

2D PROJECT 2023

40.014 ENGINEERING SYSTEMS ARCHITECTURE & 40.012 MANUFACTURING AND SERVICE OPERATIONS

TEAM 08

WINE BOUTIQUE MANAGEMENT

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MSO PROBLEM STATEMENT

Empower players (mainly small business owners) with an immersive MSO game to optimize wine boutique operations, allowing them to master inventory concepts for informed decisions, cost reduction, and maximum profitability.

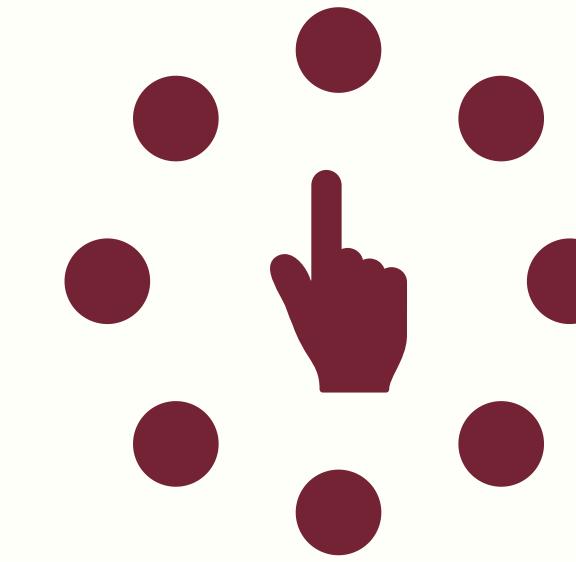
CONTEXT OF THE WINE RETAILERS



HIGH
Accounts Payable



LOW
Accounts Receivable



VARIETY
in Product Portfolio

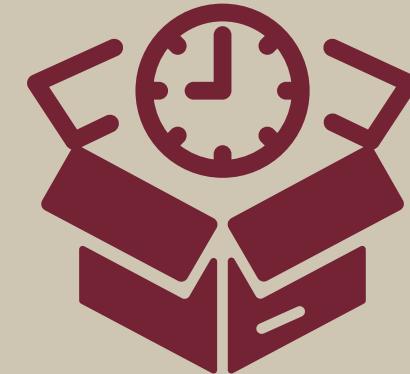


HIGH DEMAND
during festive season

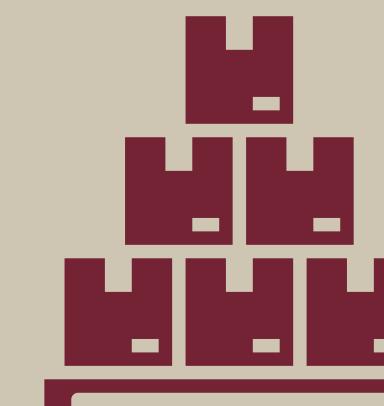
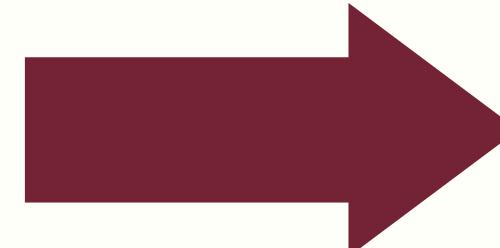
M&SO CONCEPTS



Holding Costs
Shipping Costs



Lead Time



Cycle Stock
Safety Stock
Warehouse Stock



Economic Order
Quantity

$$\text{AverageCycleStock} = \frac{1}{2} \text{OrderQuantity}$$

$$\text{SafetyStock} = \text{ROP} - \text{TransportDays} \times \text{CustomerDailyOrdersMean}$$

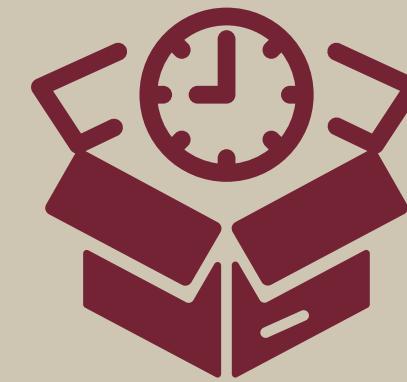
$$\text{AverageWarehouseInventory} \approx \text{SafetyStock} + \text{AverageCycleStock}$$

$$\text{EOQ} = \sqrt{\frac{2 \cdot \text{AnnualDemandRate} \cdot \text{OrderFixedCost}}{\text{HoldingCostPerUnitPerYear}}}$$

