A Revised Edition of the Beer Game *

Hironori Kurono, Kyushu International University, Toshiro Shimada, Meiji Univ., Saburo Kameyama, Chuo Univ., Tomofumi Sumita, The Univ. of Electronic-Communication, Shoji Hidaka, NTT Data Co., Shin Ichikawa, The Univ. of Transportation Economics

[ABSTRACT]

This paper shows a revised edition of the Beer Game: a revised board, steps and record sheets. This edition is based on the original Beer Game, which has been distributed by the System Dynamics Society, and a revised one of Innovation Associates Ltd. The goal of this edition is that participants of the game can experience more realistic features of the Beer Game within one hour.

Basic Problems of the Beer Game

We are familiar with the board of the original Beer Game that shows information flow on the upper side and logistics on the lower side (Figure 1a). While all the arrows are painted black, the board is designed with four colors for four positions: black for a retailer, blue for a wholesaler, green for a distributor, and red for a factory. However, Innovation Associates Ltd. designed the board by coloring these arrows differently: the color of the arrows at each position is the same as the color for each position (Figure 1b). Violet is used in the place of blue of the original game.

Coloring the board greatly helps a player easily understand the role of his position and easily play the game. One problem is that the roles of the positions on these boards do not completely correspond to those in reality. For example, while a real retailer checks and receives incoming products, he does not transport them. He places orders, but dose not bring them to a real wholesaler. These activities are usually executed by a real wholesaler.

The steps of the original Beer Game are the followings (Sterman):

1. Receive inventory and advance the shipping.
   Factory advance the production delay.
2. Look at incoming orders and fill orders.
   All incoming orders plus orders in backlog must be filled.
   If your inventory is insufficient to fill incoming orders plus backlog, fill as many orders as you can and add the remaining orders to your backlog.
3. Record your inventory or backlog.
4. Advance the order slips.
   Factories introduce production requests from last week into the production delay.
5. Place and record your orders.

There are only five steps, which makes it easy for the leader to give instructions to participants. Nonetheless, each participant is often confused with what to do when a leader calls out each step because each step basically treats all the roles of the four positions at a time. As a result, this causes a participant to make mistakes: moving an incorrect part or recording an incorrect value, sometimes forgetting to do a step. So a leader needs assistants who can quickly correct mistakes of a participant and instruct him on what to do from the opposite side of the board.

The original game uses only one record sheet with three columns: Inventory, Backlog and Order. The record sheet of Innovation Associates Ltd. is very similar to the original, except for an equation pasted at each row of the record sheet so that a participant can compute inventory or backlog correctly according to this equation. This equation, however, is complicated for a student who has not experienced computing backlogs in business.

In both record sheets, it takes time for everyone to compute when a backlog happens in the game. What makes things more confused is that a backlog is positive when recorded on the record sheet, and negative when it is mapped on a graph sheet at the debriefing stage. This is due to two equations used in these record sheets. If a positive value is treated as inventory and a negative value is treated as backlog, only one equation is enough. Thus, if a player can compute inventory or backlog just by following the operator in each cell on the record sheet, speed and accuracy of the game will be much improved.

Integrating the board, the steps and the record sheets

To overcome these basic problems, a revised board, steps and record sheets need to be redesigned.

In this revised board (Figure 2a), all the names of the upper boxes include "DELAY" because they are actually delays: order delays and the production request delay. Second, the number and short words of each step are shown close to an appropriate box for the step so that a player can notice and execute the step at once. Italic steps indicate that they are executed on a record sheet. Third, coloring clearly separates all the positions into four color areas including arrows. For example, the ÒshippingÓ box at the left of the bottom is divided into two parts by coloring black and blue because a wholesaler (Blue) advances goods into this box, while a retailer (Black) counts incomoing products in this box and recieves them into his inventory box.

There are new twelve steps for each position (Figure 2b). A game leader calls out each step so participants know the main and specific roles of the four positions. As it is convenient for a player to have a specific record sheet of each position, four kinds of revised record sheets are prepared (Figure 2c).

