

Supply-Chain Management

An Investigation of Collaboration in the Grocery Industry

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Executive Summary

This white paper provides some detail and conclusions drawn from a joint initiative of Hannaford Bros. Co., Quaker Oats, and the University of Southern Maine. This initiative, to investigate collaboration in the supply chain from the perspective of retailers and manufacturers in the food industry, was the result of the supply-chain effectiveness survey published by the Food Marketing Institute (FMI), Food Distributors International (FDI) and Grocery Manufacturers of America (GMA) in July 2002. This survey points out the need for increased collaboration as a critical aspect of future operations in the food industry.

The University of Southern Maine's *MBA Production and Operations Management* class was invited to investigate collaboration in the food industry supply chain. After an extensive literature review and interviews with executives at both Hannaford and Quaker Oats, surveys were sent to additional retailers and manufacturers to assess collaboration in the food industry. The initial review of the research indicated an opportunity to further understand the relationship of procurement strategy and position within the supply chain (i.e., retailer or manufacturer) and its influence on the level of collaboration in the grocery industry. Some of the key issues and findings discovered during the investigation and areas that need additional study are summarized.

Collaborative efforts in a supply chain are often credited with service efficiencies, improved quality and reduced costs for all participants. Most companies in this study engaged in some form of collaboration; however, there was a low percentage of formal collaborative efforts. Substantial evidence was found that the participants recognize the value of collaboration and would be willing to increase collaboration. Most participants are willing to share information with their partners, but many are not doing so. In general, retailers in our survey are more willing than manufacturers to share data. This paper reveals the types of data the participants consider important and the types they are willing to share with their supply-chain partners.

Specifically, there are several major findings:

- Formal collaboration exists but the magnitude is low. While information is readily shared, the majority of collaborative efforts are sporadic and informal.
- The Every-Day-Low-Cost (EDLC) procurement strategy may significantly improve a firm's ability to secure commitment from partners to collaborate and share information. The Hi/Lo procurement strategy may significantly improve a firm's ability to take advantage of promotions and share information with partners, but it may also hamper the ability to accurately forecast demand, ensure product availability and maintain inventory levels.
- It appears that neither procurement strategy may affect the ability of firms to collaborate. The two procurement strategies (EDLC and Hi/Lo) appear to differ in the way they support or resist collaboration.

- There is no evidence to suggest that there is a major distinction between supply-chain metrics relative to procurement strategy. However, the firm's position in the supply chain does appear to matter. The gap and misalignment in expectations may cause natural tension between supply chain partners' objectives, causing barriers to collaboration and fueling mistrust.
- Further, results indicate EDLC firms share metrics with their supply chain partners in greater proportion, which supports the positional power conclusion that EDLC firms tend to share more information, while Hi/Lo firms tend to withhold information to support the requisite need to exert influence in the supply chain.
- Regardless of strategy or position in the supply chain, there are five commonly reported barriers to collaboration:
 - Lack of consistent technology
 - Lack of trust
 - Lack of information sharing
 - Lack of flexibility
 - Lack of manpower
- Sensitivity to peak demand flows forces Hi/Lo firms to focus on state-of-the-art demand-based processes, whereas EDLC firms focus on advanced information sharing and collaborative-based processes. Further, survey results support the typical expectation concerning position in the supply chain: manufacturers focus on inventory, work in process and demand processes; retailers focus on forecasting, service levels and information processing.

Managerial Recommendations

- Collaboration is a viable approach to improving supply-chain management.
- Consider moving the inherent informal relationship that exists to more formal collaborative efforts.
- Include all components of the supply chain in collaboration efforts, rather than only buyers and sellers.
- Collaboration is not dependent on technology, but rather on developing a focus within the organization that:
 - Supports a common understanding of supply chain partners' objectives and challenges.
 - Defines appropriate metrics that measure improvement for both organizations.
 - Creates actions that move the organizations forward on the collaboration

continuum.

- Supports efforts such as data synchronization to improve technological capabilities between partners.

Introduction

The University of Southern Maine's School of Business was asked to investigate collaboration in the supply chain from the perspective of food retailers and manufacturers. Hannaford Bros. Co. and Quaker Food & Beverages initiated this project in order to improve their collaborative efforts. A survey was sent to more than 20 companies ranging in size from \$1.5 billion to \$60 billion in sales.

This paper summarizes the survey results and points out some interesting trends and observations. It also poses some intriguing questions for which the answers are not readily available but merit further investigation.

Research Methodology

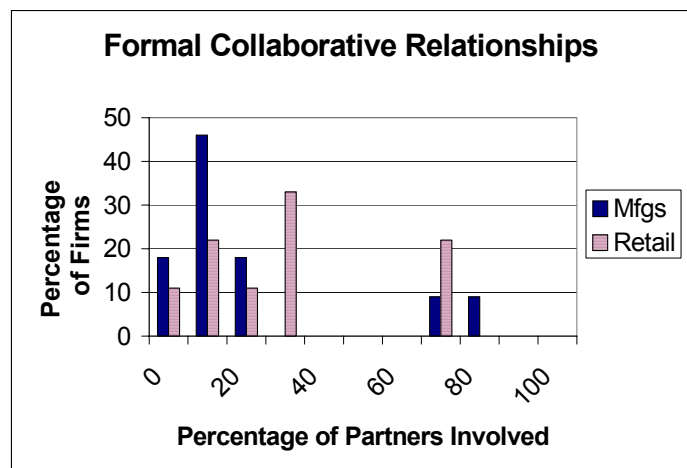
Two surveys were developed to investigate collaboration issues (one sent to retailers and the other to manufacturers). The surveys were designed to help gain a better understanding of what was important to each constituency and what issues needed to be addressed in supply-chain operations, including planning and forecasting, information sharing, metrics, proactive collaboration, procurement strategies and go-to-market strategies.

