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The Root Beer Game

The Root Beer Game

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Root Beer Game Table of Contents

Introduction to the Beer Game

The purpose of the Beer Game is to experience systemic effects and to introduce the need for supply chain and network management. Specifically it shows:

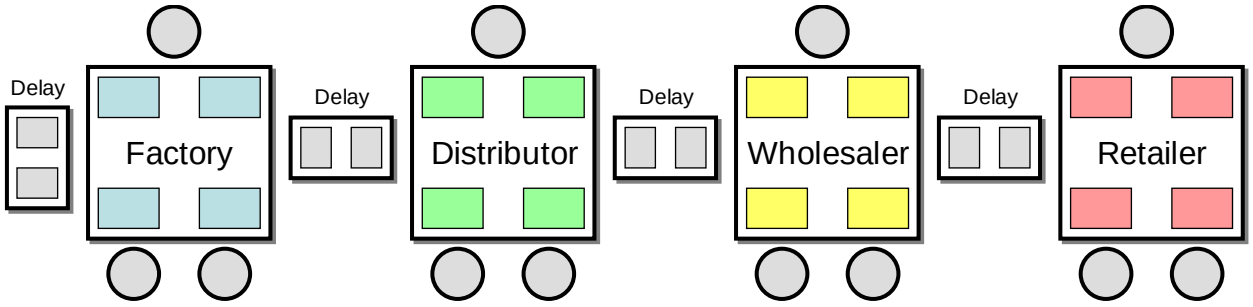
- How single parts in a system influence each other.
- How individual thinking differs from systemic thinking (network thinking).
- Potentials for systems optimization and the use of information systems.
- Supply and Demand
- The Business Cycle

The Beer Game setup

The Beer Game supply chain consists of four stages:

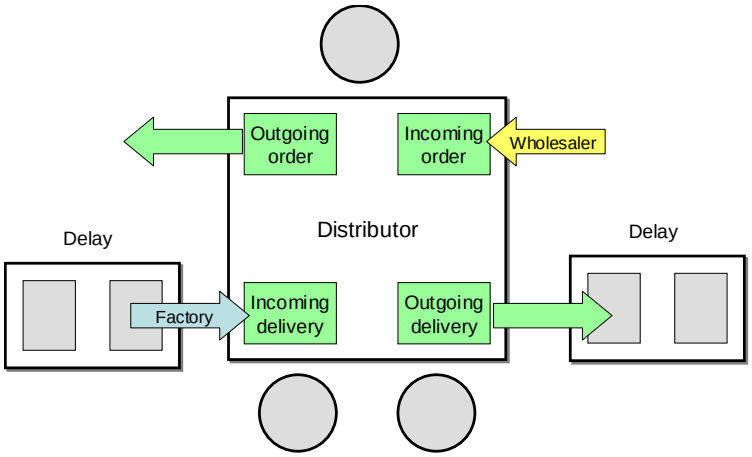
- The retailer (pink) has to fulfil the end consumer's orders.
- The wholesaler (orange) has to fulfil the retailer's orders.
- The distributor (green) has to fulfil the wholesaler's orders.
- The factory (blue) has to produce the beer to fulfil the distributor's orders.

The Beer Game is played in groups of 3, each of these groups sits around one table and plays one supply chain stage (see figure).



Every table has the same layout that shows four different areas (see figure):

- The place for incoming orders (inbox) – coming from the downstream stage
- The place for outgoing orders (outbox) – going to the upstream stage
- The place for incoming deliveries (receiving) – coming from the upstream stage
- The place for outgoing deliveries (dispatch) – going to the downstream stage



Deliveries are "on the road" for 2 weeks (lead time); production also takes 2 weeks. This lead time delay is represented by 2 two extra fields between the tables that hold the deliveries and are moved forward in each week.

