Behavioural issues in supply chain collaboration: communicating the literature via interactive learning

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Abstract: Technological innovation enables modern Supply Chain Management (SCM). The willingness to reassess the roles and behaviours of management is required to unleash the true creative power of SCM. Unfortunately, most managers and business educators have focused more on quantitative and technical aspects of SCM than on creating an environment that supports systems thinking and holistic decision making. Without redefining the system, collaboration will not occur at levels needed to create the learning SC. To help managers and educators make a closer examination at collaborative behaviour, we review the literature and illustrate its theory through an interactive simulation that demonstrates the need to go beyond technology to culture and structure to establish a truly collaborative SC model. One unique benefit of this approach is the simulation can be run first hand to support the literature and provide the significant emotional event needed to promote the needed paradigm shift to true SC collaboration.

Keywords: supply chain management; SCM; cooperative behaviour; pedagogy.


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1 Introduction

Managing the modern SC is complex and challenging, requiring a rare combination of deep, functional expertise and broad, holistic thinking. For example, appropriate relationships up and down the SC must be developed to bring unique competencies together and promote collaboration – sometimes with partners who are also competitors. Innovative ideas must be identified, adopted and disseminated, regardless of where they take root in the SC. And networks must be optimised and information shared across company boundaries. Managing the 21st century SC requires unique skills, many of which are not effectively taught in business schools. Yet, a recent Harvard Business Review commentary suggested that the need for the ‘new’ set of skills will persist into the foreseeable future.

Changes in supply chain management have been truly revolutionary, and the pace of progress shows no sign of moderating…. An end-to-end, top-to-bottom transformation of the twenty-first century supply chain is shaping the agenda for senior managers now and will continue to do so for years to come (Harvard Business Review, 2004, p.1).

The alluded to revolutionary transformation is from functional, single-enterprise thinking to cross-functional, interorganisational management. Unfortunately, most decision-makers live and manage in a functional world. The danger, as noted by Kuglin (1998) is that, “Companies that rigidly adhere to a functional, single-enterprise approach to the marketplace will quickly fall behind their competitors”. Kuglin further warned that managers are ill-prepared for a more holistic, collaborative world since universities have ‘monopolised a business student’s course load with function-driven classes’. Sharing this concern, a group of MBA students at a leading business school recently questioned the emphasis on functional curriculum. Quoting Vaclav Havel who said, “Education is the ability to perceive the hidden connections between phenomena”, the students requested ‘a more holistic curriculum with multidisciplinary cases and class work – a system that develops integration’. Regrettably, these same MBAs struggled with assignments that required integrative systems thinking.

These realities raise the question, “How can we more effectively teach the systems thinking required to make good, holistic supply chain decisions?” While the need is real, the challenge is daunting because most students do not recognise the need for systems thinking. After all, performance trade-offs occur across functional boundaries and are invisible to the casual observer. An important first step towards a more
integrative curriculum is to help students understand why a paradigm shift is needed. The characteristics of systems thinking make it important to get the students involved in discovering for themselves the value of, and challenges to, systems thinking. Thus, an active or participative learning approach is needed.

Participative learning activities including object lessons, computer simulations and experimental games have been used successfully to create awareness and provoke out-of-the-box thinking (Gibson, 2003; Lipnak and Stamps, 1993). In the Supply Chain Management (SCM) arena, Sterman’s (1989) Beer Distribution Game has been widely used. While playing the Beer Game, students witness the chaos and cost created when information is not shared upstream. The Beer Game makes the point that better communication can improve SC performance while reducing individual uncertainty as well as total SC costs. Student comments in post-game debriefing sessions quickly capture the need for better technology linkages, simplified order processing and shorter transportation lead times. Unfortunately, after playing the Beer Game, students often believe that technology is the answer to SC coordination problems. They fail to see how human behavioural issues complicate SC collaboration (Thomas-Hunt and Gruenfeld, 1998). A need exists for an interactive learning exercise that demonstrates the effects of human behaviour on SC decision making.

To help educators – and managers – understand the need to take another look at collaborative behaviour, we review the literature and illustrate its theory through an interactive simulation we call the ‘Supply Chain Puzzle Game’. The SC Puzzle Game highlights important theoretical dimensions of system design and human behaviour encountered in managing the 21st century supply chain. Participating in the simulation demonstrates the need to go beyond technology to culture and structure to establish a truly collaborative supply chain business model. One unique benefit of this approach is that the SC Puzzle Game gives students and managers first-hand experience with a variety of design issues and behavioural challenges that can hinder SC collaboration.

The simulation provides a memorable way to introduce and understand the literature while providing the significant emotional event needed to promote the paradigm shift to true SC collaboration.

2 Behavioural issues in SCM: a literature review

The fact that no one knows what the perfect SC network looks like creates uncertainty and places a premium on relationship adaptability and thus human behaviour (Fawcett and Magnan, 2001). Moreover, as SC strategies become more collaborative, personal interaction increases, further emphasising behavioural issues (Jassawalla and Sashittal, 2000; Kanter, 1989; Simonin, 1997). A complete list of all possible human behaviour issues would be exhaustive and is beyond the scope of this paper. The following five issues are frequently discussed in the SC literature and have a strong influence on collaboration success in SCM: information sharing, measurement and reward system design, interorganisational negotiation, perceptions of fairness and perceptions of ethical behaviour. How well companies manage these five behavioural issues influences the success of collaborative initiatives. The SC Puzzle Game illustrates the challenges that arise in these areas.
2.1 Information sharing

Making good SC decisions requires efficient information sharing. The Beer Game demonstrates the need for connectivity (improved technology) among supply chain partners (Sterman, 1989). Without doubt, technological connectivity is an enabling dimension in supply chains (Alkadi et al., 2003; Robinson et al., 2005), because information about demand, lead time, inventory and to allow SC members to coordinate and deliver products in a timely manner to the end customer. However, we must remember that supply chains cannot be studied in isolation – namely in regard to only technological connectivity (McCarter et al., 2005).

