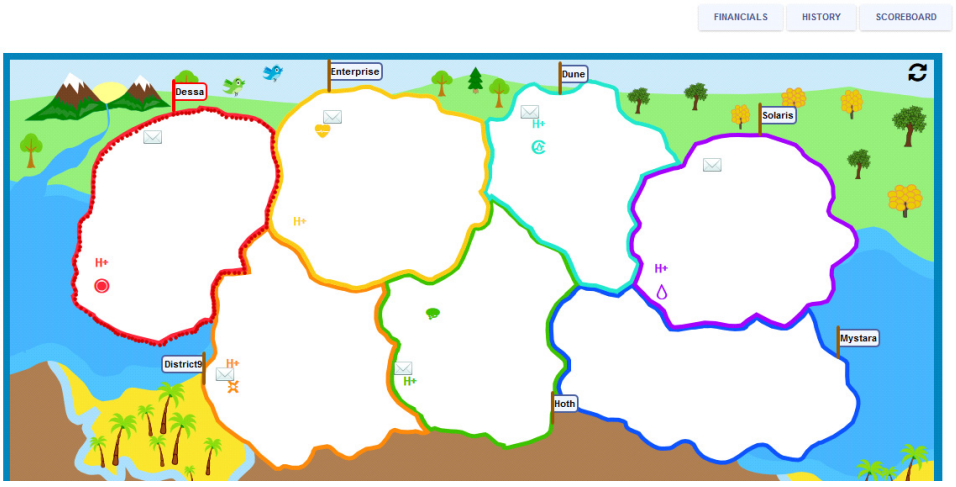
August 2018

The Sourcing Game: Managing Inventory and Price

Overview

Welcome to the Sourcing Game. Your team will be managing a simulated firm over the internet that manufactures and sells two wearable medical devices. The first product, named "Hormone View" tracks the concentration of several hormones. It is a generic product that any team can make. Your other product is a proprietary design that only your team can make. You may log into your firm at any time while the game is suspended, running, or done. After logging into the game you will see a screen that looks like the following:



Your home region is outlined in red dots and contains three icons: an envelope icon that opens a panel to exchange messages with members of your team; an "H+" icon that opens a panel to manage inventory and price of your "Hormone Plus" product; and a unique icon that opens a panel to manage inventory and price of your proprietary product. You will see similar icons in other teams' home regions. Clicking on another team's envelope icon allows you to exchange messages with members of that other team. Other teams' inventory icons are not clickable.

Your objective is to set the retail price and inventory reorder point for each product (four settings altogether) to achieve the highest cash balance by the end of the game.

Background

Your firm was founded six months ago by an angel investor and a single engineer. The investor purchased half the firm with cash. The proceeds were then used to purchase a facility to manufacture and distribute the monitors.

Monitors are produced in batches of 100. The materials cost for each monitor is $100, so production of a batch begins by incurring a cost of $100 × 100 units = $10,000. The batch takes 60 hours to manufacture and the facility can only produce one batch at a time. Once the batch is completed another batch can begin production while the finished batch goes into "transit" for 24 hours where each monitor is packaged and prepared for shipping. Once the monitors are ready to ship they go into finished goods inventory. Customers only purchase monitors from finished goods inventory. The facility operates 24 hours a day.

You control production by setting a reorder point. Production of a new batch is triggered when the sum of in-transit and finished inventory is equal to or less than your reorder point.

Customers arrive at a constant rate throughout each day. The amount of money a customer is willing to pay for a monitor is random. You set the retail price of the monitors. If a customer arrives and the price is higher than what the customer is willing to pay the customer is lost forever without any effect on the arrival of future customers. Higher prices result in less customer purchases over time. If a customer arrives and there is no finished inventory, the customer is also lost forever regardless of price, again without any effect on future arrivals.

At the end of the game the monitor technology will be replaced by a new generation of technology. As result the facility shuts down and all inventory becomes worthless.

Managing your firm

After logging in, you can click on either of your inventory icons to open an inventory panel. The panel uses the following icons:

- click next to a value to open a panel with more details;
- click next to price or reorder point to change those values;
- click next to a value to plot it over time.
- click next to price to analyze the effect of price on demand and profitability.

The panel also shows the net cash generated by the product. Click next to the current cash value to see a break-down of cash from inventory-level activities like purchasing raw materials and selling finished goods. From that details panel, you can click on a globe icon to break down cash from firm-level activities for your team and other teams. You can view the sources and uses of cash for your own team though the last completed day, by day, week, quarter, or year, and for other teams through the last completed quarter, by quarter or year. In this game, there are 7 days in a week, 91 days in a quarter and 364 days in a quarter.

The inventory panel also includes a table showing your inventory in process, in transit, finished, and total. Click the chart icon next to any of the values to see how they changed over time.