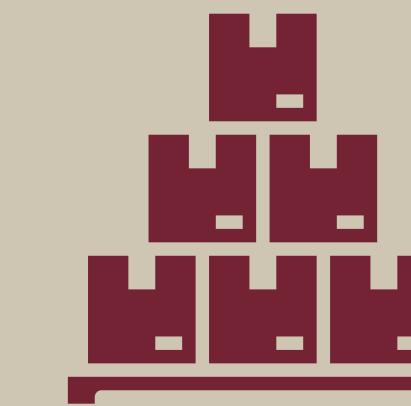
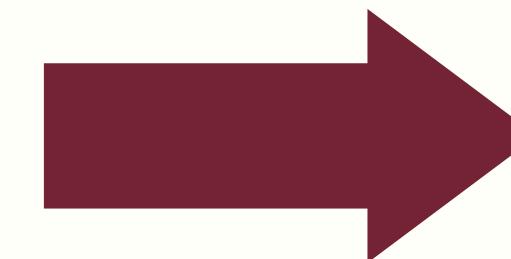
M50 CONCEPTS



Surge Demand



Lead Time



Anticipation Stock

$$Y_{t+1} = P_t - R_t$$

Y_t : *Anticipation stock at the beginning of month t*

P_t : Cumulative reorder by end of month t

R_t : *Requirements for cumulative reorder by end of month t*

CONCEPT DIAGRAM

INITIAL DRAFT

WEEK 23

REGISTER

LOGIN

Cash Balance:

\$236,000

Order Quantity:

1500

VAN

TRUCK

EXPRESS



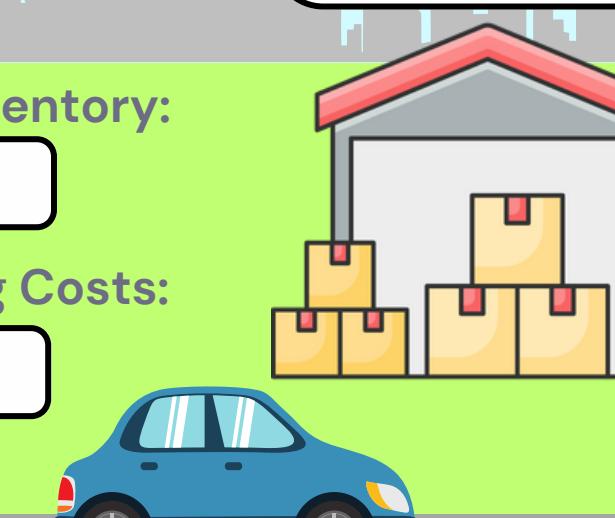
Warehouse Inventory:

420

Weekly Holding Costs:

\$900

WAREHOUSE



+\$5200



BOUTIQUE



-130



Boutique stock:

500/500

NEXT >

CONCEPT DIAGRAM

MAIN GAME PAGE

Week: 1

Cash Balance: \$1013225.00

Weekly Demand: 183

Warehouse Stock: 317

Stock In Transit: 0

Weekly Revenue: \$13725.00

Boutique Stock: 500

NEXT

Order Sheet

Order
Quantity:
Enter Value

0

Delivery Mode:
Choose one

- Van (up to 500 bottles)
- Truck (up to 2000 bottles)

Delivery Type:
Choose one

- Standard (3 weeks)
- Express (1 week)



CONCEPT DIAGRAM



SUFFICIENT
STOCK



INSUFFICIENT
STOCK

CONCEPT DIAGRAM



VAN
ARRIVING



TRUCK
ARRIVING

CONCEPT DIAGRAM

GAME
ENDING
PAGE



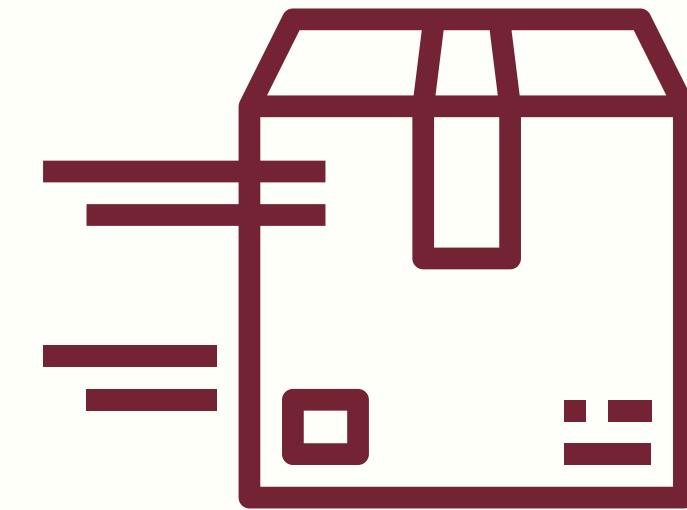
INPUTS TO GAME (USER)