Formal Collaborative Relationships

Collaboration in the supply chain can take place formally or informally. Formal collaboration was defined as initiatives where participants have defined roles and responsibilities, regularly scheduled meetings take place and specific data are shared. We attempted to assess the level of formal collaboration, if any, that currently exists. One survey question asked this directly, while other questions indirectly addressed this issue by asking what programs were used with supply-chain partners, as well as what kinds of data were shared.

Does formal collaboration exist between retailers and manufacturers?

The survey results indicate that it does; however, the magnitude is low. Nearly all respondents indicated that some collaboration does take place with a percentage of their partners ranging from a low of no collaboration to a high of 80 percent of partners. Two retailers and two manufacturers responded that they had



formal collaborative efforts with 70 percent or more of their partners. Most responses indicated a 10-30 percent collaboration rate. One retailer and two manufacturers stated they had no formal collaborative arrangements. It is interesting to note that in other sections of the survey, both manufacturers and retailers responded that they either share a good deal of information already or are willing to do so. Thus, when collaborative sharing takes place, *it must be sporadic and informal*.

Perceptions of Collaborative Effort

Does position within the supply chain affect perceptions of collaborative effort, i.e., do retailers perceive that they collaborate more than manufacturers or vice versa? Retailers reported a higher level of collaboration than manufacturers, although it is difficult to gauge any sort of trend.

The research indicated that understanding partners' go-to-market strategy would be important to manufacturers, and those who understood it would have more formal collaborative agreements. However, only two manufacturers had formal collaboration agreements with retailers (one with a level of collaboration of 70 percent and one at 80 percent) and they felt it was only moderately important to understand their partners' strategy. The nine remaining manufacturers had levels of collaboration from zero to 20 percent, yet felt that it was vitally important to understand their partners' strategy.

Strategy Preferences

Retailers and manufacturers were asked to identify their current procurement strategy, as well as the strategy they preferred in trading partners. The purpose of this question was to determine whether retailers and manufacturers prefer to work with companies using the same strategy as their own.

Four of the nine retailers surveyed identified their procurement strategy as mostly EDLC. These retailers indicated that they prefer to work with manufacturers that are mostly EDLC. The two retailers that identified their strategy as equally distributed between EDLC and Hi/Lo prefer to work with manufacturers that were also equally distributed. Five of the nine retailers prefer to work with manufacturers with a mostly EDLC procurement strategy, while none of the retailers prefer to work with manufacturers that use a mostly Hi/Lo or pure Hi/Lo strategy.

Three (one mostly Hi/Lo and one mostly EDLC) of the 11 manufacturers surveyed prefer to work with retailers that use the same procurement strategy as they do. Four manufacturers prefer to work with retailers that use a different strategy than their own. Overall, eight of the 11 manufacturers prefer to work with partners using either mostly EDLC or pure EDLC.

Does the choice of procurement/go-to-market strategy alter a firm's ability to collaborate?

The responses to the question identifying procurement strategy were examined, along with the responses regarding ability to collaborate. This cross tabulation was used to determine whether there is a correlation between strategy and collaboration ability.

A great deal of evidence suggests that the choice of procurement/go-to-market strategy alters a firm's ability to collaborate. We evaluated each survey response to the questions related to the extent to which a firm's procurement strategy improves or impairs its capabilities. An interval score was applied to 11 capabilities (Significantly improve = 2, Improve = 1, No effect = 0, Impair = -1 and Significantly impair = -2), and means were calculated for firms self-categorized as all or mostly EDLC, equally distributed between EDLC and Hi/Lo, and all or mostly Hi/Lo.

Our first hypothesis — Hi/Lo retailers/manufacturers have adopted a strategy they believe enables them to move independently — was generally supported. Hi/Lo firms tend to believe that their strategies improve their ability to:

- 1) Take advantage of promotions
- 2) Share information with supply chain partners.

Companies using a Hi/Lo strategy, on average, also believe their strategy impairs their ability to:

- 1) Accurately forecast demand
- 2) Ensure product availability
- 3) Maintain inventory levels.

Our second hypothesis — EDLC retailers/manufacturers believe their strategies allow them to move in collaboration with their supply-chain partners — was also supported by the survey responses. EDLC firms believe their go-to-market or procurement strategies improved or significantly improved their abilities to

- 1) Secure commitment from partners to collaborate
- 2) Share information with supply-chain partners.

Further, on average, no capability was viewed as being impaired or significantly impaired by the EDLC strategy.

Some evidence suggests that Hi/Lo retailers/manufacturers have adopted a strategy they believe allows them to leverage power and position (Table 1, Page 7). Evidence suggests that EDLC retailers/manufacturers believe their strategies allow them to move in collaboration (plan and execute) with their supply-chain partners.

CONCLUSION: This provides some evidence that affirms the natural tension in the supply chain that the two strategies (EDLC & Hi/Lo) are different in the way they

support/resist collaboration.

ACTION: To improve the ability to collaborate, supply-chain partners need a clear understanding of each other's procurement strategy and objectives.

