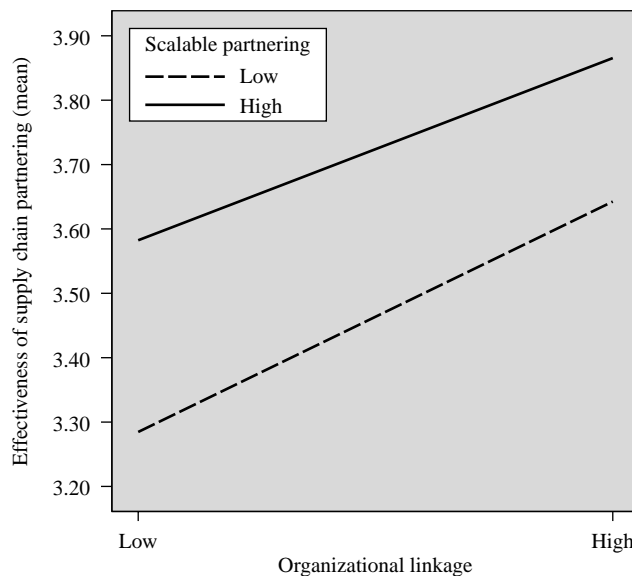


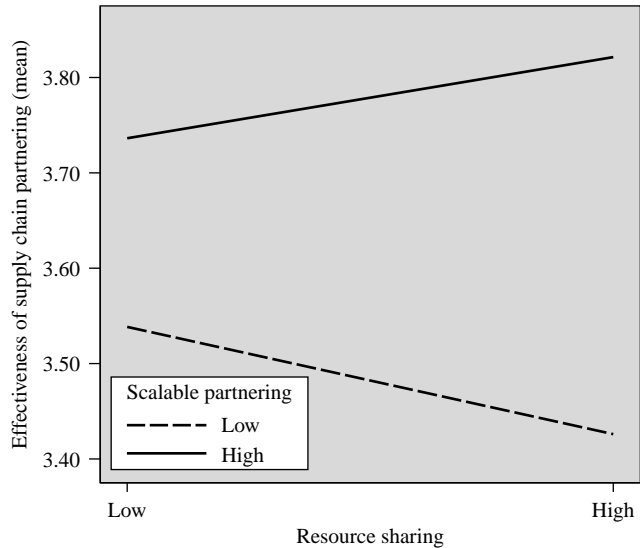
Figure 2.
Interaction effects
of organizational linkage
and scalable
partnering on SCP

5. Discussions

5.1 Selected factors of effective SCP and the role of scalable partnering

The results of the survey indicate that information flow, organizational linkage and supply chain infrastructure affect SCP. This finding is consistent with a previous empirical study of 57 top-tier suppliers in a North American automotive industry (Jayanth *et al.*, 2000). In their study, all eigenvalues exceeded one, and the cumulative percentage of variance explained was 67 percent. The lowest factor loading within

Figure 3.
Interaction effects
of resource sharing
and scalable partnering
on SCP



a factor was 0.61, with the highest exceeding 0.70. Also, there was a high degree of divergence across factors as indicated by the lack of high cross-loading of any item on more than one factor. The data support that information flow, organizational linkage and supply chain infrastructure are related to effective SCP. In this research, two variables (information flow and organizational linkage) had identical estimated values ($\beta = 0.29, p < 0.01$). Both the variables appear to be equally important in effectiveness of SCP. These results hold two implications. First, information flow, by itself, encourages effective SCP by enabling the channel partners to view and share information on a timely and effective basis. Second, the elements of organizational linkage equal contribute to the set-up of a structure that enables the channel players to suggest equal responsibility in a given chain.

Overall then, the results from the analysis of the moderating effects are somewhat mixed. On the one hand, our central proposition that companies that have developed strong scalable relationships with their customers should see significant improvements in the design of SCP is partially supported (an increase of 3 percent in the explained variance of SCP). This finding underpins the arguments developed in our model and points to the importance of addressing the potential effects of moderating variables. On the other hand, scalable partnering does not moderate information flow and the supply chain infrastructure. However, two out of the four interaction effects (information flow, supply chain infrastructure, resource sharing and organizational linkage) have explained an additional variance of 4 percent in SCP. They are organizational linkage \times scalable partnering ($\beta = -0.33, p < 0.01$) and resource sharing \times scalable partnering ($\beta = 0.15, p < 0.05$). Thus, scalable partnering is exhibited joint effects on SCP with organizational linkage and resource sharing, respectively. A possible explanation for this finding is that scalable partnering, while perhaps more critical for firms intending to move forward, may be evolving from trust and commitment from the channel partners. Both the factors organizational linkage

and resource sharing are grounded on people involvement in comparison to information linkage and supply chain infrastructure which are process orientated. This is consistent with Handfield and Nichols (1999) who have argued that firms are willing to work on a cooperative basis with customers to ensure they provide them with the information they require to perform their duties, whenever, wherever, and however they need if they believe there is a commitment.