General playing procedure

The game runs in weeks and it starts in week 1. In each week, each supply chain group has to proceed with the following steps:

1. Receive new deliveries and update the play sheet ("incoming" and "available").
2. Receive orders in the inbox and update the play sheet ("new order" and "to ship")
3. Calculate the total amount that will be shipped ("your delivery"), note down the amount, and place it in a box in the dispatch area on your table.
4. Agree on a new order amount, note down the number, and put it in an envelope in the outbox field.

The goal

Your goal is to minimize your cost!

(Remember that you compete against the same stage in the other supply chains – retailer against retailer, distributor against distributor etc.)

There are two different kinds of cost:

1. Inventory cost: Items in stock cost $50 per week in holding costs.
2. Backorder cost: If an incoming order cannot be (fully) fulfilled, items are outstanding and have to be put on "backorder" to be fulfilled in the following week(s). Each item on backorder costs $100 per week.

What is a backorder?

If an incoming order cannot be fully fulfilled due to a lack of available items in the inventory, items go on backorder. In this case your inventory is empty and a number of items have to appear as backorder in your play sheet.

What happens in the next week?

In the following week, you will add the old backorder to the new incoming order to calculate the amount "to ship". Again, if the available inventory is too little to fulfil the amount "to ship", items have to be put on backorder and will cost $ 1 per item.

Some general rules

- No communication is allowed between supply chain groups, supply chain groups must not talk to each other at any time!
    - Especially the customer demand is only known to the retailer.
- If stock is available, an order has to be fulfilled.
- Every order has to be fulfilled, either in the current week (if enough stock is available) or in one of the next weeks (items go on backorder).
- Either the inventory or the backorder, one of them is always zero (0)!

Each week's steps in detail

1. Incoming delivery (new delivery)

Add incoming delivery to controlling sheet and update "available". Add incoming delivery to old inventory to get the available number of items in stock.

Available = Inventory (last week) + Incoming

2. Incoming order (new order)

Open envelop and enter the order amount to your controlling sheet and then calculate the amount that has to be shipped. Take into account any backorders.

To ship = backorder (last week) + New Order

3. Prepare delivery

Figure out the amount that will be delivered to the next stage and write the number on a delivery slip, fold it, and place it into a shipping container.

If the amount to ship exceeds the available stock, then you have to deliver whatever is available, otherwise you will simply fulfil the order.

If (To ship) > Available then Your Delivery = Available

If (To ship)	<	*Available*	*then*	*Your Delivery*	=	*To ship*

4. Calculate backorder

If the outstanding orders (“to ship”) cannot be fulfilled, then put the remaining items on backorder.

If (To ship)	>	*Available*	*then*	*Backorder*	=	*To ship – Available*
			Else	*Backorder*	=	*0*

5. Calculate inventory

The new inventory is simply the available stock minus the delivery that is made. It is zero in case the outstanding orders (“to ship”) cannot be fully satisfied (in case of backorders).

If (To ship)	>	*Available*	*then*	*Inventory*	=	*0*
			Else	*Inventory*	=	*Available – To ship*

6. Place new order

Discuss and place your new order (or production order). Note down your order using an order slip and fill it into your controlling sheet, then place your order in the outbox using an envelope.

The root beer game is a role-play simulation game that lets students experience typical coordination problems of (traditional) supply chains, in which information sharing and collaboration does not exist. In more general terms, this supply chain represents any non-coordinated system in which problems arise due to lack of systemic thinking.

The root beer game is a role-play supply chain simulation that lets students experience typical supply chain problems.

In the root beer game students enact a four stage supply chain. The task is to produce and deliver units of beer: the factory produces and the other three stages deliver the beer units until it reaches the customer at the downstream end of the chain.

The aim of the players is rather simple: each of the four groups has to fulfil incoming orders of beer by placing orders with the next upstream party.

History

The root beer game (or beer distribution game) was originally invented in the 1960s by Jay Forrester at MIT as a result of his work on system dynamics.

While the original goal of the simulation game was to research the effect of systems structures on the behavior of people ("structure creates behavior"), the game can be used to demonstrate the supply and demand as well as the business cycle.

