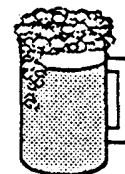


TO 313: Beer Game Preparation

- To prepare for the game, please read this document before class, which includes:
 - Introduction and instructions for the game
 - Graphs illustrating Retailer, Wholesaler, Distributor, and Factory
 - Beer Game Data Form
 - Beer Game Rules and Reminders for your assigned position.

Make sure that you familiarize yourself with the graph for your position, rules for your positions, and the Data Form.



The Beer Distribution Game

Purpose To introduce participants to the supply chain concept and to the effects that decisions along the chain have on inventory levels and costs.

Introduction In this game the retailer sells cases of beer to a consumer and orders cases of beer from the wholesaler; the wholesaler sells cases of beer to the retailer and orders cases of beer from the distributor; and the distributor sells cases of beer to the wholesaler and orders beer from the factory (brewery). The factory brews the beer. For each day of play, every participant follows the same cycle in this order and concurrently:

- Receive shipments and advance all goods in transit (or beer in brewery),
- Advance all order slips in transit,
- Ship cases of beer according to the new order (and backorders), subject to inventory availability,
- Count inventory/backorders of cases of beer and place orders for (or brew) more beer.

There are only two costs involved in this simplified version of a supply chain: inventory holding costs (\$0.50/case/day) and backorder costs (\$1.00/case/day). Each team has the goal of minimizing the sum of those costs by balancing the cost of having inventory (inventory holding cost) with the cost of being out of inventory when a customer orders beer (backorder cost).

At the end of the game, the total game cost for the distribution system is the sum of the four individual participants' total costs (retailer cost + wholesaler cost + distributor cost + factory cost). The goal is to minimize team costs.

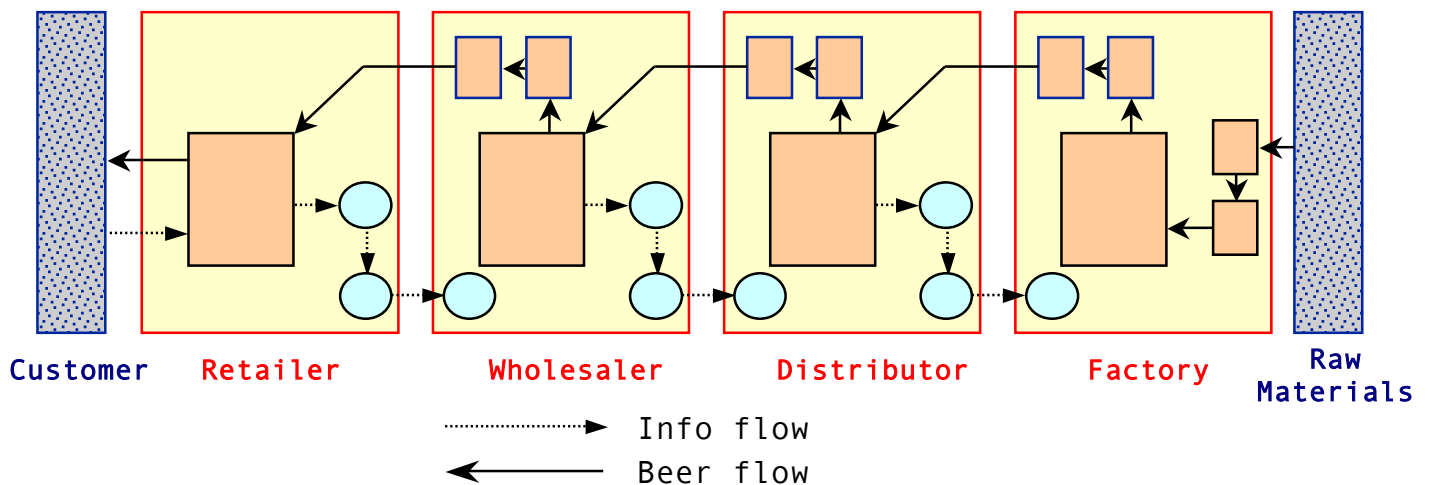
This exercise was developed at the Massachusetts Institute of Technology's Sloan School of Management by its System Dynamics Group and contributed by John D. Sterman, Professor of Management Science and Director, MIT System Dynamics Group.

