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ABSTRACT

While companies are looking to collaborate with a larger number of external partners, many fail to achieve this goal. The problem can be traced to the fact that executives have become overly dependent on new supply chain technologies which has resulted in overlooking the role that people play when launching a collaborative program. However, when employing just the opposite strategy, supply chain leaders have increased their productivity, improved concept-to-market-development times, and achieved high levels of customer satisfaction. This paper argues that people are just as important as having the right supply chain process or technology.

INTRODUCTION

The growing number of global competitors is forcing executives to rethink how their organizations are going to compete in the 21st Century. To generate more innovative products, companies are looking to collaborate with a larger number of external partners. Cisco Systems, Inc. (2006) found that 58 percent of manufacturers predict that supply chain collaboration among vendors and other parties will play a major role in their firm's long-term success. Correspondingly, Accenture (2005) found that 90 percent of the top Global 3,000 companies believe that an integrated supply chain is very important and/or critical to their long-term success.

To facilitate this type of collaboration, companies are employing the latest supply chain technology. While a seemingly quick way to improve business performance, the end result has been somewhat disappointing. Forrester (2005) reports that while 48 percent of U.S. businesses implemented advanced supply chain programs and technology only nine percent are considering future updates, with the remaining not sure how to proceed. One possible explanation for this failure is that management overlooked the role of employees (Spanyi 2006). Setia, Sambamurphy and Closs (2007) believe that investing in technology alone does not necessarily equate to superior business performance as employees must be "ready" to use the technology.

By overlooking the role people play when launching a new supply chain technology, firms can face a wide array of behavioral issues ranging from turf-defense, resistance to change, to lack of trust. When resisting forces are equal to or greater than driving forces behind technology adoption, collaboration stalls. The only way to *unfreeze* this condition is through: an external disruption (loss of sales or market share); a significant emotional event (potential job loss due to poor performance); or

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a new resolve by management that employee engagement is as important as adopting the right process or technology (Fawcett, Magnan and McCarter 2008). The importance of taking a "holistic approach" is also supported by Copaconi (1977), Chopra and Meindl (2001), Fredendall and Hill (2001), Melville, Kraemer and Gurbaxani (2004), Poirier, Ferrara, Hayden and Neal (2004), Accenture (2005), and Gain (2005). However, the ability to execute this approach requires understanding what factors facilitate human collaboration.

To help management achieve the right collaborative behavior, this paper reviews the fundamentals of supply chain collaboration, audits the collaboration practices of two highly-recognized supply chain leaders, and draws a set of managerial recommendations to improve supply chain performance.

FUNDAMENTALS OF SUPPLY CHAIN COLLABORATION

While executives believe that supply chain collaboration is crucial to the success of their operations, they often have a difficult time agreeing on how best to achieve it. Cohen and Roussel (2005) suggest that:

> If you asked 100 supply chain executives for a definition, you'd likely get 100 different answers. Certainly most would agree that collaboration is important, that technology and relationship building are critical components, and that companies with effective collaboration skills are likely to have a competitive advantage. However, few executives would be able to offer a clear, unambiguous definition.

Therefore a good place to start this discussion is by defining supply chain collaboration. Coyle, Langley, Gibson, Novak and Bardi (2008) and Soosay, Hyland and Ferrer (2008) define supply chain collaboration as a condition whereby various parties agree to invest time, energy and share information/resources/rewards/responsibilities to solve common problems. While there is agreement on the overarching conditions for supply chain collaboration, some authors tend to emphasize the importance of one element (people, process or technology) over another. For example, Merono-Cerdan, Soto-Acosta and Lozez-Nichola (2008) believe that collaboration is best achieved when more emphasis is given to technology resources, Heinrich and Betts (2003) believe that collaboration is achieved through the standardization of business processes and technology, while Hansen (2009) believes that collaboration needs to involve people.

This paper posits that supply chain collaboration is best achieved when autonomous organizations align their resources (people, processes and technology) in a similar fashion to solve mutual problems. When organizations in a network fail to employ the right mix of resources to support collaboration, they as well as the whole network will struggle to communicate and solve common business problems. After studying over 150 multinational corporations located in Europe, Roussel and Skov (2007) found that the lack of the right competencies in partners contributed to lower supply chain performance 47 percent of time.