In the table of this record sheet, two columns are added to the original version: ÒRecording incomoing productsÓ and ÒRecording the order.Ó Also, two columns of the original record sheet, ÒInventoryÓ and ÒBacklogÓ are unified into one column: ÒCompute Inventory or BacklogÓ while the other one is ÒDecide & Record the order.Ó As a result, there are four columns in the table and these columns on the record sheet are in the order of the equation. The equation, which is explained using an example at the top of the record sheet (how to compute inventory or backlog), helps a player to become immediately familiar with computing inventory or backlog easily by following an operator inside a cell. At the end of the game, when a backlog is negative, the absolute value of each negative value of a backlog is added up for total costs. The other two columns, Date and Name, are added at the top of this record sheet. The Name column is also necessary on the graph sheet in order to utilize the graph at the debriefing stage.

In this way, the board, the steps and the record sheets are integrated in this revised edition of the Beer Game by redesigning the equation and roles for each participant.

* We had valuable suggestions from Shogo Sakakura, Takayuki Toyama and Koichi Yamauchi, who joined playing the Beer Game at the office of the Japanese Chapter of the System Dynamics Society on Dec. 21, 1996.

References

John Sterman 1984 "Instructions for Running the Beer Distribution" D-3679 System Dynamics Group, Sloan School of Management, Massachusetts Institute of Technology