Table 1

Hypothesis 1a: Hi/Lo retailers/manufacturers have adopted a strategy that they believe allows them the ability to move independently.			
S3a **	It is more common for a firm with a Hi/Lo strategy to believe that its strategy improves the ability to negotiate price.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.50 0.43 0.29
S3i **	It is more common for a firm with a Hi/Lo strategy to believe that its strategy improves the ability to take advantage of promotions.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.00 0.86 0.57
Hypothesis 1b: EDLC retailers/manufacturers believe that their strategies allow them to move in collaboration with their supply-chain partners.			
S3b *	It is more common for a firm with an EDLC strategy to believe that the strategy improves its ability to secure a commitment from supply-chain partners to collaborate.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.50 0.43 1.00
S3c **	It is more common for a firm with an EDLC strategy to believe that its strategy improves the ability to shorten lead times from supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	-0.17 0.14 0.43
S3d **	It is more common for a firm with a Hi/Lo strategy to believe that the strategy improves its ability to maintain order flexibility.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	-0.33 0.43 0.29
S3e **	It is more common for a firm with an EDLC strategy to believe that its strategy improves the ability to ensure product availability.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	-0.50 -0.29 0.29
S3f **	It is more common for a firm with an EDLC strategy to believe the strategy improves its ability to maintain long term relationships.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.17 0.29 0.71
S3g *	It is more common for a firm with an EDLC strategy to believe that its strategy improves the ability to share information with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.67 0.29 0.86
S3h **	It is more common for a firm with an EDLC strategy to believe that the strategy improves its ability to maintain price consistency.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	-0.33 0.00 0.57
S3j **	It is more common for a firm with an EDLC strategy to believe that its strategy improves the ability to accurately forecast demand.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	-0.67 0.00 0.43

S3k	It is more common for a firm with an EDLC strategy to believe that the strategy improves its ability to maintain inventory levels.	Pure or mostly Hi/Lo	-0.50
**		Equal distribution	0.00
		Pure or mostly EDLC	0.43

** = strongly supported

* = supported

Supply-Chain Performance Metrics

Respondents were asked how important specific information is in evaluating supply-chain performance, which information they share with their retail or manufacturing partners and which information their retail or manufacturing partners share with them. The purpose of examining the responses collectively was to identify which information is important in supply-chain evaluation and to determine whether there is a willingness to share that information between the retailers and manufacturers. The majority of retailers indicated that most of the information categories listed below are vitally to moderately important in the evaluation of their supply-chain performance.

With the exception of the ROI, most of the retailers questioned are currently sharing or are willing to share the specified information with their manufacturing partners. According to the retailers, their manufacturing partners are currently sharing or willing to share much of the information. The retailers indicated that their manufacturing partners are less willing to share forecast accuracy and ROI information with them.

Most manufacturers indicated that several of the information categories listed are vitally to moderately important. Only two categories — percentage of goods in transit and new item performance — were identified as completely unimportant by some of the manufacturers. Additionally, only two of the manufacturers believe that gross profit is vitally important, while nine retailers believe gross profit is vitally important to their supply-chain evaluation.

Although gross profit was rated as being vitally to moderately important by manufacturers, they are not willing to share that information with their retail partners, and most of their retail partners do not currently share, nor are they willing to share, that information with them. The results of the manufacturers' surveys indicate that they are willing to share more information than they are receiving from their retail partners. For example, freight costs are vitally to moderately important to manufacturers and the majority of them currently share or are willing to share that information. Only one manufacturer indicated that their retail partners are currently sharing or are willing to share freight cost information. In addition to gross profit, the manufacturers surveyed indicated that the majority of their retail partners were unwilling to share ROI information with them.

ROI and gross profit were identified by both retailers and manufacturers as being information that they are unwilling to share with their partners. Respondents on both sides indicated unwillingness to share pricing detail. Also, both retailers and manufacturers identified their

partners as unwilling to share forecast accuracy information.

Does the choice of procurement strategy alter the importance of a firm's supply-chain metrics?

Little evidence was found to suggest that procurement strategy plays a role in metric importance. Each survey response to the questions related to the importance of specific metrics in evaluating supply-chain performance was evaluated. An interval score was applied to 17 different metrics (Vitality important = 2, Moderately important = 1 and Completely unimportant = 0), and means were calculated for firms self-categorized as all or mostly EDLC, equally distributed between EDLC and Hi/Lo, and all or mostly Hi/Lo.

There was more support for the first metrics hypothesis (table 2, page 10) – Hi/Lo retailers/manufacturers regard metrics that reflect the ability to move independently as more important indicators of supply-chain performance.

The second hypothesis – EDLC retailers/manufacturers regard metrics that reflect the ability to move in collaboration with their supply-chain partners as more important indicators of performance – found little support. The only exception was some evidence that suggests that it is more common for a firm with a EDLC strategy to believe that *frequency of delivery* and *invoice accuracy* are more important indicators of supply-chain performance.

Overall, EDLC firms appear to value measures, such as *market share* and *on-time delivery percentage*, as a measure of supply-chain performance just as readily as Hi/Lo firms. Likewise, Hi/Lo firms seem to value *inventory turns* and *percentage of goods in transit* as important measures of supply-chain effectiveness.

CONCLUSION: There does not appear to be a major distinction between metrics of supply-chain performance relative to strategy.