Order Quantity



Delivery Mode :
VAN (max 500 bots/van)
TRUCK (max 2000 bots/truck)

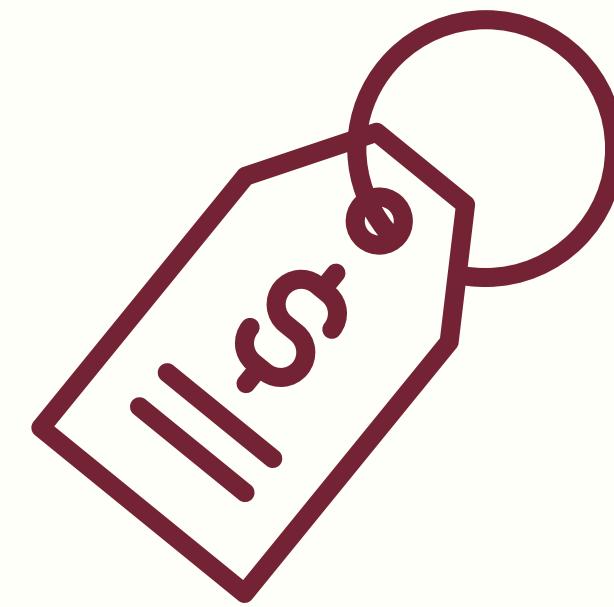


Delivery Type :
STANDARD (1 week lead time)
EXPRESS (3 weeks lead time)

INPUTS TO THE GAME (SYSTEM)



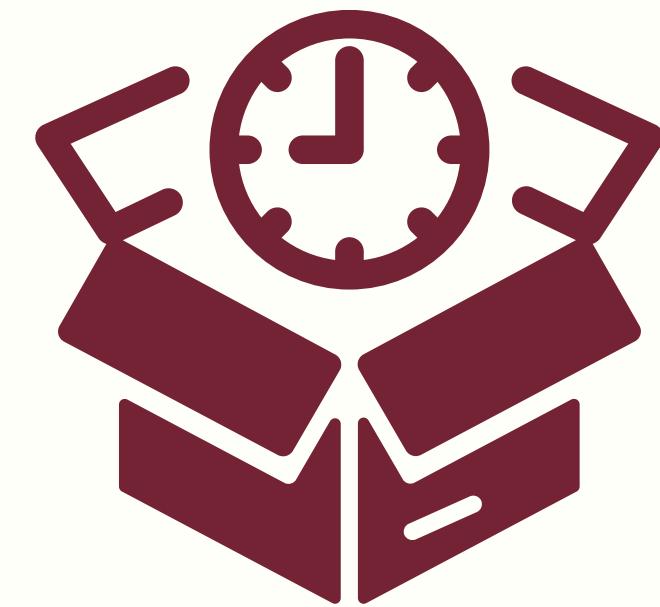
NORMAL Demand
SURGE Demand
(randomly generated)



Price per bottle
(\$75)



Cost per bottle (\$50)
Holding Costs
Shipping Costs



Lead Time :
Standard (3 weeks)
Express (1 week)

CONTROLS IN THE GAME



CLICK
Interaction

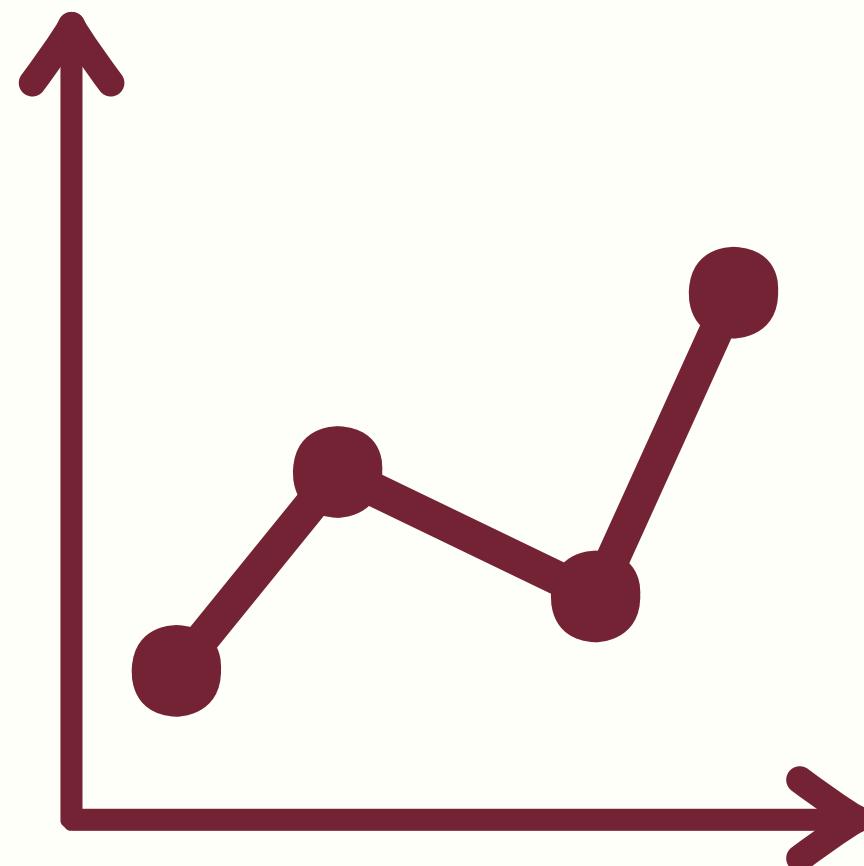
Start & Next Button
Select Transportation Method