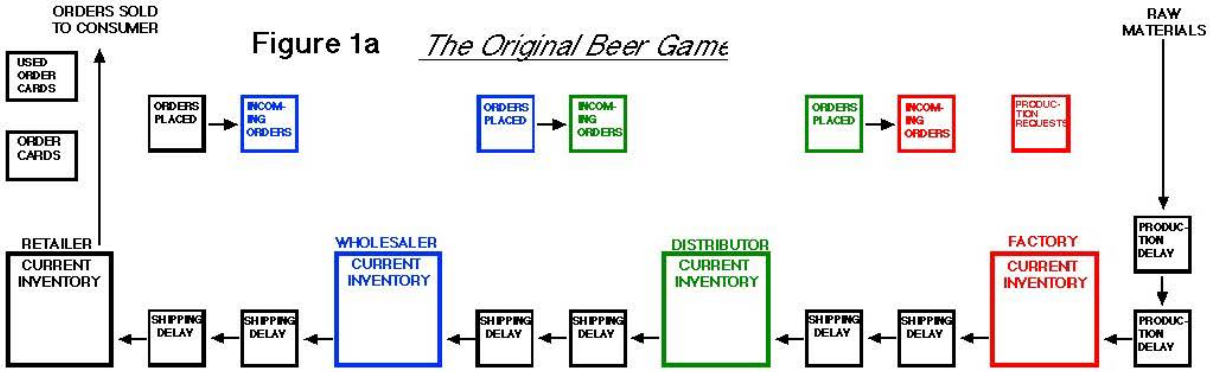

Figure 1a *The Original Beer Game*

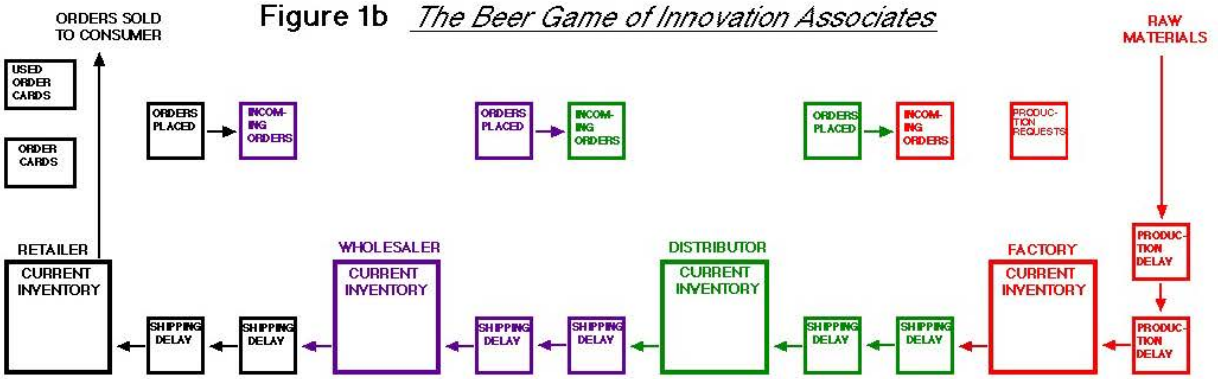

Figure 1b *The Beer Game of Innovation Associates*

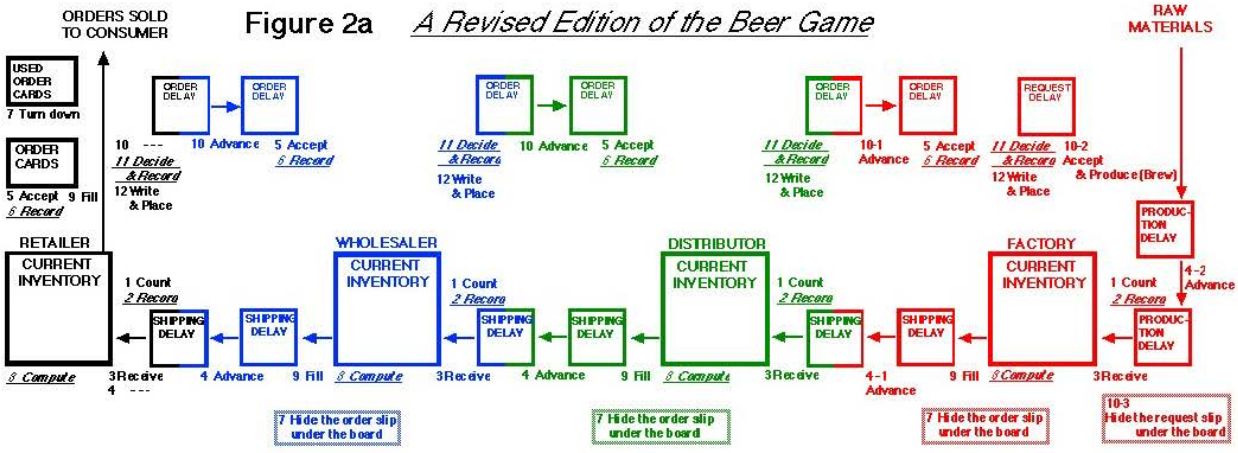

Figure 2a *A Revised Edition of the Beer Game*

Figure 2b TWELVE STEPS OF THE GAME

STEPS OF THE GAME: STEP 1 THROUGH STEP 12 FOR EACH POSITION
Underlined Italic Steps are executed on the record sheet.

Retailer	Wholesaler & Distributor	Factory
1 Count incoming products	1 Count incoming products	1 Count incoming products
2 Record incoming products	***2 Record incoming products***	***2 Record incoming products***
3 Receive incoming products	3 Receive incoming products	3 Receive incoming products
4 ---	4 Advance the shipping delay	4-1 Advance the shipping delay 4-2 Advance the production delay
5 Accept the order card	5 Accept the order slip	5 Accept the order slip
6 Record the order	***6 Record the order***	***6 Record the order***
7 Turn down the order card	7 Hide the order slip under the board	7 Hide the order slip under the board
8 Compute inventory or backlog	***8 Compute inventory or backlog***	***8 Compute inventory or backlog***
9 Fill the order as many as you can	9 Fill the order as many as you can	9 Fill the order as many as you can
10 ---	10 Advance the order delay	10-1 Advance the order delay 10-2 Accept the req. & Produce(Brew) 10-3 Hide the request slip under the board
11 Decide & Record the order	***11 Decide & Record the order***	***11 Decide & Record the request***
12 Write & Place the order slip	12 Write & Place the order slip	12 Write & Place the request slip