The interaction between people, technology and processes was originally proposed by Bal and Teo (2000, 2001, 2001a) and supported by a number of other authors (Dyer 2000, National Research Council 2000, Handfield and Nichols 2002, Seifert 2003, Davis and Spekman 2004, and Russell and Hoag 2004). Melville, Kraemer and Gurbaxani (2004) advanced this discussion of resource alignment by suggesting that "the application of IT (information technology) and complementary organizational resources (people) may improve business processes or enable new ones, which ultimately may impact organizational performance." Therefore, one can conclude that supply chain collaboration is achieved when employees administer the technology and supply chain processes in place to achieve common goals (see Figure 1).

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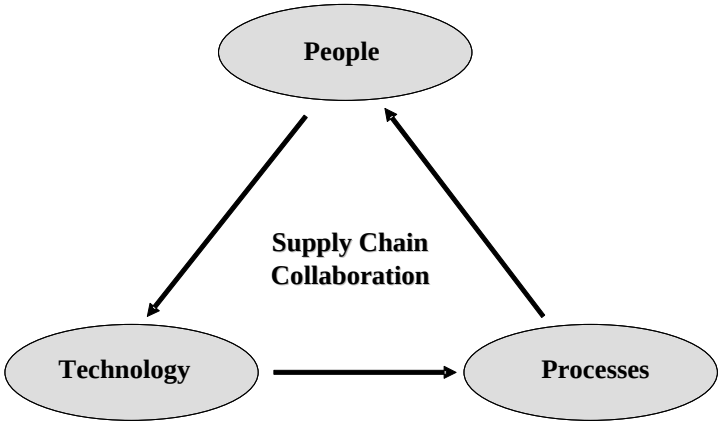
Figure 1
Collaboration
Resource Alignment for Supply Chain



Having established a working framework, the next step is to determine the level of collaboration required with each supply chain relationship. Based on the value and criticality of the raw materials or finished goods being purchased, one can conclude that all supply chain relationships are not created equal and therefore require a different level of collaboration. When comparing the types of relationships with the levels of collaboration required, Cohen and Roussel (2005) concluded that supply chain relationships can be categorized in one of four ways:

1. Transactional Collaboration. Transactional collaboration applies to manufacturer-supplier situations in which low risk and low value purchases are made like cleaning supplies or maintenance repair services. Due to the low criticality of these generic purchases, the focus is normally on price and ways to minimize the effort required to acquire these goods and services e.g., the use of purchasing cards reduces the number of checks written or setting a fixed price over the terms of the agreement.

2. Cooperative Collaboration. Cooperative collaboration has a higher level of information exchange than transaction collaboration because the products or services are more critical to the manufacturer – like screws, bolts and nuts that go into making an airplane wing. As these commodity type products are not overly unique, price, quality, freight, and inventory tend to be major purchasing considerations.

3. Coordinated Collaboration. Coordinated collaboration requires that manufacturers and suppliers work much closer due to the high criticality of the products or services like the hydraulic systems that control the landing gear in an airplane. As a result, coordinated collaboration requires strong two-way communication between partners, as well as a high level of negotiation and compromise.

4. Synchronized Collaboration. Due to the high-risk, high-value of critical products or services at this level, it is mandatory that manufacturers and suppliers operate in high fashion - moving beyond supply chain operations to include other critical business

processes. For example, partners may invest in joint research and development projects, supplier development, and intellectual property development.

Having found a means to decipher the right level of collaboration, the next step is to remove any barriers that inhibit collaboration. Fawcett and Magnan (2001) identified five barriers that impact supply chain collaboration:

1. *Alignment barriers* include problems with goal setting and poor measurement practices.
2. *Technology barriers* center on the lack of adequate information systems.
3. *Human Resource barriers* include issues with employee loyalty, motivation and empowerment.
4. *Functional barriers* include problems with the interpretation of job duties.
5. *Relationship barriers* include the lack of clear alliance guidelines. Specifically, which relationships merit top status, the intensity required for each relationship, and how key resources are to be developed, shared and protected?

The first and fifth barriers can be categorized as process oriented, the second barrier as technology oriented, whereas barriers three and four are people oriented. Chopra and Meindl (2001) also found that supply chain barriers can be grouped into the same three categories: people (behavioral and incentive obstacles); process (operational and pricing obstacles); and technology (information processing obstacles).