There are more benefits to be derived from using scalable partners than factors (IVs) only. Scalable partnering is revolutionizing the way channel partners build relationships in a chain between upstream and downstream companies. Connecting numerous processes, people, and integrating scalable partnering can significantly increase the partnering efficiency of a firm. Scalable partnering can lead to a competitive advantage as well as profitability for a firm. The channel members in a supply chain are expected to feel a sense of belonging to the given chain as well as a high degree of mutual trust (Skjoett-Larsen, 1999). This involves the commitment of decision makers in multiple organizations to partner in achieving common goals. The basic assumption from this research is that organizational linkage together with scalable partnering facilitates close working relationships between the members of a supply chain. Some researchers opine that flatter organizations are more efficient than hierarchical ones in exchanging information across borders. Others have suggested that process-oriented organizational structures will work better than traditional hierarchical structures in networks with many partners (Cooper *et al.*, 1997). They can be oriented towards sequentially, vertically or horizontally dependent activities (Lambert *et al.*, 1998). However, from this study, we conclude that organizations that are structured to embed flexibility and have a linkage (formal) among partners with scalable strategies will enhance their effectiveness in a chain.

5.2 Theoretical implications

A contribution of this paper is the conceptual linkage between the IVs (information flow, organizational linkages, resource sharing and supply chain infrastructure) and scalable partnering towards achieving effective SCP. Resource sharing takes a lesser role in SCP and becomes important when scalable partnering is introduced. Scalable partnering – contributing to higher degree of partnering – is critical for customers and suppliers if they desire the advancement of their business endeavors. It is also found that scalable partnering moderates the relationship between resource sharing and perceived SCP performance; these need to be considered from a theoretical perspective. Scalable partnering is acknowledged as a new contribution to the body of knowledge in SCM and as mentioned earlier, in the literature review. Following testing, this variable was found to be a key moderator for the effective SCP in SCM which further enhances our understanding of the phenomenon. High-scalable partnering companies may benefit more from these factors (resource sharing) than low-scalable partnering companies. The results also show that companies could use EDI to gain co-ordination with suppliers and customers. These results support other studies that stress the importance of cooperation in the management of the supply chain. Fawcett and Magnan (2001) found that cooperation and collaboration characterize the intensity and nature of supply chain relationships in a sample of industry managers engaged in supply chain initiatives.

5.3 Managerial implications

The implementation of effective SCP implies a working relationship both across functional areas and in the extended supply chain. A move away from the traditional hierarchical organizations with strong functional areas (silo) is necessary. Still, as the formation of SCP becomes more prevalent, managers have little guidance when it comes to when and how to best achieve such relationships. This paper has empirically tested the viability of scalable partnering as a moderator to advance the effectiveness of SCP. The findings derived are not only of theoretical interest, but can also be of great practical significance. For the practicing manager, the challenge is mainly of balance and knowing where to invest scarce time and efforts. Specifically, there are several managerial implications from the findings which are:

- There are two types of information flows in a management information system. An external information flow is information that either comes to or is sent from the organization. An intra-organizational flow is information flowing within the organization. External information includes the inward flow of information, called intelligence, and the outward flow, called organizational communications. Managers choosing to begin using information flow to enhance partnering efforts will have to look at both the external informational and intra-organizational flow.
- Next, managers should carefully review the perceived values and the cooperative goals that are going to be established from the perspective of supplier development. Purchasing managers should attempt to deliberately allow the channel partners, especially the suppliers, to see the linkage between the focal organization and theirs. The supplier development strategy will allow managers to work with suppliers from the beginning as this will result in a higher speed of supplier development and a better alignment with the focal company needs and objectives.
- Managers must also recognize the influential role of scalable partnering which actually motivates channel partners to continue their investment in SCM initiatives. Thus, managers should pay more attention to the need of channel member to generate a higher level of confidence in scalable partnering. In addition, it should be noted by manufacturing managers that product salability is a central foundation of channel commitment in SCM. They need to listen to both the distributor personnel and the end customer to ensure that their product offerings are viewed as competitively attractive products. Without competitive and sellable product offerings, the other party's incentives to commit in SCP relationship would be decreased.