Technological connectivity is necessary but not sufficient to sharing information in the SC. Ultimately, people determine what information is shared because they are the operators of the technology that holds and carries the information (Constant et al., 1994; Lee and Whang, 2000). Thus, information sharing in supply chains is equally dependent on the willingness of people and organisations to share sometimes sensitive information. Since information is power, managers tend to hoard it, selectively sharing pertinent information when they perceive some potential benefit for themselves (Gilmour, 2003). This opportunistic behaviour jeopardizes meaningful collaboration (Scarborough, 2003). That is, someone somewhere in a SC relationship possesses the information and knowledge needed to resolve many problems or promote synergies (Argote and Ingram, 2000) and the challenge is to create a culture that promotes willingness to share this information and knowledge (Davenport and Prusak, 1998; Drucker, 1993; Lipnak and Stamps, 1993).

Although, many firms invest in technology and information sharing systems (Ofek and Sarvary, 2001) many firms fail to teach their employees the knowledge, skills and practical tools needed to effectively share information (Coulson-Thomas, 2004). One possible explanation for this shortcoming is that managers rely on information technology as the end-all solution to fostering cooperation (Fawcett and Magnan, 2001). The SC Puzzle Game allows participants to communicate openly and freely – representing high technological connectivity. Yet, much information remains unshared, demonstrating the challenge of inculcating a culture of willingness to share information into an organisation’s cultural fabric.

2.2 Measurement and reward system design

While a cliché, the old saying, “What gets measured, gets done” possesses the virtue of being true. Although research has shown that SCM can lead to desirable rewards (see Pagell, 2004, for a review), it is not always clear how the rewards will be distributed (Ragatz et al., 1997). Reward systems mould individual behaviour – either promoting or impeding SC collaboration. Traditional reward systems (e.g. stock price valuations, quarterly P&L statements) tend to focus on local outcomes, pitting SC members against each other as they each seek to capture the margin within the supply chain (Senge and Sterman, 1992). When potential partners are viewed as competitors rather than companions, there is little incentive to collaborate and counterproductive behaviour often results (Ellinger, 2000; Hamel et al., 1989; Thurow, 1980).

Many SC managers recognise the need to change existing reward structures to induce collaboration (Fawcett and Magnan, 2001; Preuss, 2002); however, achieving the necessary changes has proven to be an elusive goal (Cooke, 2003). Scholars have
suggested that reward structure and distribution expectations should be formally determined during alliance formation rather than remain flexible (Ragatz et al., 1997), and have found that successful SC alliances tend to divide rewards among partners (Fawcett and Magnan, 2001). The rewards in the SC Puzzle Game are based on traditional measurement systems. However, participants are allowed to allocate rewards as they see fit. This reality highlights the need for managers to proactively establish and adhere to clear reward allocation agreements that promote collaboration during alliance formations.

2.3 Interorganisational negotiation

Collaborative SC relationships are built through negotiation. During negotiations, managers adopt either a distributive or integrative bargaining strategy (Murnighan et al., 1999). Distributive negotiators strive for domination through persuasive arguments or threats (Pruitt, 1983). This approach creates ‘conflict spirals’, which lead to emotional conflict, refusal to compromise, impasse and ultimately the loss of mutual benefit (Brett and Shapiro, 1998; Schelling, 1960). Integrative negotiators, by contrast, strive for mutually acceptable solutions (Gupta, 1989). The desire to achieve meaningful collaboration leads negotiators to look beyond their immediate short-term interest to consider the other party’s needs.

The conflict resolution literature has yet to provide clear guidelines for developing the integrative negotiator (Druckman and Robinson, 1998; Herrman et al., 2001; Hite et al., 1987; Nadler et al., 2003; Porter and McKibbin, 1988); however, the SC Puzzle Game does bring to light several key factors regularly found in the negotiation literature.

The SC Puzzle Game demonstrates to participants that each style of negotiation has its own place and time and that following set guidelines without adapting to the person or group’s needs can lead to negative results for both parties (Fynes and de Búrca, 2005). The second caveat the Game teaches is that, unlike one-shot negotiations (e.g. purchasing a car), SCM is a form of alliance management and alliances centre on building long-term relationships (Chang, 2005; Fynes and de Búrca, 2005; Susskind, 2005). This suggests that one should not ‘burn bridges’ with others by sacrificing the future for what seems to be for the best (for themselves) at the moment.