While the three categories barriers disrupt collaboration, management tends to focus most often on technology or IT barriers. This decision has resulted in overlooking the role of people and not aligning current business processes with new IT tools. A study by Computer Sciences Corporation shows that the lack of buy-in from people accounted for 41% of the problems with technology deployment whereas the inability to change business processes accounted for 37% of the problems (Coyle, Langley, Gibson, Novak and Bardi 2009). This finding suggests that supply chain collaboration requires more than selecting the right technology. Rather, it is about defining the roles for people, technology and processes and insuring that each is "ready" to operate in an integrated fashion.

To make sure that people are "ready" to collaborate, supply chain managers need to address those factors that facilitate human collaboration. The next section proposes a number of factors that are supported in the literature and embraced by two well-recognized supply chain leaders – Dell Computer and Toyota.

HUMAN COLLABORATION FACTORS

One factor is the establishment of a core set of *beliefs*. *Beliefs* are a state of mind in which an individual or group uses to determine one's purpose and set of expectations. Establishing common *beliefs* also builds confidence in peers and management (Grenier and Metes 1995). Our review of the best practices at Dell and Toyota showed that:

- Dell *believes* that its success is based upon what the company knows, how it learns, and how quickly the company can apply that knowledge, which is why human collaboration plays a major role in its supply chain strategy. As a result, Dell established five competencies for its employees and partners: 1) being customer focused, 2) being good problem solvers, 3) being results driven, 4) learning on the fly, and 5) being able to work as a team (Dell and Fredman 2006).

- Toyota's management *believes* that continuous improvement comprises thousands of small collaborations between its employees and suppliers which are managed by "asking why five times." This level of granularity encourages individuals/teams to pay attention to small details, eliminate small problems at the source, and trim anything resembling excess out of the process (Evans and Wolf 2005).

These examples show how *beliefs* support collaboration by establishing a base of agreement. *Beliefs* are not only important with internal collaboration but also when working with the employees of suppliers who are scattered around the globe. Therefore, the following proposition is drawn:

P_1 = Human collaboration requires a common set of beliefs among individuals and teams.

Beliefs establish the foundation for *knowledge* and *skill* development. The ability to generate and use *knowledge* effectively requires that an individual or team are able to share information and provide feedback on a regular basis – especially with cooperated, coordinated, and synchronized collaboration (Goldman, Nagel and Preiss 1995). Interpersonal and communication *skills* are also essential to achieve the required level of collaboration. Any effort to collaborate with supply chain partners can be sabotaged by ignoring *skill* development among external participants (van Hoek and Mitchell 2006). Our review of the best practices at Dell and Toyota showed that:

- Dell University delivers custom-configured education to all employees because it believes that *knowledge* is critical to the future success of the company. Its on-line training programs are designed for employees to learn as they work. For example, in Dell's customer service and sales centers, new employees listen in on customer calls being handled by an experienced employee (Dell and Fredman 2006). This exercise reinforces the importance of placing the customer needs ahead of just selling products

- Toyota places high value on face-to-face communication *skills*. For example, Toyota assigns guest engineers to work full-time with vendors at Toyota's technical center at Toyota City. Toyota believes this is the most efficient way to communicate complex, dynamic information during the development of new vehicle models (Dyer 2000). Toyota management also prefers to communicate important information in person instead of electronically or virtually. Executives often travel to individual plants to pass on information to all of the workers in their own working environments. These face-to-face interactions within the working environments are known as genba in Japanese (Takeuchi, Osono and Shimizu 2008).

These examples show how *knowledge* and *skills* contribute to both intra and inter-company collaboration. This is especially important when implementing complex supply chain systems or expanding supply chain boundaries (Cleland, Bopaya and Chung 1995). Therefore, the following proposition is drawn:

P_2 = Human collaboration requires that individuals and teams are knowledgeable and maintain common skill sets.

Knowledge and *skill* development is largely governed by the *culture* which hinges on how much employees *trust* internal and/or external partners. A *trust-based culture* requires a level of dependability and faith. Specifically, that each partner is interested in the other partner's welfare and would not take action without considering the impact on the other partner. A *trust-based culture* accepts radical change – such as working with a new set of people who have little or no experience (Kramer 2006). Our review of the best practices at Dell and Toyota showed that:

- Dell saved more than $1.9 billion by a) leveraging its empowered *culture*, b) launching Business Process Improvement programs spearheaded by its manufacturing employees, and c) encouraging open communication during plant visits by senior management (People's Daily Online 2006).