5.4 Limitations of the study

The study presented in this paper has limitations. First, the companies included in the study have been selected from the directory of the FMM and the study is also biased towards companies willing to discuss and share results openly. Second, the focus of this paper is on a single industry rather than on the manufacturing industry as a whole. Additionally, since each company has been surveyed only once, some important insights might not have been captured during the process. Next, the variables presented in this study should be tested by size of companies to gain further understanding of the various levels of partnering that have an impact how benefits are derived. Finally, while

it is probably true that procurement managers would be familiar with measures of supply chain practices, it can be argued that they would be less well informed about measures of customer relationships and satisfaction in a given chain.

5.5 Future research

Finally, this study also points to areas of potential future research. As is often the case, longitudinal research could provide valuable contributions to theory development and refinement in the fields of SCM. There is a considerable body of knowledge in the SCM literature which suggests that best SCM practices evolve over a considerable period of time within companies and that different challenges are faced at different points in time (Fynes and Voss, 2002). Research from the customer's (distributors, wholesalers, and retailers) perspective would complement and add to the findings of this study. Future research could examine issues such as customer perceptions of effective SCP. The impact of other contingency variables on the SCP performance relationship should also be considered, given the findings of this study. Identifying the circumstances or variables that have an intervening effect on the effective SCP relationship could provide both the academic and practitioner communities with potentially compelling answers to the question of why SCP programs sometimes fail.

5.6 Conclusion

Partnering does not just happen. It needs long-term investment from the upper management that translates downward through the organizations of the respective channel partners. When partnering is based on information flow, resource sharing, organizational linkage, and supply chain infrastructure, baselines must be firmly established so that performance can be continuously measured. Regular communications must be maintained between the channels partners, with specific points of contact laid out. Finally, the results indicate that manufacturing firms will be more effective if they are designed to fit in with the SCP model. Successful implementation of SCP will depend on the identification of the relevant factors to fit their chain. This paper also contributes to the existing body of knowledge in SCM. Future research opportunities exist in the identification and validation of Bullwhip effect in SCP, techniques and practices in managing the bullwhip effect particularly suited to industries in Malaysia.

Note

1. TIGER stands for Technology + Industry + Government for the e-Economic Revolution of Malaysian businesses, in particular, as a supplier to global buyers. The TIGER project is the initiative for the electrical and electronics sector and is collaboration between the Malaysian public and private sectors to roll out secure e-commerce services to manufacturing companies – Tiers 1 and 2 and including SMEs.

References

- Abdul Aziz, A.B. (2001), "Partnering: an innovative and effective project organization concept", *Journal of Cost Engineering*, Vol. 43 No. 4, pp. 32-7.
- Ahuja, G. (2000), "The duality of collaboration: inducements and opportunities in the formation of interfirm linkage", *Strategic Management Journal*, Vol. 21, pp. 317-46.
- Anderson, D.L., Britt, F.E. and Favre, D.J. (1997), *The Seven Principles of Supply Chain Management*, Institute of Operations Research and Management Sciences, Atlanta, GA.