2.4 Perceptions of fairness

People’s perceptions of fairness influence their willingness to collaborate (Hoffman and Spitzer, 1982; Kahneman et al., 1986; Thaler, 1988). When people feel that they have been dealt unfairly, emotions of anger and resentment may arise (Folger, 1993; Sheppard et al., 1992). They may then resist participating in transactions or relationships they view as unfair (Kahneman et al., 1986). At times, they may even retaliate and attempt to punish the opportunist by withholding information, providing inferior supplies, helping a competitor achieve success (Baron and Neuman, 1996; Skarlicki et al., 1999) or even – as will be shown shortly – vandalise the opportunist’s resources and establishment. This idea of retaliation by punishing the opportunist can be explained by the equity theory of vandalism (Fisher and Baron, 1982).
The assumption driving the equity theory of vandalism is that damage to another person or group’s resources is not a ‘senseless act’ but rather as payback for experienced inequity from that person or group (Taylor, 1988). Further, if individuals experience moderate-to-low levels of perceived control over the interaction they may seek ‘compensation’ through vandalism or sabotage (Fisher and Baron, 1982; Taylor, 1988). Past experimental gaming has shown that, when a team gains advantage opportunistically and the other teams feel a loss of perceived control, damaged teams are sometimes willing to punish the offender – even to their own detriment (Cropanzano et al., 2003; Güth et al., 2001). Of course, responses to unjust behaviour vary dramatically (Skarlicki et al., 1999). The SC Puzzle Game setup allows this spectrum of behaviour (from general competitive behaviour to punishing/sabotaging behaviour) to manifest simultaneously because of the number of various transactions and relationships that occur and form through the life of the game.

2.5 Perceptions of ethical behaviour

Enduring SC relationships are built on ethical behaviour. Despite many firms’ recent increase of investment in organised ethics programs (Verschoor, 2000), unethical behaviour is often tolerated in today’s business world (Anand et al., 2004; Gioia, 2002). Further, in a global setting, ethical standards can vary greatly (Cullen et al., 2004; Hosmer, 1988; Husted, 1996). Discrepancies in ethical standards can undercut collaborative efforts and lead to relationship breakdowns. Despite some tendencies to minimise the importance of ethics, managers and teachers must actively support ethical practices and highlight ethical breaches in SC relationships (Paine, 1994).

One of the purposes of the SC Puzzle Game is to show how perception of ethical behaviour and ethical decision making is quite complex. The Game demonstrates several myths of ethics highlighted by Treviño and Brown (2004) – namely

1 ‘it’s easy to be ethical’
2 ‘unethical behaviour in business is simply the result of ‘bad apples’.

Regarding the first myth, many business schools teach students to apply various normative frameworks. These frameworks usually weigh the benefits and harms to others of a potential action, emphasise the principles of justice and individual rights or emphasise the need for integrity of moral character (Treviño and Nelson, 2003). However, as Treviño and Brown note:

In the most challenging ethical dilemma situations, the solutions provided by these approaches [or frameworks] conflict with each other, and the decision maker is left with little clear guidance (Treviño and Brown, 2004, p.69 Italics added).

Regarding the second myth about ethics, some have claimed that the identification and removal of unethical people (bad apples) will eliminate unethical behaviour in business (PR Newswire, 2003). Such a position suggests that ‘unethical people’ have no affect on ‘ethical people’. This assumption, however, may not be valid in many situations (Treviño and Nelson, 1988). Individuals are subjects of their environment, and may yield to unethical behaviour – not because they are ‘bad’ – but because of people and system they are placed in (see Hartford Courant, 2002; Paulson, 2003, e.g. from the popular press).
Behavioural issues in supply chain collaboration

This does not excuse unethical behaviour, but rather this observation that people are subjects of their environment introduces the dynamic stated best by Treviño and Brown:

Bad behavior doesn’t always result from flawed individuals. Instead, it may result from a system [composed of people and methods] that encourages or supports flawed behavior (2004, p.73 Italics added).

The SC Puzzle Game debunks both of these myths, by placing the students in situations where decision making is ‘not as clear as it seems’, and allows students to behave in ways they may not normally behave because of the Game’s competitive group and reward structure.

2.6 Putting the pieces together

Thus far, we have discussed the five behavioural issues the SC Puzzle Game addresses. An additional insight the SC Puzzle Game teaches participants is that these five issues are interconnected. SCM can be thought of as a ‘collaborative vision’ (Lovell et al., 2005) that spreads and grows as enthusiastic managers share their ideas (of supply chain integration) with others. As this collaborative vision is shared, other people begin talking about the ideas and begin to pursue the vision. If the discussion is sustained, the vision becomes more clear and exact, leading to more enthusiasm towards the collaborative vision (Senge, 1990). However, despite managerial enthusiasm, collaborative visions can be derailed. A conceptual diagram depicting the potential growth or demise of a collaborative vision is illustrated in Figure 1.

Figure 1 Conceptual diagram of limits to collaborative vision growth

In The Fifth Discipline (1990), Peter Senge describes several ‘limits to growth’ that impede and even stop collaborative vision development – namely the inability of managers to allow diverse views towards a collaborative vision and forgetting that managers, departments and firms need to be ‘connected’ to each other for a collaborative
vision to be realised. The SC Puzzle Game demonstrates both of these caveats to the development and growth of a collaborative vision. In the first instance, the Game fosters an environment where each team must work together to achieve the prize. However, as the game progresses, the teams tend to become more and more fixed in their vision and group objectives, and become unwilling to yield to other group’s requests, counsel and views. This is because the Game’s reward system is such that one team’s gain may be viewed as another team’s loss. Namely, the rewards may be perceived as indivisible and therefore there is not enough reward to share across all the teams. Another reason for this diversity of views comes from each person’s interpretation of what is fair and ethical and what is not. These misalignments of rewards, values and beliefs leads to Senge’s second limit to growth – lack of connection.