A range of different versions of the root beer game have emerged over the years.

Versions

Several different approaches to playing the root beer game in a class room setting exist.

Traditional board game

The traditional version is a board game in which tokens are physically moved on the board to represent orders and stock.

The upside of this is that people relate well to moving actual objects. The downside is that it can be slow, and at first cumbersome and complex to administer.

Table version

The table version of the root beer game was originally developed by a team at the University of Klagenfurt. It is much leaner and shows a more pragmatic approach to moving orders and stock in the supply chain (using paper slips on which numbers are written by the players).

It still shows administrative overhead such as a bookkeeping person that takes stock of all things happening.

Adapted table version

The root beer game version discussed here is an adaptation of the Klagenfurt design, which eliminated the bookkeeper in order to achieve a more straightforward game.

Software versions

Existing software versions of the root beer game do not support interactive class room situations.

They are either one player simulation demonstrations (without multi-player interaction) or web-based transformations of the game to be used in a dispersed context.

in contemporary supply chains.

How is it played?


Root beer game structure of the table game version

Table setup

The root beer game simulates a four stage supply chain (retailer, wholesaler, distributer and factory). Each stage is played by one or better two or three players.

A supply chain is typically played by 8 to 12 people; more than one supply chain can be administered in one class at the same time.

The task

The task of each supply chain is to produce and deliver units of beer: the factory produces and the other three stages deliver the beer units until it reaches the external customer at the downstream end of the supply chain.

The aim of the players is rather simple: each sub group has to fulfil the incoming orders of beer.

Structural setup

Orders flow upstream, while deliveries flow downstream in the supply chain (see figure 1).

An important structural aspect is delay (i.e. time lag) in order to account for logistics and production time. Each delivery (and production order) requires two rounds until they are finally delivered to the next stage.

In the structural setup this is represented by two shipping delay fields located in between the supply chain stages as well as at the production end.

Playing the game

The game is played in rounds, which simulates weeks.

Using the materials provided on the table (see figure 2), players have to carry out the following steps in each round:

1. receive incoming orders
2. receive incoming deliveries
3. update play sheets (outstanding deliveries and inventory)
4. send out deliveries, and finally
5. decide on the amount to be ordered

Deciding on each round's order amount is effectively the only decision that players are able to make throughout the game.

Essential rules

Every order has to be fulfilled, either directly (should the players' inventory be large enough) or later in subsequent rounds.

Inventory and backlog incur cost – each item in stock costs EUR 0.50 per week, while each item on backlog costs EUR 1.00. Consequently, the primary aim of each subgroup is to keep their costs low.

Hence, the optimal strategy for the players is to run their business with as little stock as possible without being forced to "move into backorder".

Players are not allowed to communicate. The only information they are allowed to exchange is the order amount; there is no transparency as to what stock levels or actual customer demand is; only the retailer knows the external demand.

Customer demand

The external demand is predetermined and usually does not vary greatly.

In the beginning, the supply chain is pre-initialized with inventory levels (e.g. 15 units), orders (e.g. 5 units) and beer units in the shipping delay fields (e.g. 5 units).

In order to induce the bullwhip effect, the external demand remains stable for a few rounds (e.g. 5 units for 5 rounds) before it suddenly shows one steep increase (jumps to 9 units) before it remains stable again at this higher level for the remainder of the game (usually 40 to 50 rounds in total).

The one increase in external demand inevitably leads to the creation of the bullwhip effect and to a destabilization of ordering patterns throughout the supply chain.

Table preparations

Setting up the tables and administering the game:

As illustrated in the figure, four fields have to be marked on each table by fixing to the table 4 sheets of paper using sticky tape. The same is done with the delay fields.

Cardboard boxes (or plastic cups) and envelopes have to be filled with small paper slips to pre-initialize the supply chain with orders and deliveries.

Every table has to be prepared with a stack of order and delivery slips to be used during the game.