Finally, at the bottom of the panel is a table to manage production. If the game is running, click on the pencil next to the reorder point to change the reorder point. The table shows the number of batches started during the game. Click on the expand icon next to the number of batches to see a table showing when each batch was triggered, when it started production, when it finished pro-

duction and went into transit, and when it went into finished inventory. You can also see how long it took each batch from being triggered until it arrived to finished inventory and how many units of each batch are still unsold.

Communications

After logging in, you can click on the envelope icon in your own region to open an archived chat with your team members. You can use that chat, for example, to record notes during the game. The chat is not erased until your instructor resets the simulation.

You can also click on envelopes in other teams' regions to open an archived chat between members of your team and members of the other team. There isn't much of a good reason to exchange messages with other teams in this assignment. Other assignments involve more interaction between teams where communication becomes more important.

Finally, you can post messages that everyone in your simulated world can see using the "industry news" icon above the map.

An envelope or the industry news icon will turn gold if it contains a message that you haven't seen yet. You can refresh the map by clicking the refresh icon in the upper right corner of the map.

Other controls and debt

You will see two buttons above the map:

- The "History" button opens a table showing all the actions taken by your team.
- The "Scoreboard" button shows all the teams ranked by cash balance.

If your firm runs out of cash it will make emergency loans to continue operations. An emergency loan incurs an immediate 5% fee and then incurs daily interest equivalent to 20% per year. Emergency debt is automatically repaid with available cash at the end of each day.

Timing

When the game begins, you will already have of history. Over the next seven days, the game will run for another seven simulated quarters, which is equivalent to exactly 91 simulated days each real day. When the game ends all remaining inventory will be obsolete and therefore worthless.

The winning team is the one with the most cash, minus any debt, at the end of the game.

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The Sourcing Game: Managing Sourcing and Demand

Welcome back to the Sourcing Game. As in the first game, you are managing a firm that manufactures and sells wearable monitors. All the teams in your world still make a generic "Hormone View" monitor and a second product proprietary to each team. Your firm still generates cash by selling its inventory to retail customers. However, in this game, your firm can also sell inventory other teams' firms and buy inventory from other teams' firms.

Although you can only manufacture two types of monitors, there is a market in your region for all the other teams' monitors as well. The size of the market for the hormone monitor is the same in every region, but the size of the market for any other monitor varies from region to region.

Background

Both monitors are produced in batches of 100 and the unit materials cost for any monitor is $100 per unit. Monitors are produced in batches of 100. You cannot mix types of monitors in a single batch; each batch of monitors consists of 100 identical monitors. It takes 60 hours to produce a batch of either type of monitor and 24 hours to package the monitors in a batch and prepare them for shipping. The facility continues to operate 24 hours per day.

You control production by setting a separate reorder point for each monitor. Production of a new batch is triggered when the sum of in-transit and finished inventory is equal to or less than your reorder point. You can turn off production of a monitor by setting the reorder point to a negative number. If production of both monitors is triggered simultaneously, the facility alternates producing a batch of one monitor then a batch of the other monitor until only one is still triggered.

Customers for each type of monitor arrive at a constant rate throughout each day. The amount of money each customer is willing to pay for either monitor is random. You set the retail price for each of the monitors independently. If a customer for a particular monitor arrives and the price for that monitor is higher than what the customer is willing to pay the customer is lost forever without any effect on the arrival of future customers. If a customer for a particular monitor arrives and there is no finished inventory to sell, the customer is also lost forever without any effect on future customers.

Inventory of a monitor can be sold from one team to another via a shipping agreement. The team sourcing the inventory must create *and then propose* the shipping agreement and the destination team must accept it before the agreement becomes active. In addition to price, there are several other possible terms (described below) and teams can propose and counter propose changes to the agreement prior to accepting the agreement. Both teams must accept the final revision of the agreement to activate it.

Once a shipping agreement between two teams becomes active, the terms cannot be changed. The destination orders inventory by setting a reorder point that triggers shipping of finished inventory from the source. A source does not ship until it has enough inventory to meet the order quantity specified in the agreement terms. If multiple agreements for the same inventory are triggered simultaneously, then the agreement with the highest priority setting is shipped. The origin can change an agreement's priority at any time. If shipments with the same priority setting are triggered at the same time, the agreement that has waited the longest since it was either activated or triggered previously is shipped.

Managing your firm

After logging in, you can click on either of the inventory icons in your region to open a panel to manage that inventory. You will see the following icons:

- allows you open a panel to show more details;
- allows you to change parameters like price, reorder point, and order priority;
- allows you to open a plot of some metric over time;
- allows you to analyze the effect of price on demand and profitability.

You can create a shipping agreement to propose to another team in either of two ways:

- On the map, drag one of your inventory icons to another team's region. You will then be prompted to fill out a sequence a menus to create the shipping agreement for that monitor to that team.
- Click on an inventory icon in your region, scroll to the bottom of the inventory panel, and click "Add New" in the Outgoing Shipping Agreements table. Then work through the resulting sequence of menus.