Instructions for the Beer Game

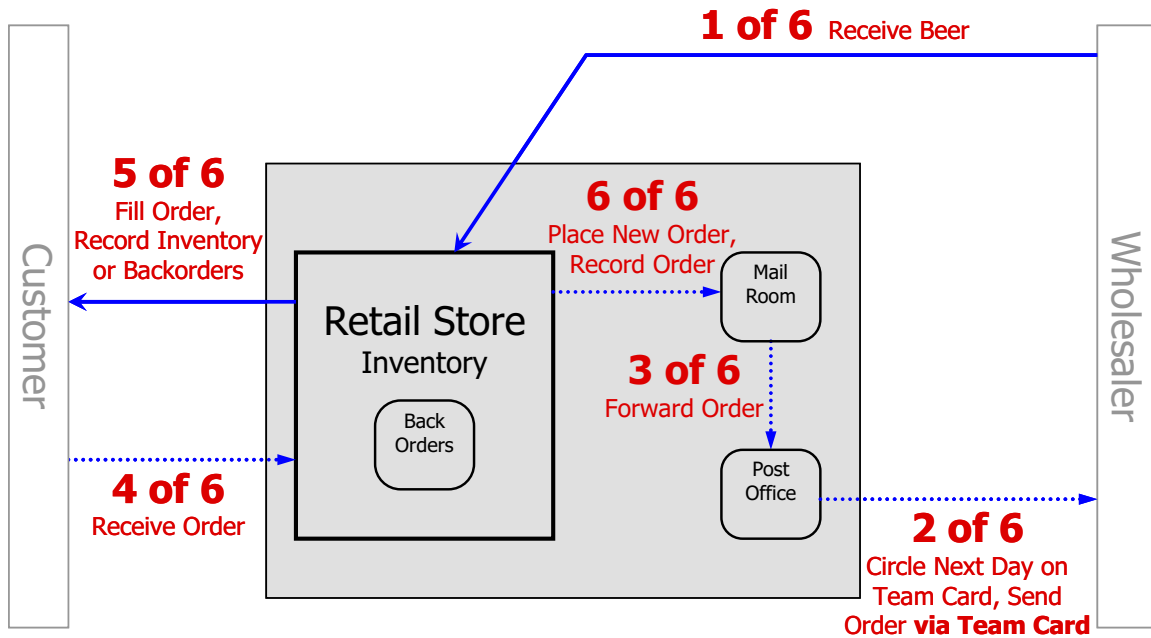
Make sure you have read the Beer Game description on the previous page. A team should have 7-8 persons; 1-2 for each role. Everybody has an assigned role (Retailer, Wholesaler, Distributor, or Factory). Instructors can choose team sizes different from 8 depending on availability of participants and / or reassign a participant.

A Team Card is used to synchronize the activities along the supply chain. A day of the beer supply chain goes through the following steps:

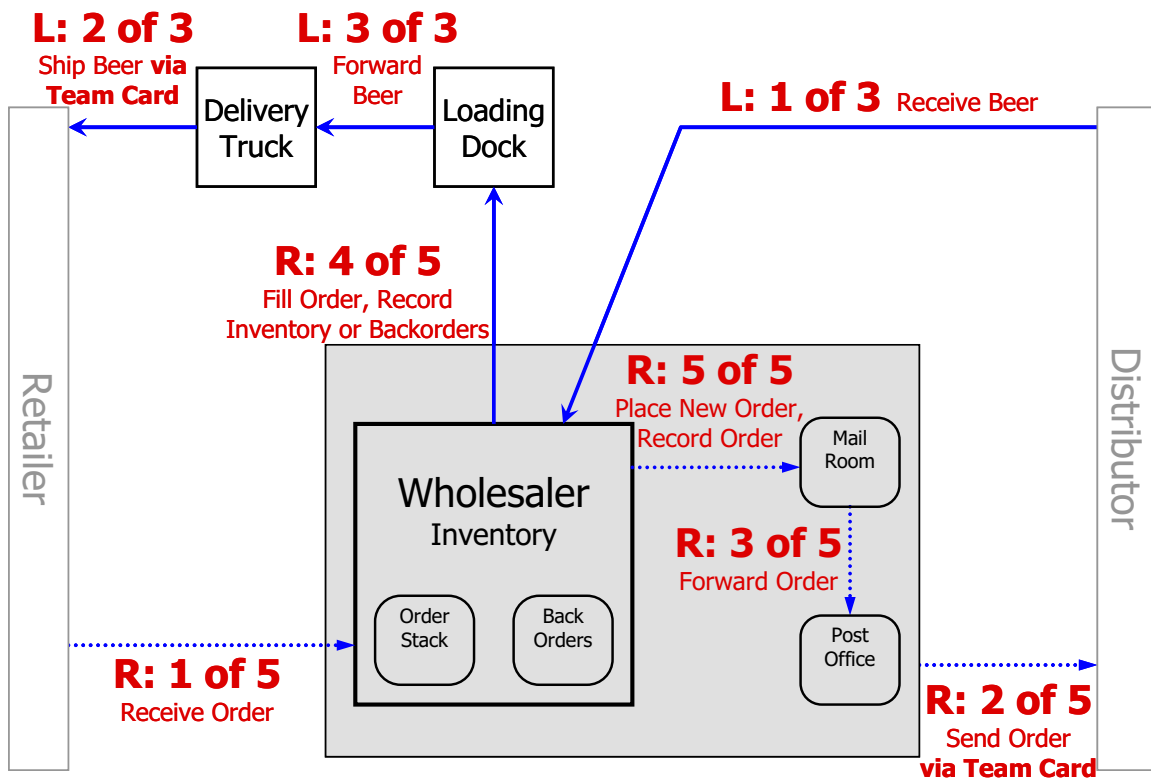
- (1) Advance all goods in transit to the LEFT: The Team Card is used to move beer-chips starting from the factory (Factory's delivery truck to Distributor; Distributor's delivery truck to Wholesaler; Wholesaler's delivery truck to Retailer). Beer-chips in every loading dock are then loaded onto the empty delivery truck. In Factory, move beer-chips from bottling to inventory and from brewing to bottling.
- (2) Advance all orders to the RIGHT: The Team Card is used to move the customer orders starting from the retailer. (Display new customer order, Retailer's post office sends new order to Wholesaler, Wholesaler's post office sends new order to Distributor, Distributor's post office sends new order to Factory). Orders in every mail room are then forwarded to post office.
- (3) Fill the new orders (plus backorders) by moving beer-chips from the on-hand inventory to the loading dock (or to the customer if you are retailer). At this moment, also record inventory (or backlog) on the form provided.
- (4) Place order for (or brew) more beer. (Write your order on post-it. Post in mail room or brew.) At this moment, also record order placed on the form provided.