- Results show that when supplier trust is high, transaction costs are low. For example, trusted automakers like Toyota spent about 21 percent of their face-to-face interaction time negotiating contracts and prices versus General Motors who spent 47 percent of its face-to-face interaction time on non-productive, transaction-oriented activities (Dyer 2000).

While *trust-based cultures* have been shown to impact business performance, they require long-term thinking and continuity on the part of leadership (Covey 2006). As noted in *The Toyota Way* , building the right *culture* 1) starts from the top, 2) evolves from the bottom-up, 3) employs middle managers as change agents, 4) takes time to develop, and 5) is "extremely" difficult to do (Liker 2004). Based on these observations, the following proposition is drawn:

P_3 = Human collaboration requires the creation of a trust-based culture.
A *trust-based culture* fosters the creation of common *goals* and *strategies*. When organizations trust each other, the give and take required to formulate common *goals* and *strategies* is a lot easier (Chopra and Meindl 2001). Our review of the best practices at Dell and Toyota showed that:

- Dell works closely with its suppliers so they understand the company's commitment to meeting and/or exceeding customer expectations via their direct business model which is extremely efficient at delivering quality products in a timely fashion. By adopting this mission, suppliers will be in a better position to help the company achieve its operating *goals* (Dell and Freeman 2006).

- Toyota's relationships with its North American suppliers are more efficient as human specialization has increased. By working together, individual employees from both Toyota and its North American suppliers have developed specialized knowledge and a shared *strategy* that allows them to catch errors and communicate more effectively. In fact, Toyota even classifies new components into two categories, one of which includes components that must be developed jointly with the supplier (Liker and Choi 2004). Toyota engages in an average of 7,325 man-days of face-to-face contact per year with suppliers and houses more than 700 supplier guest engineers at its technical center – an average of roughly 4.5 engineers per supplier. This *collaborative strategy* allows Toyota to deliver customized orders in 5 days, 25 days faster than the industry average of 30 days (Dyer 2000).

The management at Dell and Toyota clearly walk the talk when it comes to reinforcing collaborative *goals* and *strategy*. Both companies understand that each partner in their supply chain must embrace a common set of *goals* – which may run counter to their own (Lee and Denand 2005). As the possibility exists for one party to act opportunistically and take advantage of the situation, each firm must *trust* the other's willingness to act in accordance with the common mission. This is easier to achieve when *goals* are jointly developed and managed (McCarter and Northcraft 2007). Therefore, the following proposition is drawn:

P_4 = Human collaboration requires that all parties agree on a common set of goals and strategies.

To measure the impact of collaborative *goals* and *strategy* companies need to establish common *metrics. Metrics* let people know what is expected of them and allow supply chain managers to track their progress toward *goals.* Beyond traditional key performance indicators (KPI) like on-time delivery, quality of goods, service levels, response and lead-times, supply chain managers must also

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address the drivers behind collaboration. Our review of the best practices at Dell and Toyota showed that:

- Dell is not coy about pressuring its suppliers to do better. It is a *metric*-obsessed organization that measures everything, not least its suppliers' performance. Dell rates its suppliers on their ability to compete on cost, technology, supply predictability, and collaboration, and posts their scores daily on a pass-word protected web site. Based on these measures, suppliers are awarded a percentage of Dell's purchases for the upcoming year (Fast Company 2006).

- Toyota works to recognize suppliers for outstanding performance when a crisis occurs. For example, when a fire broke out at the Kariya Number 1, plant suppliers pitched-in to keep the number of brake-proportioning valves moving and when all was said and done encouraged – but not required – its suppliers to recognize the work of their tier-two suppliers (Evans and Wolf 2005).

These examples suggest that *metrics* contribute to achieving the right level of collaboration which in-turn improves business performance. For example, the high level of collaboration between Toyota and its suppliers has resulted in: a) a reduced the number of supplier defects (in parts per million) by 84 percent; b) a reduction in supplier inventories (as a percent of sales) by 35 percent in their operations; and c) an increase of 10 percent in output per worker with suppliers (Dyer 2000). Therefore, the following proposition is drawn:

P_5 = Human collaboration requires a common set of metrics.