Once the source team creates and saves a shipping agreement it can be proposed to the other team by clicking the green check mark that appears next to the agreement in the "Outgoing Shipping Agreements" table. As soon as you click the green check mark, the destination will see the inventory icon appear in their region. The destination team can then click the icon to open a new panel with an "Incoming Shipping Agreements" table showing your proposed shipping agreement.

When you receive a proposal for a shipping agreement you should always review the agreement terms. Do that by clicking the inventory icon and then the icon in the "Terms" column of that table. Never accept an agreement without reviewing its terms! If the terms are acceptable, the agreement can be activated by clicking the green check mark in the "Incoming Shipping Agreements" table. If the terms are not acceptable, you can revise them and save them, creating a counterproposal back to the source. Alternatively, you can reject the proposal outright by clicking the red X for the agreement on the inventory panel.

While an agreement is proposed or counter-proposed, either team can modify the agreement and save the new terms at any time, even if they previously accepted the terms. The agreement doesn't become active until both teams agree to a final set of terms by checking the green check mark for

the agreement for the final set of terms. Never click the green check mark without reviewing the terms! Once an agreement is activated, it cannot be revised.

A shipping agreement to another team can include several terms beyond just the price. In the process of setting up an agreement, you will see a menu where you can add or modify terms.

- **Shipping** specifies how inventory is shipped from the origin to the destination:
  - **Order quantity** specifies the number of units in the shipment. If the shipment is triggered but the source does not have enough units to ship, it does not ship any units until it does have enough units.
  - **Mode** specifies the how the inventory is shipped. There are two choices: mail is faster but usually more expensive per unit and containers are slower but less expensive if the container is full. If either a mailing or a container is not full (10 units for mail or 1000 units for container) the number of mailings or containers is rounded up to the next whole number.

- **Payments to source** are automatic payments from the destination to the source:
  - The price per unit is paid **when goods ship** from the source.
  - The agreement may include a penalty if the origin does not ship the moment the order is placed. The penalty takes the form of a **discount for delayed shipments**, The penalty specifies how many days the source has to ship a batch after the destination triggers an order for it. If it takes more than that number of day to ship the batch, the price for that batch decreases by a specified percentage per day each day it is late until the batch is shipped. If the penalty reaches 100% the destination pays nothing for the batch when it is finally shipped. The lateness penalty is prorated over fractions of a day. Both the incoming and outgoing shipping agreement tables include a column showing each agreement's delay at that moment.
  - The agreement may include an additional payment to the source **at the time of retail sale**. The payment can include both a set amount per unit and a percentage of the retail price.

- **Limits** in the agreement can enforce lower and/or upper bounds on the following parameters:
  - The **retail price** that the destination may set on the product.
  - The **reorder point** that the destination may set to trigger orders.
  - The **priority** that the origin may set to prioritize waiting orders for shipment.

- Either team can enter **other terms** that are binding but must be enforced by the teams instead of the software. For example, teams could agree on a payment to be made when the agreement is activated or when the agreement is terminated.

- Once the agreement is activated, a **Make a payment** button appears that allows either team in the agreement to pay money to other team. The button remains active even after the agreement is terminated.

- Finally, if the agreement is not yet activated, either team can add comments at the bottom of the terms panel.

When an agreement is proposed or counter proposed, clicking a red X next to the shipping agreement in the shipping agreement table rejects or rescinds the agreement. When an agreement is active clicking the red X terminates the agreement permanently.

Click on any inventory icon in your region to view controls and historic data for that inventory:

- Click the ✎ icon next to retail price to change the price;
- Click the ↗ icon next to the generated cash value to see how that particular inventory generated cash during the game.
- Click the ▮▮▮ icon next to any of the values in the inventory table to plot the value's history.
- You can change the reorder point for any of your inventories while the game is running by clicking the ✎ next to the reorder point value in the "Incoming Shipping Agreements" table.
- You can change the relative priority of each shipping agreement by clicking the ✎ next to the priority value in the "Outgoing Shipping Agreements" table. If two agreements are competing to ship the same inventory, the agreement with the higher priority value ships.
- Click on the ↗ in the batches column of either table to view all the batches created and shipped under that agreement.

Communications

Click on the envelope icon in your own region to open an archived chat with your team members. Click on an envelope in another team's region to open a chat with members of that other team. The messages are archived until your instructor resets the simulation. You can post messages that everyone in your simulated world can see using the "industry news" icon above the map.

Other controls and debt

You will see two buttons above the map:

- The "History" button opens a table showing all the actions taken by your team.
- The "Scoreboard" button shows all the teams ranked by cash position, defined as cash on hand minus debt.

If your firm runs out of cash it will receive emergency loans to continue operations. Emergency loans are automatically repaid as cash becomes available.

Assignment

Your factory and distribution center has been running for 91 simulated days (one quarter) and management has hired a high-powered team (you) to manage the production, purchasing, contracting, and retail pricing to maximize the firm's cash position after seven more quarters. The game will run at the rate of one simulated quarter per real day or just over one simulated day every 16 minutes. The game will end exactly seven real days after it began. At that point all remaining inventory will be obsolete and therefore worthless.