- Anderson, J.C. and Narus, J.A. (1990), "A model of distribution firm and manufacturer firm working partnerships", *Journal of Marketing*, Vol. 54, pp. 42-58.
- Baily, P., Farmer, D., Jessop, D. and Jones, D. (1994), *Purchasing, Principles and Management*, 7th ed., Pitman, London.
- Bejou, D. and Palmer, A. (1998), "Service failure and loyalty: an exploratory empirical study of airline customers", *Journal of Services Marketing*, Vol. 12 No. 1, pp. 7-22.
- Beth, S., Burt, D.N., Copacino, W., Gopal, C., Lee, H.L., Lynch, R.P. and Morris, S. (2003), "Supply chain challenges: building relationships", *Harvard Business Review*, July, pp. 64-73.
- Boddy, D., Macbeth, D.K. and Wagner, B. (2000), "Implementing collaboration between organizations: an empirical study of supply chain partnering", *Journal of Management Studies*, Vol. 37 No. 7, pp. 1004-17.
- Brinkerhoff, J.M. (2002), "Assessing and improving partnership relationships and outcomes: a proposed framework", *Evaluation and Program Planning*, Vol. 25 No. 3, pp. 215-31.
- Chen, H. (1999), "International performance of multinational: a hybrid model", *Journal of World Business*, Vol. 34 No. 2, pp. 37-44.
- Chopra, S. and Meindl, P. (2001), *Supply Chain Management, Strategy, Planning and Operations*, Prentice-Hall, London.
- Christopher, M. (1998), *Logistics & Supply Chain Management*, Prentice-Hall, London.
- Christopher, M. and Lee, H.L. (2001), "Supply chain confidence – the key to effective supply chains through improved visibility and reliability", Vastera Corporation White Paper, Cranfield University, Cranfield.
- Cooper, M.C., Lambert, D.M. and Pagh, J.D. (1997), "Supply chain management: more than a new name for logistics", *The International Journal of Logistics Management*, Vol. 8, pp. 1-14.
- Cousins, P.D. (2003), *Everyone Wants to Get in on the Act! How Can Firms Develop and Sustain Strategic Supply and Collaborative Relationships?*, University of Melbourne, Melbourne.
- Coyle, J.J., Bardi, E.J. and Langley, C.J. (2003), *The Management of Business Logistics*, South-Western, Mason, OH.
- Davila, A., Mahendra, G. and Palmer, R. (2003), "Moving procurement system to the internet: the adoption and use of e-procurement technology models", *European Management Journal*, Vol. 21 No. 1, pp. 11-23.
- Deutsch, M. (1980), "Fifty years of conflict", in Festinger, L. (Ed.), *Retrospections on Social Psychology*, Oxford University Press, New York, NY, pp. 46-7.
- Donald, J.B. and David, J.C. (1996), *Logistical Management*, McGraw-Hill, New York, NY.
- Elliman, T. and Orange, G. (2000), "Electronic commerce to support construction design and supply-chain management: a research note", *International Journal of Physical Distribution & Logistics Management*, Vol. 30 Nos 3/4, pp. 345-60.
- Fawcett, S.E. and Magnan, G.M. (2001), *Achieving World-class Supply Chain Alignment: Benefits, Barriers, and Bridges*, Brigham Young University, Provo, UT.
- Fynes, B. and Voss, C. (2002), "The moderating effect of buyer-supplier relationships on quality practices and performance", *International Journal of Operations & Production Management*, Vol. 22 No. 6, pp. 589-613.
- Ganeshan, R. and Harrison, T.P. (1995), *An Introduction to Supply Chain Management*, Penn State University, University Park, PA.
- Handfield, R.B. and Nichols, E.L. (1999), *Introduction to Supply Chain Management*, Prentice-Hall, Englewood Cliffs, NJ.

-
- Harland, C.M. (1996), "Supply chain management: relationships, chains and networks", *British Journal of Management*, Vol. 7, pp. 63-80 (special issue).
- IRR Report (2002), *Career Patterns Study: Logistics Executives Spend More Time Managing – Particularly, Inventory*.
- Jayanth, J., Vickery, S.K. and Droge, C. (2000), "The effects of information system infrastructure and process improvements on supply-chain time performance", *International Journal of Physical Distribution & Logistics Management*, Vol. 30 Nos 3/4, pp. 314-30.
- Juhamtila, O.-P. (2002), "Establishing intercompany relationships: motives and methods for successful collaborative engagement", dissertation, Lappeenranta University of Technology, Lappeenranta.
- Kamalini, R. and Spekman, R.E. (2000), *Chain or Shackles: Understanding What Drives Supply Chain Performance*, Darden Graduate School of Business, University of Virginia, Charlottesville, VA.
- Kevin, R. (2002), "Best practices in procurement", *ASCET*, Vol. 7.
- Kotler, P. and Armstrong, G. (1999), *Principles of Marketing*, 10th ed., Prentice-Hall, New York, NY.
- La Londe, B. and Ginter, J. (2000), *Supply Chain Glossary*, The Supply Chain Management Group, Ohio State University, Columbus, OH.
- Lambert, D.M. (2001), "Supply chain management: what does it involves?", *Supply Chain and Logistics Journal*, Fall.
- Lambert, D.M., Emmelhainz, M.A. and Gardner, J.T. (1996), "Developing and implementing supply chain partnerships", *The International Journal of Logistics Management*, Vol. 7 No. 2, pp. 1-17.
- Lambert, D.M., Stock, J.R. and Ellram, L.M. (1998), *Fundamentals of Logistics Management*, Irwin/McGraw-Hill, Boston, MA.
- Larson, D. and Halldorsson, A. (2002), "What is SCM and, where is it?", *Journal of Supply Chain Management*, Vol. 38 No. 4, pp. 36-44.
- Lee, H.L. (2000), "Creating value through supply chain integration", *Supply Chain Management Review*, Vol. 4.
- Lee, H.L. (2001), "The 5 keys to supply chain success", *CIO Magazine*, July.
- Lee, H.L. (2002), "Aligning supply chain strategies with product uncertainties", *California Management Review*, Vol. 44.
- Lee, H.L. (2004), Interview conducted at Intel Penang, February 6.
- Lee, H.L. and Whang, S. (2001), "E-business and supply chain integration", paper presented at Stanford Global Supply Chain Management Forum.
- Leenders, M.R. and Johnson, P.F. (2000), *Major Structural Changes in Supply Organization*, University of Western Ontario, London.
- Marien, E.J. (2001), "The four supply chain enablers", *The Supply Chain Yearbook*, McGraw-Hill, New York, NY.
- Morgan, R.M. and Hunt, S. (1994), "The commitment-trust theory of relationship marketing", *Journal of Marketing*, Vol. 58, pp. 20-38.
- Muzumdar, M. and Balachandran, B. (2001), "The supply chain evolution", *APICS – The Performance Advantage*, October.
- Olorunniwo, F. and Hartfield, T. (2001), "Strategic partnering when the supply base is limited: a case study", *Industrial Management Data Systems*, Vol. 101 No. 1, pp. 47-52.
- O'Toole, T. and Donaldson, B. (2002), "Relationship performance dimensions of buyer-supplier exchanges", *European Journal of Purchasing & Supply Management*, Vol. 8 No. 4, pp. 197-207.