Figure 2c Beer Game Record Sheet

Date :

Name: **Position:** Retailer **Team:**

Example: How to compute STEP 8

Week	1 Count incoming products ***2 Record incoming prod.*** 3 Receive incoming products 4 ---	5 Accept the order card ***6 Record the order*** 7 Turn down the order card	***8 Compute inventory or backlog*** 9 Fill the order as many as you can 10 ---
0	-	-	12
1	plus 4	minus 10	equals 6
2	plus 10	minus 20	equals -4
3	plus 8	minus 1	equals 3

STEPS OF THE GAME: STEP 1 THROUGH STEP 12

Underlined Italic Steps are executed on this record sheet.

<The equation for STEP 8 to compute current inventory or backlog>

[STEP 8, Last Week]+[STEP 2: the arrival]-[STEP 6: the order]=[STEP 8: inventory or backlog]

1: 12+4-10=6 : Positive value indicates "Inventory."

2: 6+10-20= -4 : Negative value indicates "Backlog." This week, you ship 16(=6+10).

3: -4+8-1=3 : Positive value indicates "Inventory."

Week	1 Count incoming products ***2 Record incoming prod.*** 3 Receive incoming products 4 ---	5 Accept the order card ***6 Record the order*** 7 Turn down the order card	***8 Compute inventory or backlog*** 9 Fill the order as many as you can 10 ---	***11 Decide & Record the order*** 12 Write & Place the order slip
0	-	-	12	-
1	plus	minus	equals	
2	plus	minus	equals	
3	plus	minus	equals	
4	plus	minus	equals	
5	plus	minus	equals	
6	plus	minus	equals	
7	plus	minus	equals	
8	plus	minus	equals	
9	plus	minus	equals	
10	plus	minus	equals	
11	plus	minus	equals	
12	plus	minus	equals	
13	plus	minus	equals	
14	plus	minus	equals	
15	plus	minus	equals	
16	plus	minus	equals	
17	plus	minus	equals	
18	plus	minus	equals	
19	plus	minus	equals	
20	plus	minus	equals	
21	plus	minus	equals	
22	plus	minus	equals	
23	plus	minus	equals	
24	plus	minus	equals	
25	plus	minus	equals	

Week	1 Count incoming products ***2 Record incoming prod.*** 3 Receive incoming products 4 ---	5 Accept the order card ***6 Record the order*** 7 Turn down the order card	***8 Compute inventory or backlog*** 9 Fill the order as many as you can 10 ---	***11 Decide & Record the order*** 12 Write & Place the order slip
26	plus	minus	equals	
27	plus	minus	equals	
28	plus	minus	equals	
29	plus	minus	equals	
30	plus	minus	equals	
31	plus	minus	equals	
32	plus	minus	equals	
33	plus	minus	equals	
34	plus	minus	equals	
35	plus	minus	equals	
36	plus	minus	equals	
37	plus	minus	equals	
38	plus	minus	equals	
39	plus	minus	equals	
40	plus	minus	equals	
41	plus	minus	equals	
42	plus	minus	equals	
43	plus	minus	equals	
44	plus	minus	equals	
45	plus	minus	equals	
46	plus	minus	equals	
47	plus	minus	equals	
48	plus	minus	equals	
49	plus	minus	equals	
50	plus	minus	equals	

Compute Total Costs of your position and your team.

Current Inventory	Total Number of Each	Total Costs of Each	**Total Costs**
Inventory	**Σ Positive value =**	*** $0.50** (Carrying costs of inventory/case/week) = $	$
Backlog	**Σ | Negative value | =**	*** $1.00** (Out-of-stock costs/case/week) = $	

Retailer	$
Wholesaler	$
Distributor	$
Factory	$
Team Total Costs	$

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