Naturally linked to metrics are methods for recognizing success. Reward systems are important for two reasons. First, they reinforce certain types of behavior. Second, employees and supply chain partners tend to emphasize the behavior which is most rewarded. It is therefore important that manufacturers pay considerable attention to the reward systems that are in place for both their employees as well as their supplier employees (Harrington and Harrington 1995).

Many organizations have found the benefit of cross-functional teams comprised of both internal and external supply chain members and that providing recognition for goal attainment has proven essential to team longevity. Team based compensation, performance reviews, and recognition demand new approaches to incentive development and cultural migration. A study of logistics cross-functional collaboration teams found only a moderately favorable perception of the organizations methods for assessment and rewards, confirming the challenge and need for improvement in these practices (Ellinger 2000).

Implementing appropriate incentives - such as rewarding responsiveness – can motivate supply chain members to make decisions that align more with higher end goals than organizational, department or self-interest goals (Rogers 2004, Simatupang and Sridharan 2004). However, achieving supply chain efficiency and cost effectiveness alone does not produce best in class results. Along with being agile and adaptable, companies must align incentives in their organization and with critical supply chain partners to truly experience long term success. By focusing incentive alignment to maximize customer returns the deep benefits of collaboration can be achieved (Lee 2004).

Our review of the best practices at Dell and Toyota showed that:

- Dell's supplier metrics are linked directly to business rewards. In addition, Dell concentrates the internal key performance indicators on links to customer satisfaction. With the metrics focused on the customer, employees can relate to these naturally identifiable goals and be passionate about their achievement. By establishing goals that align with individuals' core

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beliefs and that are supported by an appropriate rewards system, the result is the foundation for a productive culture (Dell 1994).

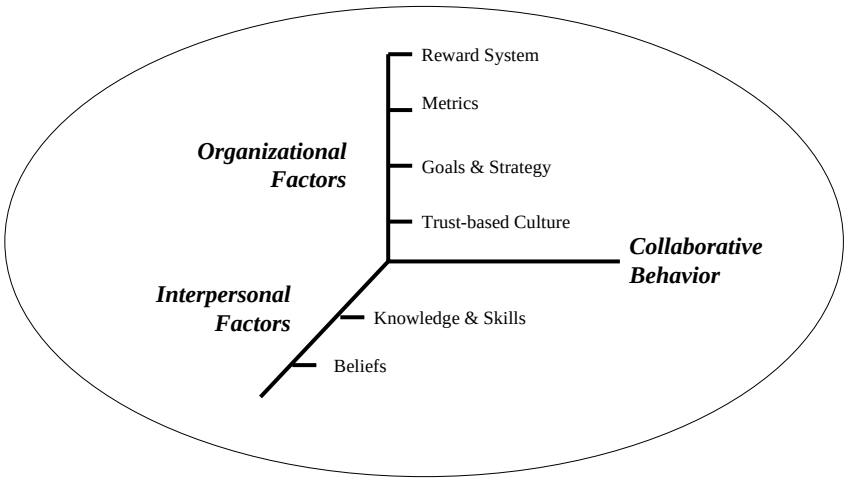
- Toyota's focus on a culture of pride and trust exist both inside the company and with supply chain partners. Objectives are set for the team and success of the team results in recognition and pride for all team members. Internally, those who no longer add value are assigned to jobs where they can do no harm which is very embarrassing and not a strong course for advancement. Likewise, expectations of suppliers is very high and not achieving goals will stress or terminate the relationship; at the same time successfully meeting or exceeding expectations will produce financial rewards and satisfaction from the follow up recognition. (Morgan and Liker 2006).

The point here is to recognize reward systems that influence attitudes, motivation and behavior. Therefore, when designing a supply chain reward system, managers need to a) focus on what is valued, b) demonstrate a clear connection between behavior/results and rewards, and c) recognize changes in behavior patterns – such as the adoption of new supply chain management collaborative practices – may require different types of incentives. Therefore, we advance the following:

P^6 = Human collaboration requires a proper reward system.