ACTION: Focus collaboration around the key metrics of the supply chain: service levels, inventory turns, lead time reliability and on-time delivery

Table 2

Hypothesis 2a: Hi/Lo retailers/manufacturers regard metrics that reflect the ability to move independently as more important indicators of supply-chain performance.			
S5b	It is more common for a firm with a Hi/Lo strategy to believe that market share is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.67 1.80 2.00
S5e	It is more common for a firm with a Hi/Lo strategy to believe that on-time delivery percentage is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.83 1.86 2.00
S5i	It is more common for a firm with a Hi/Lo strategy to believe that the inventory-to-sales ratio is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.83 1.86 1.71
S5j	It is more common for a firm with a Hi/Lo strategy to believe that gross profit per category is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.17 1.57 1.86
S5n	It is more common for a firm with a Hi/Lo strategy to believe that availability of pricing detail is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.00 1.14 1.71
S5o	It is more common for a firm with a Hi/Lo strategy to believe that return on investment is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.50 1.71 1.43
Hypothesis 2b: EDLC retailers/manufacturers regard metrics that reflect the ability to move in collaboration with their supply-chain partners as more important indicators of performance.			
S5a	It is more common for a firm with an EDLC strategy to believe that inventory turns per category is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.83 1.57 1.86
S5c *	It is more common for a firm with an EDLC strategy to believe that lead time reliability is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.83 1.71 2.00
S5d	It is more common for a firm with an EDLC strategy to believe that freight costs is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.67 1.86 1.71
S5f	It is more common for a firm with an EDLC strategy to believe that new item performance is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.00 1.83 1.14
S5g *	It is more common for a firm with an EDLC strategy to believe that percent of goods in transit is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.33 0.57 0.57

S5h **	It is more common for a firm with an EDLC strategy to believe that frequency of delivery is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.67 1.14 1.33
S5k *	It is more common for a firm with an EDLC strategy to believe that the unsaleables percentage is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.33 1.86 1.57
S5l **	It is more common for a firm with an EDLC strategy to believe that invoice accuracy is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.17 1.57 1.71
S5m *	It is more common for a firm with an EDLC strategy to believe that forecasting accuracy is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.50 1.86 1.86
S5p	It is more common for a firm with an EDLC strategy to believe that the service level is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	2.00 2.00 1.86
S5q *	It is more common for a firm with an EDLC strategy to believe that capacity utilization is a more important indicator of supply-chain performance.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.17 1.57 1.43

** = strongly supported

* = supported

To provide a contrast in overall ranking of metric importance to Hi/Lo and EDLC firms, Table 3 (page 12) displays the mean interval score for each metric partitioned by firm procurement strategy. In this table, only two categories of firm are displayed: all or mostly EDLC and all or mostly Hi/Lo. While few major absolute differences were noted, EDLC firms place more value on *gross profit*, *inventory accuracy*, *availability of pricing detail* and the *frequency of deliveries* as indicators of supply-chain performance.

CONCLUSION: There does not appear to be major relative differences between metrics of supply-chain performance across strategy.

Table 3

Average importance score	Hi/Low Strategy	EDLC Strategy	Average importance score
2.0	service level	market share lead time reliability on-time delivery percentage	2.0
1.83	inventory turns per category lead-time reliability on-time delivery percentage inventory-to-sales ratio	inventory turns per category gross profit forecasting accuracy service level	1.86
1.67	market share freight costs	freight costs inventory-to-sales ratio invoice accuracy availability of pricing detail	1.71
1.50	forecasting accuracy return on investment	unsaleables percentage	1.57
		return on investment capacity utilization	1.43
1.33	unsaleables percentage	frequency of delivery	1.29
1.17	gross profit invoice accuracy capacity utilization	new item performance	1.14
1.00	new item performance availability of pricing detail		
0.67	frequency of delivery		
0.33	percentage of goods in transit	percentage of goods in transit	.57

Does the firm’s position in the supply chain alter the importance of its supply-chain metrics?

There appears to be little evidence to suggest that procurement strategy plays a role in metric importance. Table 4 (page 13) displays the mean interval score for each metric partitioned by firm location within the supply chain. Again, each survey response to the questions related to the importance of specific metrics in evaluating supply-chain performance was evaluated along an interval range (Vitality important = 2, Moderately important = 1 and Completely unimportant = 0), and means were calculated for firms categorized as retailer or manufacturer.

Table 4 (page 13) indicates that, on average, retailers view *gross profit*, *availability of pricing detail* and the *unsaleables percentage* as much more important measures of supply-chain importance. Manufactures tend to rank *capacity utilization*, *freight costs* and *forecasting*

accuracy as slightly more important than retailers.

Table 4

Average Importance Score	Retailer Supply Chain Position	Manufacturer Supply Chain Position	Average Importance Score
2.0	inventory turns per category market share lead time reliability on-time delivery percentage gross profit service level		
1.89	inventory-to-sales ratio unsaleables percentage	service level	1.91
		freight costs on-time delivery percentage forecasting accuracy	1.82
		market share	1.75
1.67	freight costs invoice accuracy forecasting accuracy availability of pricing detail return on investment	inventory-to-sales ratio	1.73
		lead-time reliability	1.70
		inventory turns per category capacity utilization	1.55
1.33	new item performance	return on investment	1.45
		percent unsaleables invoice accuracy	1.36
		new item performance	1.30
1.22	capacity utilization	gross profit	1.18
1.11	frequency of delivery	frequency of delivery availability of pricing detail	1.00
		percentage of goods in transit	0.27
0.77	percentage of goods in transit	percentage of goods in transit	0.27

CONCLUSION: The gap and misalignment in expectations may cause natural tension between a supply-chain partner's objectives, causing barriers to collaboration and fueling trust issues.

ACTION: Recognize that collaboration partners have different expectations and desired outcomes. Engage in regular and consistent communication plans focused on understanding each other's objectives, expectations and challenges.

ACTION: Expand collaboration beyond a single-function relationship (buyer to seller) to multifunctional collaboration involving all organizational components.

Does the choice of procurement strategy alter a firm's ability to share metrics?