For the collaborative vision of SCM to be realised, managers, departments and firms must work together, not against each other. Senge emphasises,

“One of the deepest desires underlying shared vision is the desire to be connected, to a larger purpose and to one another. The spirit of connection is fragile. It is undermined whenever we lose our respect for one another and for each other’s views (1990, p.230).”

This idea of connection fragility is shown in the Game as teams become fixated on securing their own team’s benefit – even at the expense of the other teams. Examples in the Game would include the lack of willingness to negotiate (e.g. trade puzzle pieces) and share information (e.g. whether a team has a particular piece; revealing to others the need to collaborate). Senge calls these types of behaviours proselytising.

Within the SC Puzzle Game, proselytising is potentially driven by the game’s reward system, which tempts players to act in their own self-interest. When this occurs, a lack of willingness to share information (knowledge and resources) with other teams emerges. This lack of willingness leads to both ‘hurt feelings’ and perceptions of unfair behaviour. As the game continues, power across the player teams almost always becomes asymmetric, leading to alternate styles of negotiation. The negotiations become more complicated because of the teams’ past history with specific relationships either burns bridges or helps to build them. These intergroup negotiations lead to a variety of outcomes with different teams having different perceptions of how fairly they were treated. These perceptions of fairness then lead to questionable behaviours as teams go to different means to attain or maintain their advantage over each other.

This example does not imply a set pattern of interactions among the five behavioural issues, but rather demonstrates one potential example of how these issues are interrelated and how connection with others can be ‘undermined’ as trust, respect and understanding is lost.

3 The supply chain puzzle game: Dynamics and outcomes

The reality of today’s competitive business world is that no single company possesses all of the resources needed to achieve sustainable competitive advantage. Managers must learn to leverage their own company’s capabilities while working across boundaries to acquire and bring together the right set of complementary competencies. In this respect, designing and managing a supply chain can be likened to putting a jigsaw puzzle together (Felix and Qi, 2003).
Managers who learn to identify the right ‘puzzle’ pieces regardless of where they are located in the supply chain can help their companies succeed. Of course, after the ‘puzzle’ pieces are identified, they must be assembled appropriately to create competitive advantage. Thus, the emphasis on SCM’s behavioural issues – getting other members of a supply chain to share indispensable pieces of the SC ‘puzzle’ can be a real challenge. Yet, only by working collaboratively, sharing ‘puzzle’ pieces, can a competitive supply chain be assembled.

The metaphorical value of assembling a jigsaw puzzle provided the impetus for the SC Puzzle Game. The game itself is simple. Each team is given the pieces to a small 50–100 piece puzzle. The teams then compete to see who can put their puzzle together first. The winning team earns a ‘desirable’ prize. What the teams do not initially realise is that several pieces of their puzzles have been dispersed among the other puzzles. The only way to win is to find and obtain the right puzzle pieces. In other words, it is impossible for a team to complete its puzzle without interacting with the other teams. The insight, and the fun, derives from the competitive and collaborative strategies each team employs in the very dynamic quest to ‘win’ the game. The next sections describe the following key components of the Supply Chain Puzzle Game: game setup, game rules and process, game strategies and expected outcomes and debriefing session.

3.1 Game set-up

The SC Puzzle Game can be played with any number of teams; however, it works most effectively with 4–12 teams. Each team should have three to six players. Depending on time constraints, the game can be scheduled for an entire 80-min class period. At a minimum, the game administrator should plan on 40 min to play and discuss the game. The schedule for a 40-min game would include 10 min to set up and provide instructions, 20 min for a winner to emerge and 10 min to debrief. Smaller, 50–60 piece puzzles, should be used if the Administrator wants to limit the time to 40 min.

Before class, the game administrator should obtain enough puzzles for each team to assemble its own puzzle. While each team’s puzzle should be distinct, the puzzles should be of a similar type so that it is not immediately evident that puzzle pieces have been interchanged. The Administrator should also verify that all of the puzzles are complete. Each puzzle’s pieces should then be placed in a Ziplock bag. To point out the fact that managers seldom know what the optimal SC network looks like, it is important that teams do not see the puzzle’s actual box that shows a picture of the completed puzzle.

The Administrator then removes three or more pieces from each puzzle. The fewer pieces interchanged, the faster the exercise can be completed. The first piece should be exchanged on a one-for-one basis with another team’s piece. This creates a situation where interdependency exists and mutual exchange may occur. A second piece should be transferred randomly to another puzzle. This creates a situation where asymmetrical power exists. That is, the seeking team has nothing of value to trade for its ‘indispensable’ missing piece. The third piece of each puzzle is placed in a Ziplock bag and withheld from the puzzles. This piece represents the role of governmental or regulatory agencies. This third piece does not have to be removed if the Administrator does not want to highlight the fact that regulation, tax policy, environmental concerns and other external forces influence SC design and management.

A slight modification to the game can be made to highlight the potential costs of complexity. To do this, the Administrator can add three or four puzzle pieces from an
unrelated puzzle to each of the puzzles. These ‘extra’ pieces slow teams recognition that they are missing needed pieces. They also make the process of finding the right pieces more complicated.