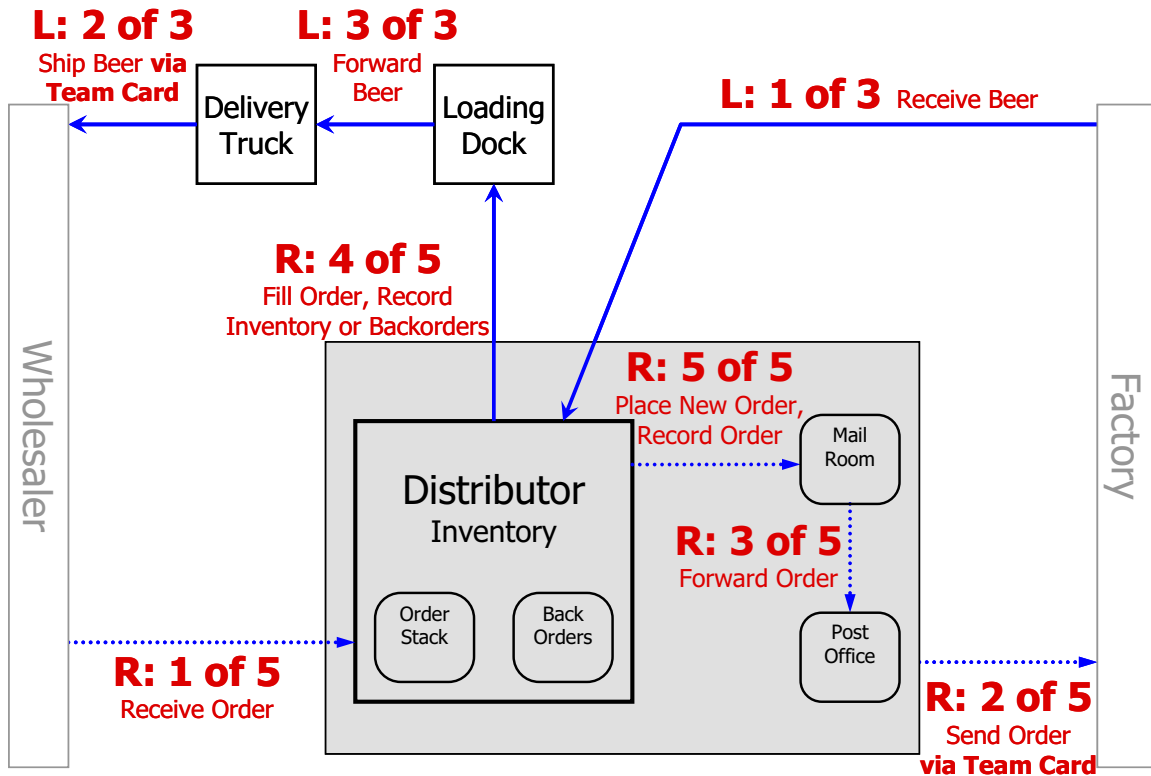
Retailer



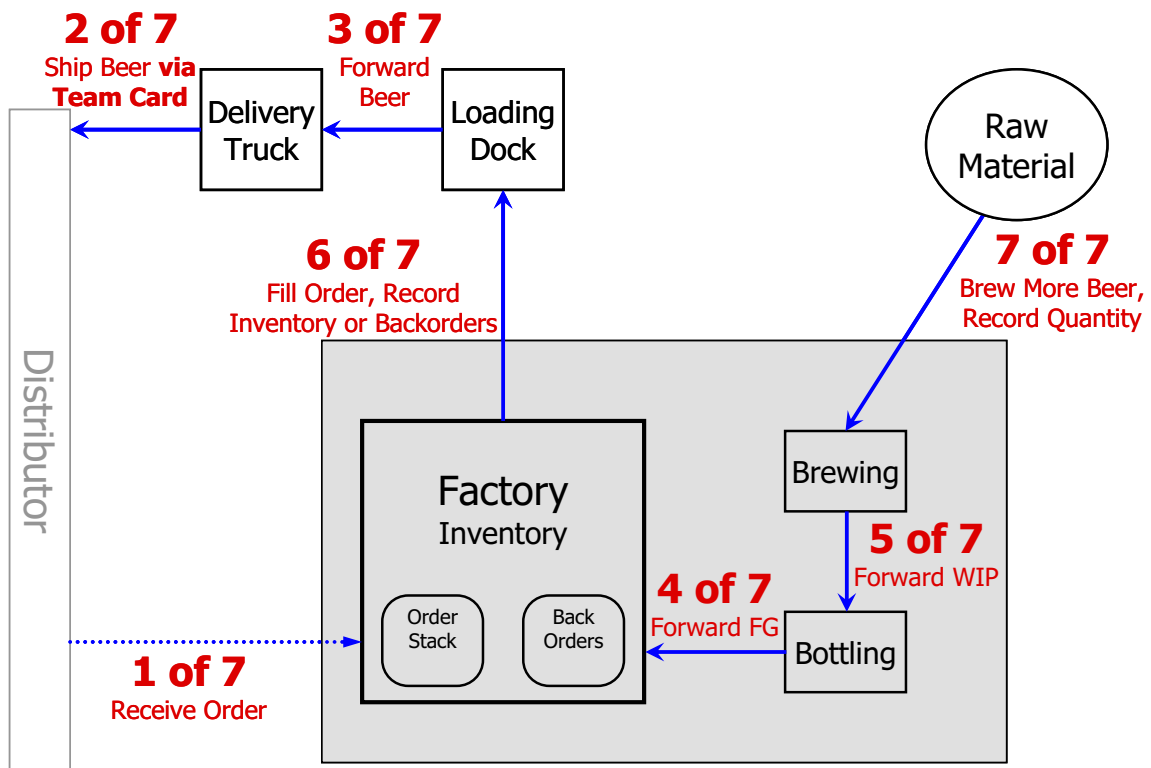
Wholesaler



Distributor



Factory



BEER GAME DATA FORM

Please hand in this sheet at the end of the game

Position (please check one): Retailer _____ Wholesaler _____ Distributor _____ Factory _____

Player Names: _____ **Team Name:** _____

In the table below, **Ending Inventory of each day** is the inventory you have **right after you have fulfilled the orders each day**. If you cannot fulfill all the orders, **backorders should be recorded as Negative Ending Inventory**. For example, if you have 3 backorders, write “-3” as your ending inventory. Inventory holding cost is \$0.5 per unit per day; backorder cost is \$1 per unit per day.

Day	Ending Inventory	Order Placed (By You)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

Day	Ending Inventory	Order Placed (By You)
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		

Beer Game Rules for the Retailer

➔ **WAIT! Do nothing until the Team Card arrives from the Wholesaler.**

When the Team Card arrives, do the following steps in the exact sequence.

1. Place the beer-chips (if any) you received from the Wholesaler into your Inventory Square. **Do not fill backorders** at this moment.
2. **Circle the next day** on the Team Card. Take the Post-it from your **Post Office** and put it on the Team Card. Hand the **Team Card** back to the Wholesaler.
3. Move the Post-it from your Mail Room into your Post Office.
4. Flip over the next card from your “Customer Demand” deck. **Do not look at the future demand.**

If the Team Card arrives again before you finish all 6 steps, you should let the Team Card and any beer-chips on it wait on the table until you finish all 6 steps.

5. **Fill Customer Order** subject to inventory availability and **Record** inventory/backorders:
 - If the entire amount (this order + backorders) is available in inventory, you should move the requested amount of beer-chips from your Inventory Square to the customer, and **record** the number of **remaining beer-chips** in your Inventory Square under **Ending Inventory** in the **data form**. **Cross out the backorders** (if any) in the Backorders Box inside the Inventory Square.
 - If the entire amount (this order + backorders) is not available in inventory, move all your beer-chips from Inventory Square to the customer, and **record** the new backorders **(i)** on the Post-it in the **Backorders Box**, and **(ii)** as **negative Ending Inventory** in the **data form**.
6. Determine a quantity you wish to order from the Wholesaler. **Record** this order quantity **(even if it is zero)** **(i)** on a new Post-it and place it in your **Mail Room**, and **(ii)** under Order Placed in your **data form**.

Reminders

- You never send your order directly to your supplier. Always put it in your Mail Room first, move to the Post Office the next day, and it gets to your supplier the next day.
- When moving beer-chips into your inventory, and if there are backorders, do not try to satisfy backorders immediately. You should satisfy them only in the Fill Customer Order step (Step 5).
- If you decide not to order any beer in a day, you should still send a Post-it with zero on it to the Mail Room.
- Keep your form filled out every day. This should be done immediately after processing a new customer order (either satisfied fully or partially or none).
- If unsure, raise your hand and ask your question.
- If you need bigger units (red chips for 10 units) raise your hand and request the exchange.
- At the end of the game make sure that your name and the name of your team is on the data form and that you return the data form to the instructor.