There is evidence to suggest that procurement strategy plays a role in metric sharing. Each survey response to the questions related to the sharing of metrics with supply-chain partners was evaluated. A percentage score (percentage of firms that report sharing a specific metric) was calculated for firms self-categorized as all or mostly EDLC, equally distributed between EDLC and Hi/Lo, and all or mostly Hi/Lo.

The first hypothesis regarding the sharing of metrics is that an equal proportion of Hi/Lo and EDLC retailers/manufacturers share metrics of independent performance with supply-chain partners. While there appears to be little support for this hypothesis (Table 5, page 15), there is some evidence that EDLC retailers/manufacturers share metrics of collaboration with their supply-chain partners in greater proportion. The only noted exception is that a slightly greater proportion of Hi/Lo retailers and manufacturers share *on-time delivery percentage* with supply-chain partners.

Overall, 100 percent of Hi/Lo firms report they share *on-time delivery percentage* and *service level* with their supply-chain partners. All EDLC firms report they share *market share*, *inventory turns*, *percent unsaleable* and *service level*.

CONCLUSION: There is some evidence to suggest that EDLC firms tend to more frequently share metrics of performance with their supply-chain partners.

To provide a contrast in the overall ranking of metric sharing, Table 6 (page 16) displays the percentage score for each metric partitioned by the firm's procurement strategy. Only the categories of all or mostly EDLC and all or mostly Hi/Lo were included. It is notable that while 70 percent of EDLC firms share 11 of the 17 measures reported in the survey, 70 percent of Hi/Lo firms share only four of the measures. It appears that the biggest differences surround the number of EDLC firms that share *inventory turns per category*, *gross profit per category*, *forecasting accuracy* and *availability of pricing detail*.

Table 5

Hypothesis 3a: An equal proportion of Hi/Lo and EDLC retailers/manufacturers share metrics of independent performance with supply-chain partners.			
S7b *	An equal proportion of Hi/Lo and EDLC retailers/manufacturers share market share performance with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.83 0.71 1.00
S7e *	An equal proportion of Hi/Lo and EDLC retailers/manufacturers share on-time delivery percentage with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.00 0.71 0.86
S7i	An equal proportion of Hi/Lo and EDLC retailers/manufacturers share inventory-to-sales ratio with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.40 0.29 0.71
S7j	An equal proportion of Hi/Lo and EDLC retailers/manufacturers share gross profit per category with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.17 0.29 0.71
S7n	An equal proportion of Hi/Lo and EDLC retailers/manufacturers share availability of pricing detail with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.00 0.00 0.57
S7o	An equal proportion of Hi/Lo and EDLC retailers/manufacturers share return on investment with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.00 0.00 0.33
Hypothesis 3b: In greater proportion, EDLC retailers/manufacturers share metrics of collaboration with their supply-chain partners.			
S7a **	EDLC retailers/manufacturers share inventory turns per category with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.50 0.57 1.00
S7c *	EDLC retailers/manufacturers share lead-time reliability with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.67 0.29 0.83
S7d **	EDLC retailers/manufacturers share freight costs with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.00 0.17 0.29
S7f **	EDLC retailers/manufacturers share new item performance with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.50 0.60 0.86
S7g **	EDLC retailers/manufacturers share percent of goods in transit with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.00 0.00 0.29

S7h *	EDLC retailers/manufacturers share frequency of delivery with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.50 0.43 0.71
S7k *	EDLC retailers/manufacturers share unsaleables percentage with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.83 0.86 1.00
S7l *	EDLC retailers/manufacturers share invoice accuracy with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.60 0.57 0.86
S7m **	EDLC retailers/manufacturers share forecast accuracy with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.00 0.29 0.57
S7p	EDLC retailers/manufacturers share service level with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.00 0.86 1.00
S7q *	EDLC retailers/manufacturers share capacity utilization with supply-chain partners.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.00 0.00 0.14

** = strongly supported

* = supported

CONCLUSION: There is further support for the positional power conclusion that EDLC firms tend to share more information, while Hi/Lo firms tend to withhold information to support their requisite need to exploit supply-chain power.

ACTION: Focus on understanding your supply-chain partners' objectives. Concentrate on the specific common metrics that exist between partners, based on their procurement strategy, that will improve your supply-chain effectiveness.

Table 6

Percent- age of Firms	Hi/Lo Strategy	EDLC Strategy	Percent- age of Firms
100%	on-time delivery percentage service level	inventory turns per category market share performance unsaleables percentage service level	100%

83%	market share performance unsaleables percentage	on-time delivery percentage new item performance invoice accuracy	86%
		Lead-time reliability	83%
67%	lead-time reliability	frequency of delivery inventory to sales gross profit per category	71%
60%	invoice accuracy	forecast accuracy availability of pricing detail	57%
50%	inventory turns per category new item performance frequency of delivery		
40%	inventory to sales	return on investment	33%
17%	gross profit per category	freight costs percentage of goods in transit	29%
		capacity utilization	14%
0%	freight costs percentage of goods in transit forecast accuracy availability of pricing detail return on investment capacity utilization		

Does the firm’s position in the supply chain alter the ability to share metrics?

Table 7 (page 18) displays the percentage score for each metric partitioned by a firm’s location within the supply chain. According to Table 7, all manufacturers surveyed share *market share performance* and *service levels* with their supply-chain partners. More than 75 percent share *on-time delivery percentage*, *unsaleables percentage*, *invoice accuracy* and *new item performance*. Most retailers surveyed share *inventory turns per category*, *unsaleables percentage*, *service level*, *on-time delivery percentage*, and *gross profit per category*.