The only other materials required are a ‘desirable’ reward to motivate the teams and a mechanism to identify the winning team. For most groups, a six-pack of large Snickers bars proves to be sufficient to motivate insightful interactions. The candy bar six-pack makes it easy for every member of the winning team to take away a personal reward; however, it creates a degree of indivisibility. That is, if two or more teams decide to collaborate, too few candy bars exist for everyone to have one. Either a creative reward-sharing system must be devised or somebody has to sacrifice. This indivisibility emulates modern stock prices and financial rewards. That is, there is no such thing as a ‘supply chain’ stock price. When one company does something that helps another company succeed such that its stock price appreciates, there is no automatic sharing of the wealth. A vehicle to share risks and rewards must be proactively, and often creatively, sought after and established. If the Administrator desires to heighten the tension, as well as the barriers to collaboration, participation points can be added to the winning team’s grade.

To identify the winning team, it is useful to create an overhead that shows a ‘Winner’s Circle’ (see Figure 2). The first team to complete its puzzle uses a designated transparency marker to write its number in the designated spot within the Winner’s Circle. The Winner’s Circle is then projected on the screen throughout the game. The use of a Winner’s Circle keeps the end goal and the emphasis on competition visible. In a sense it symbolises the business world’s relentless emphasis on individual success.

Figure 2  The Winner’s Circle

3.2  Game process and rules

To begin the game, the Administrator invites a representative from each team to come forward. These representatives then select the puzzle which their teams will assemble. As they return to their teams, the Administrator should announce that the Ziplock bags are to remain sealed until the game officially begins. The Administrator might say, “Any team that opens its bag before I say ‘GO’ will be automatically disqualified.”
The Administrator then takes a few moments to explain the game. For example, the Administrator might say something like the following:

The objective of the game is to complete your puzzle as quickly as possible. You can assemble your puzzle anywhere in the room that you like. The first team to complete its puzzle should have a member of the team come to the overhead projector and write the team’s number in the Winner’s Circle using this blue transparency marker. I will then inspect your puzzle to verify that it is completely and correctly assembled. Are there any questions? The winning team will earn this bag of six Snickers bars as well as two participation points toward their final class participation score.

At this point, a twist can be added to the game if the Administrator wants to highlight some of the intricacies involved in global SCM. For example, cultural differences, contract enforcement and relationship building can all create subtle challenges for the SC manager. The twist is to say something like ‘let us begin’, or ‘let us get started’. Typically, most, if not all, of the teams will open their bags, dump their puzzle pieces out, and start to work on their puzzles. The administrator should quickly stop the teams and point out that the contractual word, ‘GO’, was never used and that the teams that have opened their bags should be disqualified. Since most, if not all, of the teams would be disqualified, the Administrator should expect some protest.

However, it is important to point out the global operating environments of modern supply chain create a host of complications and nuances. For example, in global negotiations, some commonly used words contain different meanings. For example, the word ‘Yes’ may not mean, ‘yes’ but only, ‘I hear what you are saying’. The language in contracts is often unique to individual countries and enforcement issues vary greatly. The point of this twist is to create an opportunity to point out that SC managers often need to take a closer look at what initially appears straightforward. Once this point is discussed, the Administrator announces that a second chance will be given to the disqualified teams. After the teams have replaced their puzzle pieces and sealed their bags, the administrator can begin the game by saying, ‘GO’.

Once the game begins, many teams dump the pieces and immediately begin to put the puzzle together. Others take a few moments to devise a strategy, assigning different teams members to specific roles such as to find edge pieces or group pieces by colour or shape. In either case, within a couple of minutes the teams are fully engaged in assembling their puzzles. The Administrator can then discretely place the Ziploc bag that contains the final piece to each puzzle in a central location – typically close to the overhead projector. The goal is to place the bag out of plain sight, but accessible to someone who is looking for some missing pieces. All of the pieces needed to complete the puzzles are now in play.

Early in the game, someone usually asks if all the pieces to the puzzles are in the ‘bag’. The Administrator should acknowledge that, ‘All of the puzzle pieces are in the room’. The Administrator should be careful to answer every question factually. It only takes a few minutes before the first team realises that some of the pieces in its bag do not belong to its puzzle. Someone quickly guesses that some pieces to the team’s own puzzle are probably missing. While the team may keep this insight to themselves, it is not uncommon for someone to announce to the other teams that the pieces have been interchanged. As members of different teams start to search the room and scour other teams’ puzzles looking for their own puzzle pieces, the game dynamics become very interesting and relationship strategies begin to form.
3.3 Game strategies and expected outcomes

The SC Puzzle Game enables each team to pursue adversarial or collaborative relationships. At the adversarial extreme, every team pursues its perceived self-interest regardless of how it must treat the other teams. In the collaborative extreme, all of the teams work together so that all of the teams finish simultaneously. A close parallel involves the teams working together to help one team win. The winning team then shares the rewards equally among all of the teams. Individual team strategies can, and do, change as other teams’ behaviour is observed. Importantly, because of team independence and individuality, no single team defines the game dynamics. Rather, the dynamics emerge as teams interact and as individual team members decide how best to obtain ‘missing’ puzzle pieces. This fact creates a variety of learning opportunities.