Beer Game Rules for the Wholesaler

➔ **WAIT! Do nothing until the Team Card arrives from the Retailer, on its way RIGHT**
When the Team Card arrives, do the following steps in the exact sequence.

- R1.** Receive the **Team Card** with the Order Post-it from the Retailer. Place the Order Post-it on top of the **Order Stack**.
- R2.** Take the Post-it from your **Post Office** and put it on the Team Card. Hand the **Team Card** to the Distributor.
- R3.** Move the Post-it from your Mail Room into your Post Office.

If the Team Card arrives from the Distributor before you finish step R5, you should let the Team Card and any beer-chips on it wait on the table until you finish step R5.

- R4. Fill Order** subject to inventory availability and **Record** inventory/backorders:
 - If the entire amount (this order + backorders) is available in inventory, you should move the requested amount of beer-chips from your Inventory Square into your **Loading Dock**, and **record** the number of **remaining beer-chips** in your Inventory Square under **Ending Inventory** in the **data form**. **Cross out the backorders** (if any) in the Backorders Box inside the Inventory Square.
 - If the entire amount (this order + backorders) is not available in inventory, move all your beer-chips from inventory into Loading Dock, and **record** the new backorders **(i)** on the Post-it in the **Backorders Box**, and **(ii)** as **negative Ending Inventory** in the **data form**.
- R5.** Determine a quantity you wish to order from the Distributor. **Record** this order quantity **(even if it is zero) (i)** on a new Post-it and place it in your **Mail Room**, and **(ii)** under Order Placed in your **data form**.

WAIT! Do nothing until the Team Card arrives from the Distributor, on its way LEFT

- L1.** Place the beer-chips (if any) you received from the Distributor into your Inventory Square. **Do not fill backorders** at this moment.
- L2.** Take all the beer-chips in your **Delivery Truck**, put them on the **Team Card**. Hand the **Team Card** to the Retailer.
- L3.** Move all your beer-chips in your **Loading Dock** into your **Delivery Truck**.

Reminders

- You never satisfy your customer immediately. Always put beer-chips into your loading dock first, move to your truck the next day, and ship to your customer the next day.
- You never send your order directly to your supplier. Always put it in your Mail Room first, move to the Post Office the next day, and send to your supplier the next day.
- When moving beer-chips into your inventory, and if there are backorders, do not try to satisfy backorders immediately. You should satisfy them only in the Fill Order step (Step R4).
- If you decide not to order any beer in a day, you should still send a Post-it with zero on it to the Mail Room.
- Keep your form filled out every day. This should be done immediately after processing a new order (either satisfied fully or partially or none).
- If you need bigger units (red chips for 10 units) raise your hand and request the exchange.
- At the end of the game make sure that your name and the name of your team is on the data form and that you return the data form to the instructor.

Beer Game Rules for the Distributor

➔ **WAIT! Do nothing until the Team Card arrives from the Wholesaler, on its way RIGHT**
When the Team Card arrives, do the following steps in the exact sequence.

- R1.** Receive the **Team Card** with the Order Post-it from the Wholesaler. Place the Order Post-it on top of the **Order Stack**.
- R2.** Take the Post-it from your **Post Office** and put it on the Team Card. Hand the **Team Card** to the Factory.
- R3.** Move the Post-it from your Mail Room into your Post Office.

If the Team Card arrives from the Factory before you finish step R5, you should let the Team Card and any beer-chips on it wait on the table until you finish step R5.

- R4. Fill Order** subject to inventory availability and **Record** inventory/backorders:
 - If the entire amount (this order + backorders) is available in inventory, you should move the requested amount of beer-chips from your Inventory Square into your **Loading Dock**, and **record** the number of **remaining beer-chips** in your Inventory Square under **Ending Inventory** in the **data form**. **Cross out the backorders** (if any) in the Backorders Box inside the Inventory Square.
 - If the entire amount (this order + backorders) is not available in inventory, move all your beer-chips from inventory into Loading Dock, and **record** the new backorders **(i)** on the Post-it in the **Backorders Box**, and **(ii)** as **negative Ending Inventory** in the **data form**.
- R5.** Determine a quantity you wish to order from the Factory. **Record** this order quantity **(even if it is zero) (i)** on a new Post-it and place it in your **Mail Room**, and **(ii)** under Order Placed in your **data form**.