Table 7 also indicates that, on average, retailers tend to share more often (by a larger proportion) *gross profit*, *pricing detail* and *inventory turns*. Manufactures tend to share *market share performance*, *inventory accuracy* and *new item performance* more often than retailers.

Table 7

Percent - age of Firms	Retailer Supply-Chain Position	Manufacturer Supply-Chain Position	Percent - age of Firms
		market share performance service level	100%
88%	inventory turns per category unsaleables percentage service level	on-time delivery percentage unsaleables percentage	91%
7%	on-time delivery percentage gross profit per category	invoice accuracy	80%
		new item performance	78%
67%	market share performance lead-time reliability	inventory turns per category frequency of delivery	
62%	inventory to sales		
55%	new item performance frequency of delivery invoice accuracy		
44%	availability of pricing detail	lead-time reliability	50%
33%	forecast accuracy	inventory to sales	36%
25%	return on investment	forecast accuracy	
22%	freight costs percentage of goods in transit		
11%	capacity utilization	freight costs	10%
		percentage of goods in transit gross profit per category availability of pricing detail return on investment capacity utilization	0%

CONCLUSION: This reflects the natural tendency for supply-chain partners to focus on the core metrics of those they serve. Even though formal collaboration is not prevalent, the need to meet core customer needs supports informal collaboration.

ACTION: Recognize that informal collaboration occurs and focus to move the relationship to formal collaboration around core customer requirements.

ACTION: Conduct regular analyses of agreed-upon metrics through a collaborative

approach focused on improvement (not as a demand or “stick”).

Barriers to Collaboration

When questioned about barriers to collaboration within the supply chain, retailers indicated consistency in technology was the only significant barrier. The majority of retailers rated most of the barriers as moderate.

Manufacturers surveyed indicated that technology is a significant barrier. They rated lack of trust, inflexibility, lack of information sharing, size and lack of manpower as moderate to significant barriers to collaboration.

The perception of these barriers was not always consistent when comparing the retailers’ answers to the manufacturers’ answers. For example, size of organization is considered a barrier by six of 11 retailers compared with 10 of 11 manufacturers. It might be interesting to consider the differences in the supply chain within a retailer organization and a manufacturing organization to determine why perceived barriers may be different and how they could be eased.

Does the choice of procurement strategy alter the barriers to collaboration?

There is little evidence to suggest that procurement strategy plays a role in perceived barriers to collaboration. Each survey response to the questions related to the significance of specific barriers to reaching the ideal level of collaboration was evaluated. An interval score was applied to 10 potential barriers to collaboration (Significant barrier = 2, Moderate barrier = 1 and No barrier = 0), and means were calculated for firms categorized as all or mostly EDLC, equally distributed between EDLC and Hi/Lo, and all or mostly Hi/Lo.

There was no support for the hypothesis pertaining to barriers — Hi/Lo retailers and manufacturers view barriers to collaboration as more severe than EDLC retailers and manufacturers (Table 8, page 20). The only two patterns seen in the data suggest that Hi/Lo retailers/manufacturers view *inter-company communication* as a more severe barrier than EDLC retailers/manufacturers. Hi/Lo retailers/manufacturers view *lack of relative power* as a more severe barrier than EDLC retailers/manufacturers.

There appears to be a great deal of unanimity in comparisons across strategy. Hi/Lo and EDLC retailers and manufacturers view *lack of consistency in technology* as the more severe barrier to collaboration. Hi/Lo and EDLC retailers and manufacturers view *lack of trust* and *lack of information sharing* as very important barriers.

Table 8

Hypothesis 4: Hi/Lo retailers and manufacturers view barriers to collaboration as more severe than EDLC retailers and manufacturers.			
S8a	Hi/Lo retailers/manufacturers view inter-company communication as a more severe barrier to collaboration than EDLC retailers/manufacturers.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.67 0.71 0.86
S8b	Hi/Lo retailers/manufacturers view complexity as a more severe barrier to collaboration than EDLC retailers/manufacturers.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.00 1.00 1.00
S8c	Hi/Lo retailers/manufacturers view lack of trust as a more severe barrier to collaboration than EDLC retailers/manufacturers.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.17 1.14 1.29
S8d	Hi/Lo retailers/manufacturers view inability to be flexible as a more severe barrier to collaboration than EDLC retailers/manufacturers.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.17 0.86 1.14
S8e	Hi/Lo retailers/manufacturers view size of organization as a more severe barrier to collaboration than EDLC retailers/manufacturers.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.67 1.00 0.71
S8f	Hi/Lo retailers/manufacturers view lack of relative power as a more severe barrier to collaboration than EDLC retailers/manufacturers.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.50 0.67 0.86
S8g	Hi/Lo retailers/manufacturers view not enough time as a more severe barrier to collaboration than EDLC retailers/manufacturers.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.00 0.86 1.14
S8h	Hi/Lo retailers/manufacturers view not enough manpower as a more severe barrier to collaboration than EDLC retailers/manufacturers.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.00 0.86 1.29
S8i	Hi/Lo retailers/manufacturers view lack of information sharing as a more severe barrier to collaboration than EDLC retailers/manufacturers.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.17 0.86 1.29
S8j	Hi/Lo retailers/manufacturers view lack of consistency in technology as a more severe barrier to collaboration than EDLC retailers/manufacturers.	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	2.00 2.00 2.00

** = strongly supported

* = supported

CONCLUSION: Regardless of strategy, commonly perceived barriers to collaboration include lack of consistent technology, lack of trust, lack of information sharing, inability to be flexible and not enough manpower.