The SC Puzzle Game focuses on how a team wins rather than who wins the game. While no two games proceed exactly the same, one of four general outcomes is possible: full collaboration, selective collaboration, general competition and impasse. However, experience suggests that selective collaboration and general competition outcomes occur most frequently. In fact, in over 50 runs of the game, the full-collaboration outcome with all of the teams working for a common goal and a win–win reward-sharing scenario has never resulted. The idea arises in almost every game and is often promoted very vocally by one or more individuals. But a lack of leadership combined with communication difficulties and the power of self-interest inevitably leads to a breakdown in the full-collaboration effort. The other extreme outcome, the impasse option, has only occurred once out of more than 50 runs. Thus, one team eventually will obtain all of its pieces, assemble its puzzle and mark the Winner’s Circle. However, when individuals decide that they have been treated unfairly or that they simply cannot win, they occasionally resort to ‘mischievous’ behaviour. For example, puzzle pieces can be hidden or stolen and the Winner’s Circle overhead or the transparency marker can be taken. In the one game without a winner, these (and other) ‘extreme’ behaviours occurred widely among several teams. An impasse resulted. The following paragraphs describe the most likely outcomes.

3.3.1 General competition

The vast majority (75%) of game trials end with a single team completing its puzzle first and winning the game. Competition among teams characterises this scenario. The competition-driven scenario can be typified as follows:

- As teams notice that pieces to their puzzles are missing, they begin to ask other teams if they have pieces that do not appear to fit their puzzles.

- When a needed puzzle piece is discovered, team members attempt to obtain it either by asking permission, negotiating a trade or simply picking it up and walking away.

- Team members notice that they have pieces that do not appear to fit their puzzle. They withhold these pieces from other teams by hiding them or refusing to negotiate.
Teams intentionally undermine other teams' efforts by stealing pieces or sabotaging the process of marking the Winner’s Circle (the candy bars sometimes disappear).

When a team finds the bag containing one piece from each puzzle, its contents are used to negotiate for missing pieces. While the team that finds this bag has an advantage, this team wins only about half the time.

Ultimately, competition – motivated by individual competitive spirit and magnified by the reward system – dominates decision making. Collaboration is impeded, leading many people to feel frustrated. Any unethical behaviour that occurs creates a sense of dismay for some.

3.3.2 Selective collaboration

Approximately one in four games ends with a member of an alliance (generally two teams) completing its puzzle first and marking the Winner’s Circle. The rewards are then shared. This outcome results when a leader emerges, and sells the idea that working together is the only way to fully assemble a puzzle before one of the other teams. Alliance members often have one of each other’s missing puzzle pieces, leaving only two pieces to find – the piece held by a third team and the piece hidden in the government bag. The fact that the teams have each other’s pieces is generally the factor that often brings alliance partners together in the first place.

Often, the alliance focuses on completing the puzzle that is closest to being done. Individual team members are assigned different responsibilities such as scanning for pieces, negotiating exchanges, monitoring other teams’ progress and guarding the team’s own puzzle. By combining resources, the alliance teams not only have more people to do the work but they also have more puzzle pieces to use in negotiations as they seek to obtain their missing piece. Although alliances often lead to more rapid completion of the game, they do not guarantee success. Independent teams working on their own sometimes hustle out the alliance, other alliances prove more efficient and occasionally, ‘mischievous’ behaviour perpetrated by another team undermines the alliance’s efforts. Even when an alliance proves successful, members of other teams experience frustration at what they feel has been counterproductive behaviour.

3.4 Debriefing session

As the game concludes, the Administrator requests that teams put the puzzles back in the Ziplock bags, and asks everyone to think about and identify key learning points. If time is short, the Administrator may ask the winning team to describe its strategy and keys to success. It is then useful to ask the entire group to share both their impressions and learning points. These can be written on the board. A summary overhead or powerpoint can then be shared to reiterate critical learning points. Figure 3 highlights some of the points that should be covered. This process can be completed in 10–15 min.

If more time is available, a brainstorming or nominal group technique can be used to

1 involve more participants in the debriefing
2 more fully capture and emphasise the learning points.
Figure 3  Learning objectives: putting all the pieces together

- Global SC design is more complicated than putting a puzzle together.
- Even when the rules appear clear, subtle but vital issues are hidden in the subtext.
  • relationships  • culture  • connections  • legalese
- Supply Chain managers do not know what the optimal network should look like.
- Complexity complicates SC decision making. Complexity results from
  • SKUs  • DCs  • suppliers  • customers
- Managers never have all of the pieces – some of the missing pieces might be
  • information  • processes  • technology  • capital
- Missing pieces might be found within the organisation or in the hands of
  • suppliers  • customers  • 3PLs  • governments
- Not everyone is willing to share the key pieces on a quid-pro-quo basis.
- Some people are willing to go to extremes to further their own self-interest.
- Traditional measurement and reward systems lead to counterproductive behaviour.

The Administrator should pass out a blank transparency and marking pen to each group and indicate that three or four teams will be asked to report out their findings after a 5–10 min discussion period. Some questions the Administrator might ask to motivate the group discussion include,

- ‘Why was it so hard to assemble your puzzle and what does this imply for SCM?’
- ‘What aspects of the game process did you find frustrating?’
- ‘As a manager, what learning points should you remember to help you solve SC problems?’