Paper slips with the external demand progression have to be prepared that are handed to the retailer groups during the game.

Be aware: When administering more than one supply chain, assistants are needed to help with moving boxes and envelopes during the game.

Briefing the students

Provide a short introduction to the idea of the game, its history, structure, and rules.

When playing in more than one supply chain stress the fact that groups of each stage are competing with one another (e.g. retailer vs. retailer), in order to get the students to take playing seriously.

Trial rounds

Start playing initial trial rounds with the pre-initialized supply chain to make sure that everyone gets used to filling in play sheets and order/delivery slips.

What typically happens during these first few rounds is that people try to get rid of some of the inventory (e.g. 15 units) in order to manage their costs.

Step up the pace

Increase the pace of playing. Due to the initial behavior, when the customer demand jumps to the higher level in round 6 the supply chain has adjusted to a low demand scenario.

When retailers then place their first large order they invariably initiate a bullwhip effect that perpetuates throughout the chain. What happens then is that all groups move deeply into backorder.

Due to delivery delays it takes quite some time for the beer to move through the supply chain, so that the players typically lose track of what they have ordered and order way too much. The consequence is that the supply chain is flooded with beer and the inventories overflow (around weeks 20-35).

The effect is that people cease ordering entirely; e.g. a lot of very small orders are placed. This is especially true for the higher stages of the supply chain.

End the game abruptly

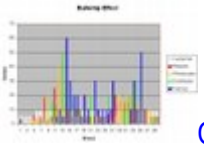
The game is played for 40 to 50 rounds. The game is then stopped abruptly so that the students do not have time to react strategically to the coming end of the game.

The final part of the game session is a short discussion directly after the game, where students are asked how they felt throughout the game and what they think the average customer demand was.

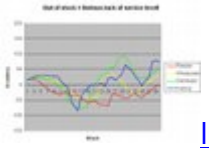
The next session after the root beer game session is the debriefing session.

Typical results

In order to learn from the root beer game, the data created by the players needs to be consolidated and plotted. Here, exemplary data of one root beer game session is presented.



Order fluctuation visualizes the bullwhip effect.



Inventory fluctuation as the result of the bullwhip effect

Additional data

Bullwhip effect

The first figure shows the order distribution over 40 weeks and a typical bullwhip effect. It becomes obvious that the retailers reacted to the customer demand jump with a little time lag of two weeks.

Then the following stages all placed large orders, each of which magnified, thus creating a typical bullwhip effect.

Inventory fluctuation

The second figure shows the inventory fluctuation, with negative inventory representing back order.

Obviously, players move into back order. Having overreacted inventories then fills quickly in weeks 20-30.

Additional data

The third figure shows some additional game data. It shows the decrease in customer demand information upstream visualized by the average order amount by the four stages. More importantly, the increase in order fluctuation upstream is illustrated by the largest amount having been ordered in each stage and the number of small orders that were placed.

All this information is being used in the following debriefing session to discuss the bullwhip effect, its implications and the reasons for its existence.

Learning from the root beer game

Assume that we have administered the root beer game successfully during one class session.

Then, the session after the root beer game session is called the debriefing session. In this session the data collected during the game play is being presented and discussed.

Moreover, the causes of the bullwhip effect - both with regards to the root beer game and the real world - are being explored and discussed.

Having established the fact that a lack of information sharing, the structure of the supply chain and a lack of collaboration are at the heart of SC coordination problems, the following sessions can then delve into the richness of E-Commerce initiatives and technologies (see course outline).

In doing so, all things discussed can be motivated and related back to the root beer game experience.

Debriefing

The debriefing session follows the root beer game session.

The debriefing usually begins with a brief discussion of students' experiences throughout the game. Typically, the following questions are being discussed:

- Did you feel yourself controlled by forces in the system from time to time? Or did you feel in control?
- Did you find yourself "blaming" the groups next to you for your problems?
- Did you feel desperation at any time?

