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The Bullwhip Phenomenon in the Management of an Oil Refinery

Conclusion

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This leaves us with a question,"How do we deal more effectively with the underlying structure of the bullwhip effect?"

The main purpose of system dynamics is so individuals will be in an excellent position to begin introducing system dynamics tools into play for a better understanding of the underlying structure.

Effects on Companies

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Beer Game

Supplies Thecasesolutions.com

Per team

- Game board (1)
- Single chips (969-989)
- Ten chips (300 [optional: can replace some single chips)
- Customer order cards (1)
- Order slips (208)
- Graphs (1)
- Effective Inventory (X)
- Orders (Y)
- Excluded Orders (Z)
- Record sheets (5)
- Pencils (5)
- Markers in four colors (1 each)
- Green - Blue
- Red - Black
- Calculators (2)

Purpose

The purpose of the Beer Game is to show how the key principle of "structure produces behavior" It also helps the players to experience the pressures that play a role in the complex distribution system.

Video

Recruitment Questions

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History

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The concept of the Bullwhip Effect is the change in the customer demand, traveling to the manufacturers. It first came about in 1958 and was introduced by Jay Forrester and was thus initially known as the Forrester Effect. During his initial research he found that it could take up to 6 months for changes in consumer demand to drift through the entire supply chain. It wasn't until later, 1960, that Procter and Gamble coined "Bullwhip Effect" for this phenomenon, while they were researching their supply chain for diapers. It was called this because the small change in consumer demand causes waves up the supply chain in increasing magnitude giving it the look of a bullwhip being cracked.

This process relates to this course because it is all about the management process. Since customer demand is rarely stable, the management team has to try to predict what the demand might be so they can order the proper amount of inventory without being too short or having way too much. Any and every company can be affected by the bullwhip effect.

Rules!

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Instructions

design by Dixie Sauls for Fresh

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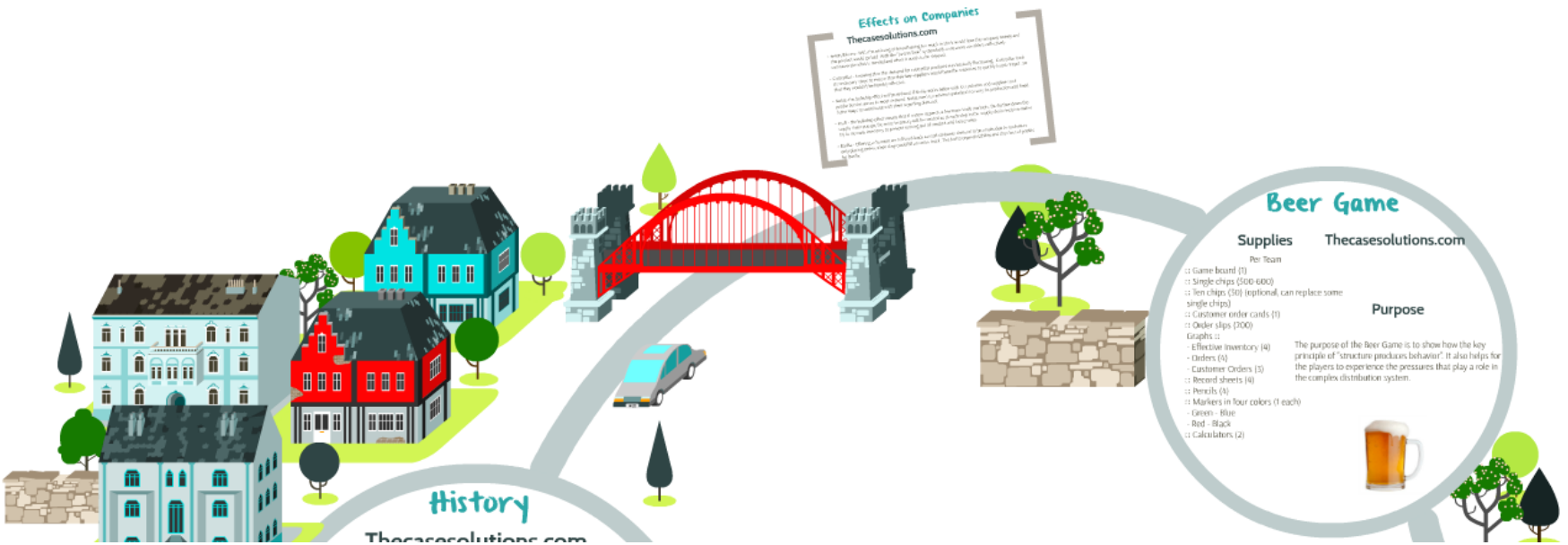
The Bullwhip Phenomenon in the Management of an Oil Refinery