The Team Card should now arrive from the Factory on its way LEFT. If not, wait until it arrives.

- L1.** Place the beer-chips (if any) you received from the Distributor into your Inventory Square. **Do not fill backorders** at this moment.
- L2.** Take all the beer-chips in your **Delivery Truck**, put them on the **Team Card**. Hand the **Team Card** to the Wholesaler.
- L3.** Move all your beer-chips in your **Loading Dock** into your **Delivery Truck**.

Reminders

- You never satisfy your customer immediately. Always put beer-chips into your loading dock first, move to your truck the next day, and ship to your customer the next day.
- You never send your order directly to your supplier. Always put it in your Mail Room first, move to the Post Office the next day, and send to your supplier the next day.
- When moving beer-chips into your inventory, and if there are backorders, do not try to satisfy backorders immediately. You should satisfy them only in the Fill Order step (Step R4).
- If you decide not to order any beer in a day, you should still send a Post-it with zero on it to the Mail Room.
- Keep your form filled out every day. This should be done immediately after processing a new order (either satisfied fully or partially or none).
- If you need bigger units (red chips for 10 units) raise your hand and request the exchange.
- At the end of the game make sure that your name and the name of your team is on the data form and that you return the data form to the instructor.

Beer Game Rules for the Factory

➔ **WAIT! Do nothing until the Team Card arrives from the Distributor.**

When the Team Card arrives, do the following steps in the exact sequence.

1. Receive the **Team Card** with the Order Post-it from the Distributor. Place the Order Post-it on top of the **Order Stack**.
2. Take all the beer-chips in your **Delivery Truck**, put them on the Team Card. Hand the **Team Card** back to the Distributor.
3. Move all your beer-chips in your **Loading Dock** into your **Delivery Truck**.
4. Move all your beer-chips in your **Bottling** square into your **Inventory** Square.
5. Move all your beer-chips in your **Brewing** square into your **Bottling** square.

If the Team Card arrives again before you finish all 7 steps, you should let the Team Card wait on the table until you finish all 7 steps.

6. **Fill Order** subject to inventory availability and **Record** inventory/backorders:
 - If the entire amount (this order + backorders) is available in inventory, you should move the requested amount of beer-chips from your Inventory Square into your **Loading Dock**, and **record** the number of **remaining beer-chips** in your Inventory Square under **Ending Inventory** in the **data form**. **Cross out the backorders** (if any) in the Backorders Box inside the Inventory Square.
 - If the entire amount (this order + backorders) is not available in inventory, move all your beer-chips from inventory into Loading Dock, and **record** the new backorders **(i)** on the Post-it in the **Backorders Box**, and **(ii)** as **negative Ending Inventory** in the **data form**.
7. Determine a quantity you wish to brew, place this quantity of beer-chips in the **Brewing** square. **Record** your brewing decision (**even if it is zero**) in the Order Placed column of your **data form**.

Reminders

- You never satisfy your customer immediately. Always put beer-chips into your loading dock first, move to your truck the next day, and ship to your customer the next day.
- You never bring raw materials directly into your finished goods inventory. Always put them in Brewing box first, move to Bottling the next day, and move to your inventory the next day.
- When moving beer-chips into your inventory, and if there are backorders, do not try to satisfy backorders immediately. You should satisfy them only in the Fill Order step (Step 6).
- If you decide not to brew any beer in a day, you should record zero in your data form.
- Keep your form filled out every day. This should be done immediately after processing a new order (either satisfied fully or partially or none).
- If you need bigger units (red chips for 10 units) raise your hand and request the exchange.
- At the end of the game make sure that your name and the name of your team is on the data form and that you return the data form to the instructor.