This discussion typically shows that people indeed were blaming their neighboring supply chain partners for not doing their jobs right (either not ordering in a sensible way or not being able to deliver)

Desperation and frustration are common feelings during the last rounds of the game.

Reflecting on the game setup

A second set of questions can be discussed to reflect upon the root beer game and its degree of simulating real world conditions:

- What, if anything, is unrealistic about this game?
- Why are there order delays?
- Why are there production delays? Shipping delays?
- Why have both distributor and wholesalers; why not ship beer directly from the factory to the retailer?
- Must the brewer be concerned with the management of the raw materials suppliers?

Please note: By stressing the fact that real-life supply chains are much more complex (a huge variety of products and supply chain partners exist, as well as complex crisscrossing networks of relationships) students can quickly be convinced that real-life conditions favor the emergence of the bullwhip to a much greater extent and that the root beer game is indeed a good vehicle to simulate the creation of the effect.

Discuss the results

The next step is to present, for all supply chain groups, the data and figures derived from the game play. This typically leads to a very interactive and lively discussion. This is where the concept of 'cumulated supply chain cost' is introduced, e.g. by pointing out that the product at the customer end has to earn all

(cumulated) costs of all supply chain parties; this insight serves as a first step in establishing the idea of global thinking and chain-wide optimization, which essentially requires eCollaboration technologies.
At this point in the session one can then go on with identifying the causes of the bullwhip effect

Bullwhip causes

The bullwhip effect is mainly caused by three underlying problems: 1) a lack of information, 2) the structure of the supply chain and 3) a lack of collaboration.

The three causes can be identified in an interactive session with the students by discussing the root beer game experiences and then be corroborated with insights from practice and the literature.

1) Lack of information

In the root beer game no information except for the order amount is perpetuated up the supply chain. Hence, most information about customer demand is quickly lost upstream in the supply chain.

With these characteristics the root beer game simulates supply chains with low levels of trust, where only little information is being shared between the parties.

Without actual customer demand data, all forecasting has to rely solely on the incoming orders at each supply chain stage. In reality, in such a situation traditional forecasting methods and stock keeping strategies contribute to creating the bullwhip effect.

2) Supply chain structure

The supply chain structure itself contributes to the bullwhip effect. The longer the lead time, i.e. the longer it takes for an order to travel upstream and the subsequent delivery to travel downstream, the more aggravated the bullwhip effect is likely to be.

With traditional ordering, the point in time where an order is typically placed (the order point) is usually calculated by multiplying the forecasted demand with the lead time plus the safety stock amount, so that an order is placed so far in advance as to ensure service level during the time until the delivery is expected to arrive.

Hence, the longer the lead time is, the more pronounced an order will be as an reaction to an increase in forecasted demand (especially in conjunction with updating the safety stock levels, see above), which again contributes to the bullwhip effect.

3) Local optimization

Local optimization, in terms of local forecasting and individual cost optimization, and a lack of cooperation are at the heart of the bullwhip problem.

A good example for local optimization is the batch order phenomenon. In practice, ordering entails fix cost, e.g. ordering in full truck loads is cheaper than ordering smaller amounts. Furthermore, many suppliers offer volume discounts when ordering larger amounts.

Hence, there is a certain incentive for individual players to hold back orders and only place aggregate orders. This behavior however aggravates the problem of demand forecasting, because very little information about actual demand is transported in such batch orders.

And batch ordering, of course, contributes directly to the bullwhip effect by unnecessarily inflating the orders.

