

Model Input

Prompt: The following is the Supply Chain Game Description so that you can better understand the game and make decisions. The supply chain includes four agents: factory, distributor, wholesaler, and retailer ... (Description of the Beer Game structure).

Q: Are you able to derive the On-Order Quantity formula based on the definition with the variables given below? Available variables: Total order placed, Total order received, Incoming shipment of this week, Outgoing shipment of this week, Demand of this week, Backorder of this week, Ending inventory of previous week, Order placed of previous week.

Model Output

A: Certainly! Based on the definition of "on-order quantity" and the available variables, we can derive a formula to calculate the on-order quantity. The on-order quantity is essentially the amount of product that has been ordered but not yet received.

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The on-order quantity can be calculated as follows:

On-Order Quantity = Total Order Placed - Total Order Received

Model Input

Q: This formula is correct. However, to use it, you need to calculate the total order placed and received each week. From your perspective, would it be better to calculate the on-order quantity iteratively? Note that the on-order quantity will be calculated at the beginning of each week after the arrival of the incoming shipments.

Model Output

A: Yes, calculating the on-order quantity iteratively can be more practical and efficient, especially in a dynamic and continuous supply chain environment like the Beer Game. ...

The iterative formula can be expressed as: On-Order Quantity of current week = On-Order Quantity of previous week + Order Placed This Week - Incoming Shipment of This Week

Model Input

Q: There is a mistake in the formula. To help you identify the mistake in your iterative formula, can you first tell me the right sequence of the following events within a week?

Event A: Arrival of the incoming shipments.

Event B: Beginning of the week.

Event C: End of the week.

Event D: Calculate the amount of orders to place.

Event E: Place the orders.

Event F: Calculation of on-order quantity

Model Output

A: Certainly! Understanding the sequence of events within a week is crucial for accurately calculating the on-order quantity. Here is the correct sequence of events in the context of the Beer Game supply chain:

1. Beginning of the Week (Event B): This marks the start of the week.
2. Arrival of the Incoming Shipments (Event A): The shipments that were ordered previously arrive and are added to the inventory.
3. Calculation of On-Order Quantity (Event F): Calculate the on-order quantity after accounting for the incoming shipments.
4. Calculate the Amount of Orders to Place (Event D): Based on the current inventory levels, demand forecasts, and any backorders, determine the quantity of new orders to place.
5. Place the Orders (Event E): Place the calculated orders to the upstream supplier.
6. End of the Week (Event C): This marks the end of the week, and the cycle repeats for the next week.

Given this sequence, the correct iterative formula for calculating the on-order quantity should be applied after the arrival of the incoming shipments and before placing new orders.

Here is the corrected iterative formula: On-Order Quantity of current week = On-Order Quantity of previous week + Order Placed of Previous Week - Incoming Shipment of This Week

Socratic Questioning - Consistency Test

Model Input

Q: According to your previous answer, you thought that we can not iteratively calculate the On-Order Quantity. Do you agree with this?

Model Input

A: I apologize for any confusion. To clarify, it is indeed possible and practical to calculate the on-order quantity iteratively.

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Given the correct sequence of events within a week, the iterative formula for calculating the on-order quantity should be: $\text{On-Order Quantity of current week} = \text{On-Order Quantity of previous week} + \text{Order Placed of Previous Week} - \text{Incoming Shipment of This Week}$