This review of the literature and the best practices at Dell Computer and Toyota has shown that: 1) six interlinked factors facilitate human collaboration; 2) the six factors can be categorized as either interpersonal or organizational; and 3) the six factors stimulate collaborative behavior that can range from improved communications to complex problem solving. These observations have been mapped in Figure 2 and their implications will be discussed in the next section.

Figure 2
Factors that Facilitate Human Collaboration



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CONCLUSION

This paper argues against the common belief that supply chain collaboration can be achieved by purchasing the latest "collaborative" technology. Companies wanting to collaborate with a larger number of external partners must insure that the proper resources (people, processes and technology) are available and aligned with each partner. The best way to engage people scattered across a supply chain is to manage six factors (*beliefs*, *knowledge/skills*, *culture*, *goals/strategy*, *metrics, and rewards*) that have been shown to facilitate human collaboration. This condition is especially critical for firms wishing to engage in more complex collaborative networks. This paper provides management insight on the steps that need to be taken to make one's supply chain more collaborative.

The authors plan on conducting follow-up empirical analysis to demonstrate how each research proposition facilitates human collaboration, and by doing so improve an organization's supply chain performance. The by-product of which will be a "collaboration tool" that provides specific direction on how to address poor-performing supply chain partnerships.

IMPLICATIONS FOR MARKETING PRACTITIONERS

To stay competitive, executives are shifting the focus of their supply chains from transactional to relational models that require a higher level of human collaboration. This shift is not easy as it requires overcoming several critical gaps such as selecting the right supply chain architecture/structure, identifying the right leadership, to enhancing working relationships among key employees (APICS 2010). This paper has focused on improving the working relationships of a growing number of employees so they can collaborate at high levels and be more willing to uniformly administer the supply chain processes and technologies in place. In the case of Toyota, this ability has resulted in: 1) outstanding productivity, 2) high quality ratings, 3) quick concept-to-market-development times, 4) satisfied customers, and 5) normally unbeatable levels of profit (Fawcett, Ellram and Ogden 2007).

Our observations pertaining to collaborative behavior among employees have several managerial implications. The first is that supply chain collaboration requires a strong commitment from all the partners in the supply chain. Leadership within each organization must endorse the importance of human collaboration, provide the necessary resources, and realign the incentives to develop cross-organizational collaboration. At the same time, lower level managers and employees must also buy into the idea of collaborating for the common good of each partner (Fawcett, Ogden, Magnan and Cooper 2006). When this is achieved, supply chain managers can begin to map the "as-is" state of collaboration against the "ideal" state of collaboration such that barriers can be identified and removed. This exercise pinpoints where counterproductive behaviors exist and shows how they impact supply chain performance (Fawcett, Magnan and McCarter 2008).

To remove counterproductive behavior, supply chain managers must develop a roadmap to achieve true cross-organizational collaboration. This roadmap requires a number of steps. Step one is for all partners to agree on a common definition of supply chain collaboration which this paper proposes as the condition when each autonomous organization agrees to align their resources (people, processes and technology) to solve mutual problems for the betterment of each partner. Step two is for manufacturers to realize that all supply chain relationships are not the same and therefore require a different level of collaboration. This requires that supply chain managers to employ a number of supply chain strategies. Step three requires the removal of any and all barriers standing in the way of each resource (people, process and technology). It is important that the leadership in each organization recognize and address the various barriers that exist. To remove those barriers that stand in the way of human collaboration, we developed a list of questions that stem from Figure 2:

1. Do the involved employees and teams share a common set of beliefs?
2. Do the involved employees and teams have the required knowledge and skills to collaborate?
3. Does a trust-based culture exist across the supply chain network?
4. Do all the parties share a common set of goals and strategies?
5. Do all the parties employ a common set of metrics?
6. Do all the parties reward employees/teams for achieving common goals?

Answers to these questions will educate supply chain managers as to what elements are weak and need attention. Compiling that data over time not only provides a baseline of the collaborative behavior, but also underscores the cause and effect of human collaboration.

Finally, because supply chain relationships are constantly in a state of flux, supply chain managers must: a) periodically evaluate each relationship, b) adjust strategies to meet current conditions on the ground, and c) strive to improve the organizations' collaborative capacity in terms of people, processes and technology to keep pace with changing market conditions. This review has shown how to improve supply chain collaboration when the proper understanding, resources and commitment are in place.

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