ACTION: Recognize that the impact collaboration has on improving chain effectiveness is not dependent on technical solutions but rather by the commitment of vendors and customers to develop and maintain ongoing communications processes and agreed-upon metrics. Move naturally occurring informal collaboration to a more formal process.

Does the firm’s position in the supply chain alter the barriers to collaboration?

Strategy appears not to play a major role in determining the perceived barriers to collaboration. Table 9 displays the mean interval score for each barrier, partitioned by firm location within the supply chain. Again, each survey response to the questions related to the importance of specific barriers was evaluated along an interval range, and means were calculated for firms categorized as retailer or manufacturer.

The hypothesis explored next was that retailers and manufacturers view barriers to collaboration equally. Table 9 indicates that this hypothesis is strongly supported. On average, manufacturers are more likely than retailers to believe that *size of organization*, *lack of trust* and *inability to be flexible* are severe barriers. Since these differences are relatively small, however, there may not be sufficient evidence to confirm that retailers and manufacturers view barriers to collaboration differently.

CONCLUSION: As with strategy, barriers are viewed similarly across the supply chain.

Table 9

Hypothesis 5: Retailers and manufacturers similarly view barriers to collaboration.			
S8a **	Inter-company communication	Retailer	0.78
		Manufacturer	0.73
S8b **	Complexity	Retailer	1.00
		Manufacturer	1.00
S8c	Lack of trust	Retailer	1.00
		Manufacturer	1.36
S8d	Inability to be flexible	Retailer	0.89
		Manufacturer	1.18
S8e	Size of organization	Retailer	0.44
		Manufacturer	1.09
S8f **	Lack of relative power	Retailer	0.66
		Manufacturer	0.70

S8g **	Not enough time	Retailer	1.00
		Manufacturer	1.00
S8h **	Not enough manpower	Retailer	1.00
		Manufacturer	1.09
S8i **	Lack of information-sharing	Retailer	1.00
		Manufacturer	1.18
S8j **	Lack of consistency in technology	Retailer	2.00
		Manufacturer	2.00

** = strongly supported

* = supported

Does the choice of procurement strategy alter the firm's use of state-of-the-art processes and programs?

Evidence suggests that procurement strategy plays a role in the use of state-of-the art processes and programs (Table 10, page 23). Each survey response to the questions related to the extent that specific processes and programs are being used was evaluated. A percentage score (percentage of firms that report using a specific process or program) was calculated for firms categorized as all or mostly EDLC, equally distributed between EDLC and Hi/Lo, and all or mostly Hi/Lo.

The next investigation centered around the question of whether an equal proportion of Hi/Lo and EDLC retailers/manufacturers use noncollaboration-based advanced processes and programs. Secondly, do EDLC retailers/manufacturers use collaboration-based advanced processes and programs in greater proportion? There appears to be some evidence that roughly an equal proportion of Hi/Lo and EDLC retailers/manufacturers use noncollaboration-based advanced processes and programs, such as *material requirements planning*, *Efficient Consumer Response*, *customer relationship management* and *point-of-sale data*. Further, it appears that in greater proportion, EDLC retailers/manufacturers use collaboration-based advanced processes and programs.

Overall, the processes and programs used most often by Hi/Lo firms include *point-of-sale data*, *electronic data interchange* and *vendor-managed inventory*. Likewise, 100 percent of EDLC firms use *efficient consumer response*, *point-of-sale data*, *electronic data interchange*, *data synchronization* and *vendor-managed inventory*.

Table 10

Hypothesis 6a: An equal proportion of Hi/Lo and EDLC retailers/manufacturers use noncollaboration-based advanced processes and programs.			
S9b	An equal proportion of Hi/Lo and EDLC retailers/manufacturers use Voluntary Interindustry Commerce Standards (VICS).	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.50 0.71 0.83
S9c *	An equal proportion of Hi/Lo and EDLC retailers/manufacturers use Materials Resource Planning (MRP)	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.83 0.71 0.71
S9f	An equal proportion of Hi/Lo and EDLC retailers/manufacturers use Efficient Consumer Response (ECR)	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.83 0.57 1.00
S9h *	An equal proportion of Hi/Lo and EDLC retailers/manufacturers use Customer Relationship Management (CRM)	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.33 0.29 0.57
S9j	An equal proportion of Hi/Lo and EDLC retailers/manufacturers use Advanced Planning and Scheduling (APR)	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.50 0.71 0.71
S9n **	An equal proportion of Hi/Lo and EDLC retailers/manufacturers use Point-of-Sale Data (POS)	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	1.00 1.00 1.00
Hypothesis 6b: In greater proportion, EDLC retailers/manufacturers use collaboration-based advanced processes and programs.			
S9a	A greater proportion of EDLC retailers/manufacturers use Collaborative Planning, Forecasting and Replenishment (CPFR)	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.83 0.29 0.71
S9d	A greater proportion of EDLC retailers/manufacturers use Enterprise Resource Planning (ERP)	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.83 0.71 0.86
S9e **	A greater proportion of EDLC retailers/manufacturers use Supply Chain Information Database (SCIP)	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.40 0.43 0.86
S9g **	A greater proportion of EDLC retailers/manufacturers use Effective Foodservice Response (EFR)	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.20 0.29 0.43
S9i **	A greater proportion of EDLC retailers/manufacturers use Supply-Chain Execution software (SCE)	Pure or mostly Hi/Lo Equal distribution Pure or mostly EDLC	0.33 0.43 0.57

S9k	A greater proportion of EDLC retailers/manufacturers use Electronic Data Interchange (EDI)	Pure or mostly Hi/Lo	1.00
		Equal distribution	1.00
		Pure or mostly EDLC	1.00
S9l *	A greater proportion of EDLC retailers/manufacturers use Data Synchronization	Pure or mostly Hi/Lo	0.83
		Equal distribution	1.00
		Pure or mostly EDLC	1.00
S9m	A greater proportion of EDLC retailers/manufacturers use Vendor Managed Inventory (VMI)	Pure or mostly Hi/Lo	1.00
		Equal distribution	0.86
		Pure or mostly EDLC	1.00

** = strongly supported

* = supported

CONCLUSION: Sensitivity to peak demand flows forces Hi/Lo firms to focus on demand-based processes, whereas EDLC firms focus on information-sharing and collaborative-based processes.