Root Beer Game Outline/Course Overview

Sessions (3 hours each)

1. Root beer game session

1. Introduction to supply chains (why have supply chains?)
2. Root beer game introduction (setup, structure, rules of the game)
3. Playing the game (40-50 rounds)
4. Brief discussion afterwards

2. Debriefing

1. Discussion of experiences and game setup
2. Presentation and discussion of root beer game data (results)
3. Teaching case Barilla: bullwhip causes [optional]
4. Identification of the three main causes of the bullwhip effect
5. Short presentation of three areas of improvement and the schedule for the next three sessions

3. Information sharing

1. Short discussion: why is information sharing important?

4. Supply chain reform

1. Overview: efficient replenishment initiatives
2. Efficient inventory management: Quick Response, Continuous Replenishment, Vendor Managed Inventory (VMI)
3. Efficient Logistics: Warehousing, Direct Delivery, Cross-Docking
4. Just-in-Time Delivery in the automotive industry [Kanban]

6. Management of inter-firm collaboration

1. Complexities of supply chain reform initiatives
2. The role of trust and social capital in inter-firm relationships

Materials

PowerPoint slides

In this PowerPoint file you find a brief animated introduction to how the root beer game table version is played in class.

Short introduction

In this word file I have described how the root beer game is played. This document can be handed out to the students for briefing. Please note that it contains a lengthy description of how to update the play sheet. This is only needed when playing without laptop computers and the excel spread sheet.

Table layout

In this zip file you will find documents that contain the paper sheets that have to be attached to prepare the tables. I used to print the sheets for the four tables in different colors (see ppt file) and the delay and factory fields on white paper. For the table setup refer to the PowerPoint file.

Paper play sheets

In this zip file you will find four documents that need to be printed to become the play sheets for the four groups in a supply chain when NOT using the excel/laptop version.

Excel play sheets

This Excel file contains the four different play sheets for the players in the supply chain. Hand out the file (using an usb stick) to the root beer game groups and ask them to fill in the respective table for their group (e.g. retailer etc.). All cells in the spread sheets have been locked except for the ones that are to be filled in by the students. Hence, they are not able to mess with or accidentally corrupt the file.

Paper slips

In this zip file you will find the paper slips to be used by the players for ordering and delivery. You need to print enough to have on each table enough slips to play the number of rounds you'd like to play. You'll also find the customer demand, which you need to print and then to hand out to the retailer group during the game, i.e. to induce the bullwhip effect.

Data analysis

This Excel file can be used to analyze the data produced during the game. Take the play sheets used by the groups and copy the relevant data to the first page of this xls file and on the subsequent pages the inventory, order and cost progressions are automatically calculated and plotted. You can then copy the figures to be used in a PowerPoint debriefing.

Optional exercise

This file contains a group exercise that can be handed out to students as homework. It consists of two parts - one is about analyzing and reflecting the root beer game experience - the other uses a teaching case from the Simchi-Levi et al. supply chain text book.

Debriefing slides

In this PowerPoint file you find some material that can be used in the debriefing session after the game. This is the place where you'd want to fill in the figured generated by the Excel analysis sheet.

Table version

Goals and Objectives

Topic 3: Supply and Demand

Essential Question(s): What are the laws of supply and demand and what role do they and other factors play in determining market price?

SS.912.E.1.4: Define supply, demand, quantity supplied and quantity demanded; graphically illustrate situations that would cause changes in each, and demonstrate how the equilibrium price of a product is determined by the interaction of supply and demand in the market place.

II.5: People incur costs and realize benefits when searching for information related to their purchases of goods and services. The amount of information people should gather depends on the benefits and costs of the information.

MA.912.A.2.1: Create a graph to represent a real-world situation.

MA.912.A.2.2: Interpret a graph representing a real-world situation.

Topic 8: Measuring Economic Performance

Essential Question(s): What are the major economic indicators and how are they used to determine the health of the economy and whether or not the United States is meeting its economic goals?

LACC.1112.RH.3.9: Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources

SS.912.E.1.12: Examine the four phases of the business cycle (peak, contraction - unemployment, trough, expansion – inflation.)

Advice

This is a difficult simulation. Please carefully review all the materials and the resources. I suggest doing this over 2-3 days. Play with a small group first, one production line, for 15 rounds in front of the rest of the class. It will be ugly for the first part of the game. Be patient. They kids will get it, after about 15 rounds sometimes thirty. It will be worth it.