- Parvatiyar, A. and Sheth, J.N. (2000), "The domain and conceptual foundations of relationship marketing", in Sheth, J.N. and Parvatiyar, A. (Eds), *Handbook of Relationship Marketing*, Sage, Thousand Oaks, CA.
- Porter, M.E. (1980), *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, The Free Press, New York, NY.
- Porter, M.E. (1985), *Competitive Advantage*, The Free Press, New York, NY.
- Pyke, D.F. and Johnson, M.E. (2002), *Sourcing Strategy and Supplier Relationships: Alliances vs Procurement*, Tuck School of Business, Hanover, NH.
- Rich, N. and Hines, P. (1997), "Supply chain management and time-based competition: the role of the supplier association", *International Journal of Physical Distribution & Logistics Management*, Vol. 27 Nos 3/4, pp. 210-25.
- Sanjiv, P. (2002), *Architectures for e-Business Systems: Building the Foundation for Tomorrow's Success*, Auerbach, Boca Raton, FL.
- Shapiro, J.F. (2001), *Modeling the Supply Chain*, Duxbury Press, Pacific Grove, CA.
- Skjoett-Larsen, T. (1999), "Interorganisational relations from a supply chain management point of view", *Logistik Management*, Vol. 1 No. 2, pp. 96-108.
- Spekman, R.E., Kamauff, J.W. and Myhr, N. (1998), "An empirical investigation into supply chain management: a perspective on partnerships", *International Journal of Physical Distribution & Logistics Management*, Vol. 28 No. 8, pp. 630-50.
- Supply-Chain Council (2002), *An Introduction to the Supply Chain Operations Reference Model version 6.0*, available at: www.supply-chain.org
- Veen, J.V. and Venugopal, V. (2000), *Win-Win Situation in Supply Chain Partnership: A Tutorial*, University Nyenrode, Straatweg.
- Viswanadham, N. (2002), "The past, present, and future of supply-chain automation", *Robotics and Automation Magazine*, June, pp. 44-56.
- Waller, D.L. (1999), *Operations Management: A Supply Chain Approach*, International Thomson Business Press, London.
- Whipple, J.M. and Frankel, R. (2000), "Strategic alliance success factors", *Journal of Supply Chain Management*, Vol. 36 No. 3, pp. 21-8.
- Wong, A. (2002), "Sustaining company performance through partnering with suppliers", *International Journal of Quality & Reliability Management*, Vol. 19 No. 5, pp. 567-80.
- Yong, A. (2002), "Global supply chain management system connects manufacturers", *Asia Pacific Information and Communication Technology*, March/April.
- Zhao, Y., Ball, M. and Chen, Y. (2002), *A Scalable Supply Chain Infrastructure Research Test-bed*, University of Maryland, College Park, MD.

Further reading

- Lee, H.L. (2003), "Efficiency alone won't fix supply chain", *EBN Manhasset*, September 15, p. 4.
- Lee, H.L., So, K.C. and Tang, C.S. (2000), "The value of information sharing in a two-level supply chain", *Management Science*, Vol. 46 No. 5, pp. 626-43.
- Malaysian Industrial Development Authority (MIDA) Report (2005), *Investment in the Manufacturing Sector – Policies, Incentives and Facilities*, MIDA.