MIT NEWS FEATURE

The Beer Game

A rite of passage for new Sloan MBA students provides lessons in systems thinking.

By Peter Dizikes

October 22, 2013

Thursday, August 29, 1:00 p.m.
It is a miserably muggy afternoon in Cambridge as the incoming class of the MIT Sloan School of Management—roughly 400 students from 41 countries—files into a second-floor ballroom at the Kendall Square Marriott. They are here to play the Beer Game, a Sloan orientation tradition. Unfortunately given the weather, the Beer Game does not involve drinking cool beverages.

"There is no actual beer in the Beer Game," says John Sterman, the Sloan professor who is overseeing the proceedings for the 25th consecutive year.

Rather, the Beer Game is a table game, developed in the late 1950s by digital computing pioneer and Sloan professor Jay Forrester, SM '45. Played with pen, paper, printed plastic tablecloths, and poker chips, it simulates the supply chain of the beer industry. In so doing, it illuminates aspects of system dynamics, a signature mode of MIT thought: it illustrates the nonlinear complexities of supply chains and the way individuals are circumscribed by the systems in which they act.

All that will be explained in a class-wide debriefing Sterman will conduct after the game. For now, it's game on, and as a writer for *MIT News*, I've been invited by Sterman to play this year. I go to one of the 47 tables where students are randomly seating themselves in teams of eight, introduce myself to my seven teammates (MBA candidates from India, Peru, and the United States), and listen to Sterman explain the rules.

1:30 p.m.
Each Beer Game team is divided into four units of two players each, who play the roles of retailer, wholesaler, distributor, and brewer. The goal is to keep team operating costs as low as possible. We learn that teams will be penalized for having too much inventory (50 cents per case of beer per week) or unfilled back orders ($1 per case per week). Each link in the supply chain keeps track of its own costs, but a team's score is the sum of these tallies. The lower the score, the better.

As we begin the first of 50 rounds (which represent weeks), each retailer unit draws a card indicating consumer demand for cases of beer; at the same time, all the units send slips of paper with orders up the supply chain. In response, cases of beer—represented by poker chips—move in the opposite direction, from brewer to retailer. A small number of chips are already at every station when we start.

2:15 p.m.
After 20 rounds, my team is on a hot streak.

I'm sitting at the retailer station with finance student Adah Jung, who's been submitting orders at a level closely mimicking consumer demand. Our score at the retail station is low, and there are few chips elsewhere on the table, meaning our team's costs are minimal. It's hard to see how things could go wrong: with seven smart teammates and a stable supply chain, why can't we win this thing? I can almost hear Sterman asking us to stand for a round of applause.

2:35 p.m.
Seemingly out of nowhere, our team's distributorship has an inventory of 178 surplus cases of beer, which lasts seven weeks, adding $623 to our costs in a game where the average score after 50 weeks is $2,000 per team. How did that happen? Can't someone tell our two teammates at the brewery just to stop making so much beer?

Well, no. "I can't tell them anything," observes teammate Juan Trujillo. Indeed, to simulate the incomplete information we deal with in real life, players cannot communicate across stations, apart from relaying orders. And somehow, someone on our team ordered way too much beer.

Worse, it can take several weeks for an excessive order to leave the system. I'm still staring at the chip mountain—now spreading to the wholesaler—when the game ends.

Oh, well. At least we retailers kept our own costs low. If only everyone had done that.

3:30 p.m.
Sterman's assistants tape charts to the ballroom walls detailing every team's performance. Today's winning score was $460 (the best possible score is about $200), while the worst-performing team racked up $6,618 in costs.
Sterman initiates a discussion, pointing out how inventories and backlogs spike and plummet erratically. The distributor on today's last-place team went from a backlog of 70 cases to an inventory of 191 in three weeks.

One thing to learn from the Beer Game, then, is why many businesses experience boom-and-bust cycles—oil and gas exploration and housing among them. Complex systems produce nonlinear phenomena.

4:15 p.m.
Sterman pounds home a bigger lesson: our psychological habits and limited perspectives often keep us from properly understanding complex systems. To prove it, he asks distributors, wholesalers, and brewers to estimate their consumer demand; their responses are wildly inaccurate.

All too often, Sterman adds, this means we attribute problems to other people rather than to flawed systems. For instance: "I found that some people were kind of slow to take corrective action," offers one student—who had just played for the winning team, a fact Sterman emphasizes to much hilarity.

It doesn't make sense for us retailers to blame our teammates—who had imperfect information—for our disappointing scores. "It just cannot be true that, by chance, all the smart people ended up as retailers and all of the people running the factories were dumb," Sterman says. The Beer Game's structure makes it hard for certain players to perform well. It's not the people; it's the system.

Thus, firing people tends to be a futile management action. "Your role as a leader is to create a system in which everybody can thrive," he says.

A cake is wheeled out, marking Sterman's 25 years running the Beer Game. After a rousing ovation, students file out, making jokes about locating some actual beer—assuming real-world beer supply chains are running better than our feeble attempts to mimic them.

Tuesday, September 3, 11:45 a.m.
In Sterman's MIT office, I get a private debriefing. I admit that as my team sank, I realized that we retailers would have to temporarily increase our orders, add inventory, and suffer a worse score before the team could lower its overall costs. Otherwise the chips would just sit with the distributor and wholesaler. But part of me resisted that: the retailers didn't cause the problem, so why should we clean it up?

“It can be frustrating to see this tsunami of chips coming,” Sterman agrees. But my reaction was “a frame brought into the room from prior experience that’s completely wrong,” he adds. “There was no individual incentive. In the Beer Game, it’s explicitly a team incentive.” A good manager can use system dynamics to think about psychology and organizational structures in a way that makes teams work better for everyone.

“In my view, the real purpose and real value of a Sloan education is to develop [students’] capabilities as systems thinkers and the leadership abilities to use those capabilities to build the world we truly want. Not for the short run. Not to boost the bottom line, or to pump up the stock price. But to create the world we truly want, for the long run.”

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MIT Technology Review