History

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Effects on Companies

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- Seven/Eleven - With the ordering of bread having too much in stock would lose the company money and the product would go bad. With the "Just in Time" system both companies are able to effectively communicate what is needed and when it needs to be shipped.

- Caterpillar - Knowing that the demand for caterpillar products was basically fluctuating, Caterpillar took its necessary steps to ensure that their key suppliers would have the resources to quickly boost output, so that they wouldn't be horribly effected.

- Nokia -the bullwhip effect will be reduced if Nokia works better with its customer and suppliers and production increases to meet demand. Nokia need to convince (retailers) to carry its production and fined better ways to coordinate with them regarding demand.

- Kraft - the bullwhip effect means that if a store requests a few more Kraft products, the further down the supply chain you go, the more inventory will be created as at each step in the supply chain decision-maker try to increase inventory to prevent running out of product and losing sales.

- Barilla - Offering a discount on full truckloads caused costumer demand to be erratic due to customers only placing orders when they could fill an entire truck. This led to unpredictability and thus loss of profits for Barilla.

Beer Game

Supplies

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Per Team

:: Game board (1)
:: Single chips (500-600)
:: Ten chips (30) (optional, can replace some single chips)
:: Customer order cards (1)
:: Order slips (200)
Graphs ::
- Effective Inventory (4)
- Orders (4)
- Customer Orders (3)
:: Record sheets (4)
:: Pencils (4)
:: Markers in four colors (1 each)
- Green - Blue
- Red - Black
:: Calculators (2)

Purpose

The purpose of the Beer Game is to show how the key principle of "structure produces behavior". It also helps for the players to experience the pressures that play a role in the complex distribution system.

Rules

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- Have each team pick a name for their brewery (e.g. the name of a real beer).* Distribute one Record Sheet to each position and have them label their Record Sheet with the name of their brewery and their position, e.g. retailer, wholesaler, etc.
- Have each person ante up $1.00, or an appropriate amount, which will go to the winning team, winner takes all.

  *Note: The product represented by the chips does not have to be beer. Any product appropriate to the group may be chosen by the facilitators.
- The object of the game is to minimize total costs for your team. The team with the lowest total costs wins. Costs are computed in the following way: The carrying costs of inventory are $.50 per case per week. Out-of-stock costs, or backlog costs, are $1.00 per case per week. The costs of each stage (retailer, wholesaler, distributor, factory) for each week, added up for the total length of the game, determine the total cost.
- No communication between positions. Retailers should not talk to anyone else, same for wholesalers, distributors, and factories. The reason for this is that in real life there may be five factories, several dozen distributors, thousands of wholesalers, and tens of thousands of retailers, and each one cannot find out what the total activity of all the others is. The only communication between sectors should be through the passing of orders and the receiving of beer.
- Retailers are the only ones who know what the customers actually order. They should not reveal this information to anyone else.

Results/Post Questions

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- Playing this game should get people to really see for themselves that different companies in the same structure produce to get similar results. Were there any overall patterns of behavior?

- Allows individuals to reflect on the point of what happens in the real world when there is a new order for inventory. Did anyone have specific problems in communication, and who did they blame?

- The game clearly demonstrates how individuals can put the blame on someone else, but this response is different due to people following different rules for generating orders. Have everyone who were not retailers found out what the pattern of customer orders was and what they thought the customers were doing?

- Most people believe that customer demand was fluctuating because they believe that system fluctuations must have been externally driven. Try to get players to see that they assumed the fluctuating customer orders. (Have players review order sheets)

Conclusion

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This leaves us with a question,"How do we deal more effectively with the underlying structure of the bullwhip effect?"

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Citations

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http://sloanreview.mit.edu/article/the-bullwhip-effect-in-supply-chains