The entire group should be involved in discussing the issues reported on by the selected groups. Table 1 shows actual participant comments. Participants almost always raise insightful learning points related to each of the five behavioural issues discussed in the literature review above. Two points are emphasised most often: collaboration and ethics. The debriefing should conclude by reviewing the summary overhead or PowerPoint, which emphasises critical learning points – at least one or two points on the overhead are missed in the preceding discussion. The dynamic game process and interactive discussion makes impressions that participants remember long after the game is played.
### Table 1  Sample learning points from in-class brainstorming exercise

<table>
<thead>
<tr>
<th>Typical student comments by topic area</th>
<th>Expected percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collaboration and negotiation</strong></td>
<td></td>
</tr>
<tr>
<td>No one wins when you do not collaborate</td>
<td>20–25%</td>
</tr>
<tr>
<td>True collaboration requires buy-in from all parties</td>
<td></td>
</tr>
<tr>
<td>You can go only so far doing things by yourself</td>
<td></td>
</tr>
<tr>
<td>When others showed a willingness to collaborate, we were able to do more</td>
<td></td>
</tr>
<tr>
<td>At first, people did their own thing – no one was ready to win. We learned we needed each other</td>
<td></td>
</tr>
<tr>
<td>Get the right members and the right alliances</td>
<td></td>
</tr>
<tr>
<td>Keep good relations with your competitors in case you have to collaborate</td>
<td></td>
</tr>
<tr>
<td><strong>Fairness and ethics</strong></td>
<td></td>
</tr>
<tr>
<td>You have to take what you can get</td>
<td>20–25%</td>
</tr>
<tr>
<td>Play by the rules … but get even when others do not</td>
<td></td>
</tr>
<tr>
<td>Some people would step on their mother’s head to move up in the world</td>
<td></td>
</tr>
<tr>
<td>Security issues are important</td>
<td></td>
</tr>
<tr>
<td>Remember the Golden Rule</td>
<td></td>
</tr>
<tr>
<td>Devious competition sucks</td>
<td></td>
</tr>
<tr>
<td>Protect your puzzle … Saboteurs are everywhere</td>
<td></td>
</tr>
<tr>
<td><strong>Resources and competencies</strong></td>
<td></td>
</tr>
<tr>
<td>We quickly recognised we did not have everything ourselves</td>
<td>15–20%</td>
</tr>
<tr>
<td>We may not have all the pieces in our own puzzle and may have to look outside our company to get them</td>
<td></td>
</tr>
<tr>
<td>Other organisations may not have the pieces we are missing</td>
<td></td>
</tr>
<tr>
<td>There were real barriers we had to overcome to finish</td>
<td></td>
</tr>
<tr>
<td><strong>Scanning</strong></td>
<td></td>
</tr>
<tr>
<td>Early scanning can produce superior results</td>
<td>10–15%</td>
</tr>
<tr>
<td>We had to scan to find suppliers for needed pieces</td>
<td></td>
</tr>
<tr>
<td>Scanning is the key to solving problems</td>
<td></td>
</tr>
<tr>
<td><strong>Process design and role assignment</strong></td>
<td></td>
</tr>
<tr>
<td>Team members must have a defined role – one common objective</td>
<td>10–15%</td>
</tr>
<tr>
<td>Role assignment helps in the beginning</td>
<td></td>
</tr>
<tr>
<td>Finding commonalities will speed up things</td>
<td></td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td></td>
</tr>
<tr>
<td>Good, open communication is necessary</td>
<td>5%</td>
</tr>
<tr>
<td>You need to understand the fine print of the contract</td>
<td></td>
</tr>
<tr>
<td><strong>Shared risks and rewards</strong></td>
<td></td>
</tr>
<tr>
<td>If you participate in collaboration but do not gain anything then you become bitter</td>
<td>5%</td>
</tr>
<tr>
<td>Shared Rewards = Snickers Bars</td>
<td></td>
</tr>
<tr>
<td><strong>Measurement and motivation</strong></td>
<td></td>
</tr>
<tr>
<td>Did not have incentive for cooperation</td>
<td>5%</td>
</tr>
<tr>
<td>Chocolate and extra points are great motivators</td>
<td></td>
</tr>
<tr>
<td><strong>Creative decision-making</strong></td>
<td></td>
</tr>
<tr>
<td>It is easy to go most of the way – the last one percent is tough</td>
<td>5%</td>
</tr>
<tr>
<td>Begin with the end in mind – before assembling the puzzle uncover all of the pieces</td>
<td></td>
</tr>
</tbody>
</table>
4 Game implications

The SC Puzzle Game, like other simulations, creates insight into real-world managerial dilemmas (Gibson, 2003). Specifically, the debriefing highlights barriers to, and opportunities for, more effective systems thinking that are made visible by playing the game. Likewise, it suggests areas for future investigation. Some of the SC Game’s theoretical and practical implications are discussed below.

4.1 Willingness to share information implications

In the SC Puzzle Game, the teams that are best organised tend to be one step ahead of their counterparts when it comes to recognising that some pieces are missing. They therefore possess valuable ‘process’ information before other teams. They also possess puzzle pieces needed for other teams to succeed. They are, however, dependent on other teams for success. After all, they also need to obtain puzzle ‘pieces’ to complete their puzzle and win the game. The question is, “Under what circumstances are people willing to share valuable resources?”

Unfortunately, the SC Puzzle Game clearly demonstrates that people tend to hoard both information and puzzle pieces, especially when they believe hoarding creates advantage. Moreover, sharing occurs selectively – when it promises to lead to a specific benefit. For example, Team A may be willing to share a puzzle piece with Team B in exchange for one of Team A’s pieces, but be unwilling to share with Team C because Team C has nothing of value to trade. Asymmetrical power has a chilling effect on a team’s willingness to share.

To summarise, the tendency to hoard as well as the presence of asymmetrical power impedes effective sharing. However, people will share when they perceive sharing to be in their best interest. Their willingness to share depends on who is asking (Gilmour, 2003). The bottom line: SC managers must create a setting that makes it safe and beneficial to share.