Resources

Webpages

http://www.beergame.org/the-game This website is fantastic. In fact, I used almost all of it making this document. Notice it is called the beer game, I have switched the name to the root beer game to reflect out underage audience.

http://en.wikipedia.org/wiki/Beer_distribution_game

http://supplychain.mit.edu/games/beer-game a online version. I have not played it but what the heck, give it a try

http://www.powerguru.org/beer-distribution-game-supply-chain-simulation/ another version with more downloadable material.

Videos

http://hbsp.harvard.edu/list/3101-demo-page-basic

https://www.youtube.com/watch?v=vQQUxgLfY-g

https://www.youtube.com/watch?v=qxpgM8paegQ

https://www.youtube.com/watch?v=U_A19dtcn2w&index=4&list=PLzRkOj8JsRXPmtLBWBZVHpbJ_l2exw_yY

Documents

See Attached

INCOMING ORDER
(Inbox)

OUTGOING ORDER
(Outbox)

INCOMING DELIVERY
(receiving)

OUTGOING DELIVERY
(dispatch)

FACTORY

Week	Incoming (coming in from your production)	Available (inventory + incoming)	New Order (coming in from distributor)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
0						0	15
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FACTORY

Week	Incoming (coming in from your production)	Available (inventory + incoming)	New Order (coming in from distributor)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)

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30							

FACTORY

Week	Incoming (coming in from your production)	Available (inventory + incoming)	New Order (coming in from distributor)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
31							
32							
33							

34							
35							
36							
37							
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40							
41							
42							
43							
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45							

DISTRIBUTOR

Week	Incoming (coming in from Factory)	Available (inventory + incoming)	New Order (coming in from wholesaler)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
0						0	15
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DISTRIBUTOR

Week	Incoming (coming in from Factory)	Available (inventory + incoming)	New Order (coming in from wholesaler)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
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DISTRIBUTOR

Week	Incoming (coming in from Factory)	Available (inventory + incoming)	New Order (coming in from wholesaler)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
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RETAILER

Week	Incoming (coming in from Wholesaler)	Available (inventory + incoming)	New Order (Consumer demand)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
0						0	15
1							
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14							
15							

RETAILER

Week	Incoming (coming in from Wholesaler)	Available (inventory + incoming)	New Order (Consumer demand)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
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29							
30							

RETAILER

Week	Incoming (coming in from Wholesaler)	Available (inventory + incoming)	New Order (Consumer demand)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
31							
32							
33							
34							
35							

36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

WHOLESALER

Week	Incoming (coming in from Distributor)	Available (inventory + incoming)	New Order (coming in from retailer)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
0						0	15
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

WHOLESALER

Week	Incoming (coming in from Distributor)	Available (inventory + incoming)	New Order (coming in from retailer)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
16							
17							
18							

19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

WHOLESALER

Week	Incoming (coming in from Distributor)	Available (inventory + incoming)	New Order (coming in from retailer)	To Ship (backorder + new order)	Your Delivery (= To Ship, unless no full availability)	Backorder (To Ship – Your Delivery)	Inventory (Available – Your Delivery)
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

Week 1

5

Week 11

9

Week 21

9

Week 31

9

Week 2

5

Week 12

9

Week 22

9

Week 32

9

Week 3

5

Week 13

9

Week 23

9

Week 33

9

Week 4

5

Week 14

9

Week 24

9

Week 34

9

Week 5

9

Week 15

9

Week 25

9

Week 35

9

Week 6

9

Week 16

9

Week 26

9

Week 36

9

Week 7

9

Week 17

9

Week 27

9

Week 37

9

Week 8

9

Week 18

9

Week 28

9

Week 38

9

Week 9

9

Week 19

9

Week 29

9

Week 39

9

Week 10

9

Week 20

9

Week 30

9

Week 40

9

Delivery stage 1

Delivery stage 2

Production stage 1

Production stage 2

ORDER

ORDER

ORDER

ORDER

DELIVERY

DELIVERY

DELIVERY

DELIVERY

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