ACTION: As noted earlier, to enhance collaboration efforts, recognize the differences in objectives driving the company's procurement strategy, agree upon common areas of interest, define the appropriate metrics and focus on improving supply-chain effectiveness.

Does the location in the supply chain alter the firm's use of state-of-the-art processes and programs?

Table 11 (page 25) displays the mean percentage score for each state-of-the-art process and program partitioned by firm location within the supply chain. Again, each survey response to the questions about use of a specific process or program was tallied for firms categorized as a retailer or manufacturer.

Hypotheses 7a and b (Table 11) asked if an equal proportion of retailers and manufacturers use collaboration-based and noncollaboration-based advanced processes and programs. On average, the largest differences in scores relate to manufacturers' use of tools that are not as applicable to retailers. These tools include *material requirements planning, advanced planning and scheduling, and enterprise resource planning*. However, there is some evidence that in equal proportion retailers and manufacturers use collaboration-based advanced processes and programs, such as *electronic data interchange, data synchronization and vendor-managed inventory*.

Table 11

Hypothesis 7a: An equal proportion of retailers and manufacturers use noncollaboration-based advanced processes and programs.			
S9b	Voluntary Interindustry Commerce Standards (VICS).	Retailer	0.56
		Manufacturer	0.82
S9c	Materials Resource Planning (MRP)	Retailer	0.44
		Manufacturer	1.00
S9f **	Efficient Consumer Response (ECR)	Retailer	0.78
		Manufacturer	0.82
S9h	Customer Relationship Management (CRM)	Retailer	0.22
		Manufacturer	0.55
S9j	Advanced Planning and Scheduling (APR)	Retailer	0.44
		Manufacturer	0.82
S9n **	Point-of-Sale Data (POS)	Retailer	1.00
		Manufacturer	1.00
Hypothesis 7b: In equal proportion, retailers and manufacturers use collaboration-based advanced processes and programs.			
S9a **	Collaborative Planning, Forecasting and Replenishment (CPFR)	Retailer	0.56
		Manufacturer	0.64
S9d	Enterprise Resource Planning (ERP)	Retailer	0.56
		Manufacturer	1.00
S9e **	Supply-Chain Information Database (SCIP)	Retailer	0.56
		Manufacturer	0.60
S9g	Effective Foodservice Response (EFR)	Retailer	0.11
		Manufacturer	0.50
S9i **	Supply-Chain Execution software (SCE)	Retailer	0.44
		Manufacturer	0.45
S9k **	Electronic Data Interchange (EDI)	Retailer	1.00
		Manufacturer	1.00
S9l **	Data Synchronization	Retailer	1.00
		Manufacturer	0.91
S9m *	Vendor Managed Inventory (VMI)	Retailer	0.89
		Manufacturer	1.00

** = strongly supported

* = supported

Use of Technology

Our research shows that the *effective use of technology is key to successful collaboration*. Consequently, this survey examines whether the lack of technology is a barrier to increasing the level of collaboration. Retailers and manufactures agree that it is, yet many respondents reported that they were using several different programs, such as MRP and EDI, that require the use of technology. *A possible conclusion could be that the lack of technological capability is not a barrier to collaboration, rather it is a lack of compatible technology between supply-chain partners.*

Summary

Collaboration along the supply chain is desirable for both retailers and manufacturers because it has the potential to reduce costs and improve delivery of the goods to the ultimate destination, the consuming public. Both manufacturer and retailer respondents agree that collaboration is an important goal yet many have no formal collaboration efforts. The reasons given vary, but many cite *resource allocation as a significant barrier to increasing collaboration*. Our research supports this conclusion.

Robert Bruce, president of VCC Associates, summed it up nicely when he said, “The process is built on openness, trust and broad information- and data-sharing, as well as leveraging the strength, knowledge, capabilities and capacities of others to improve the process.”¹ *The question of resource allocation is one that should be explored further by future researchers*. What kind and amount of resources are necessary to achieve a measurable ROI?

Trust is another issue that future researchers will need to explore in detail. Retailers and manufacturers both cited trust as a significant barrier to collaboration. Unfortunately, the scope of this project did not allow us to probe more deeply in this area. What are the issues that would lead retailers and manufacturers to distrust each other?

Finally, although retailers and manufactures have much in common in the types of data they want or are willing to share, they remain far apart on sharing freight costs. This refusal to share could lead to trust issues. In a recent survey conducted by Kurt Salmon Associates, one large retailer speculated that it was subsidizing freight costs for the smaller retailers in the same geographic area.² Not enough information to support this claim is available, but it may be an important area of focus for future researchers.

References

1. Collaboration: To Be or Not To Be?, October 2002 WERC Sheet Published by Warehousing Education and Research Council, Oak Brook, IL
2. Results of Supply Chain Effectiveness Survey, July 2002 by Kurt Salmon Associates