4.2 Reward system design implications

Like many real-world measurement systems, the reward structure in the SC Puzzle Game focuses on local outcomes – the team that completes its puzzle first earns the candy bars. True, the teams can decide to collaborate and share the reward. However, the game’s observed process as well as its outcomes suggests that collaboration is not the instinctive approach – even in a classroom setting where the importance of collaboration has been discussed for the preceding 8–10 weeks.

Collaboration is rare, requiring out-of-the-box thinking, initiative and risk taking. Collaboration seldom takes root when it runs counter to the existing reward system (Cooke, 2003; Dyer et al., 2004). Otherwise, counterproductive and opportunistic behaviour will emerge (Scarbrough, 2003; Senge and Sterman, 1992). Further, the frequently observed counterproductive and unethical behaviour emphasises the power of reward systems to mould behaviour. Reward systems influence behaviour more than communication or training.

Again, the fact that SC Puzzle game is often used in the middle of a SC course or seminar that has already placed great emphasis on the value of collaboration merits
Behavioural issues in supply chain collaboration

4.3 Interorganisational negotiation implications

As teams decide how they are going to interact with each other in the SC Puzzle Game, opportunities for distributive and integrative negotiation styles abound. A frequent mistake occurs when asymmetric bargaining power changes integrative negotiators into distributive negotiators only for circumstance to change the balance of power later in the game (Murnighan et al., 1999; Pruitt, 1983). After all, bargaining positions can change dramatically as puzzle pieces are exchanged and the ‘missing’ bag of pieces is discovered. This reality is not always readily apparent at the beginning of the game. Thus, some teams damage future relationships, and competitiveness, in the quest for immediate gains (Heide and Miner, 1992).

What does this mean? As in the SC Puzzle Game, SC managers must adopt negotiation guidelines and styles suitable for a dynamic environment. It is important to avoid early misunderstandings that could hinder future relationships (Jassawalla and Sashittal, 1999, 2000).

4.4 Perceptions of fairness implications

As with teams in the SC Puzzle Game, no company possesses all of the resources needed to win. In today’s global marketplace, companies must rely on others for vital resources (Argote and Ingram, 2000; Lipnak and Stamps, 1993). Interdependency makes the notion of fairness an important SC concept (Malhotra, 2004). Observed behaviour in the SC Puzzle Game shows that people’s perceptions of fair play do influence their behaviour (Hoffman and Spitzer, 1982; Kahneman et al., 1986; Thaler, 1988).

When teams perceive they have been treated unfairly, not only do they avoid future interactions with the ‘abusive’ team but they also use their anger to justify punishing the abuser (Folger, 1993; Sheppard et al., 1992). Some individuals lose sight of the original goal in their efforts to obstruct another team’s progress (Baron and Neuman, 1996; Cropanzano et al., 2003; Güth et al., 2001; Roth, 1995). When asked to explain this behaviour, a typical response is, “I would rather have us lose, than have those cheaters win”. Long-term success means that SC managers must build fairness into systems and relationships.

4.5 Perceptions of ethical behaviour implications

The interactions in the SC Puzzle Game invariably create situations where ethical dilemmas arise. Individuals and teams must decide how to handle these dilemmas. The SC Puzzle Game clearly shows that some individuals are willing to resort to questionable behaviour to accomplish their goals. Those who behave questionably justify their behaviour in a variety of ways (Kahneman et al., 1986). They argue, “The rules never said we could not take your pieces. Business is business. You should have protected your pieces more carefully”. They claim, “We were victimized. All we did by taking the transparency marker was level the playing field”. Or they classify concealing information or puzzle pieces as ‘strategic decision making’.
Ethical breaches lead to a breakdown in collaborative initiatives (Holpp and Phillips, 1995). Such breakdowns, large and small, occur when a team’s self-interest in winning eclipses its ethical and professional standards. Ethical standards, and their enforcement mechanisms, must be clear and consistent.

5 Conclusions and limitations

Like the real SC world, the SC Puzzle Game allows managers to pursue strategic objectives through competition or collaboration. The Game models an environment in which reward systems promote local decision making but shared puzzle pieces create interdependency and a need for cross-team interaction. Basic process characteristics and generalised outcomes can be predicted. However, the process and outcome depend on the individuals playing the game. Individual personalities and behaviours influence specific interactions as well as the overall ‘spirit’ of the game. Because the Game’s pedagogy focuses on how rather than who wins the game, the Administrator can bring to light a number of behavioural issues that hinder or promote effective SC decision making.

As with other simulations, the SC Puzzle Game does not perfectly depict reality; rather, it provides a simplified worldview. For example, time constraints limit trust development and the establishment of long-term relationships (Ring and Van de Ven, 1994). Because of the many dynamics taking place in the game simultaneously, it is difficult to isolate reasons for game outcomes (e.g. it would be inaccurate to say that game breakdowns occur only because of mischievous behaviour of teams). Thus, the game’s outcomes lead to a rich in-class discussion of collaboration dynamics that is remembered by participants and can be referred to throughout the remainder of the semester or seminar. The SC Puzzle Game demonstrates the value of, and challenges to, systems thinking. It shows that behaviour is as important as technology to executing a winning SC strategy.

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References


**Note**

¹Fawcett and McCarter (2006) describe the game previously in a condensed Teaching Brief.