TEXT INPUT
Interaction

Enter Order Quantity

OUTPUTS OF THE GAME

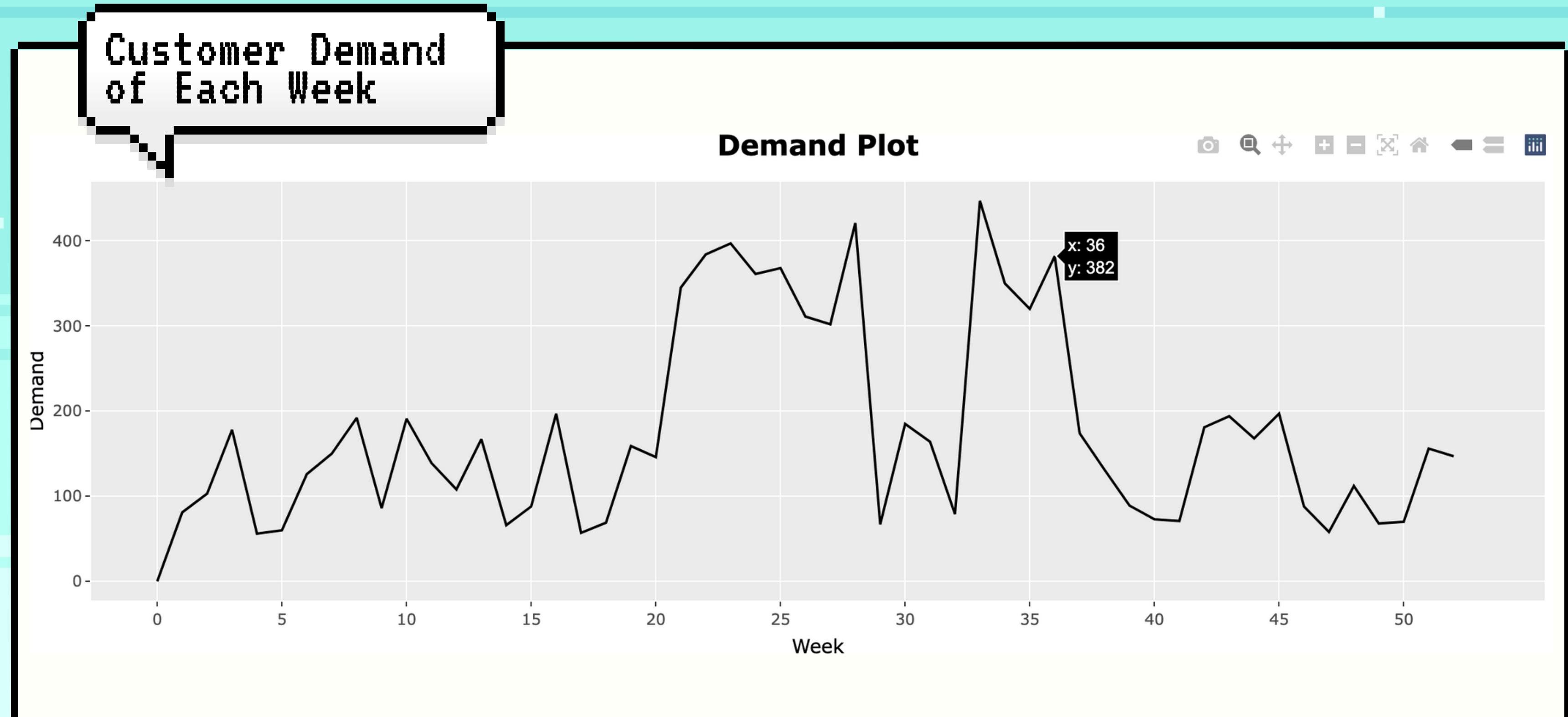


Charts



Leaderboard

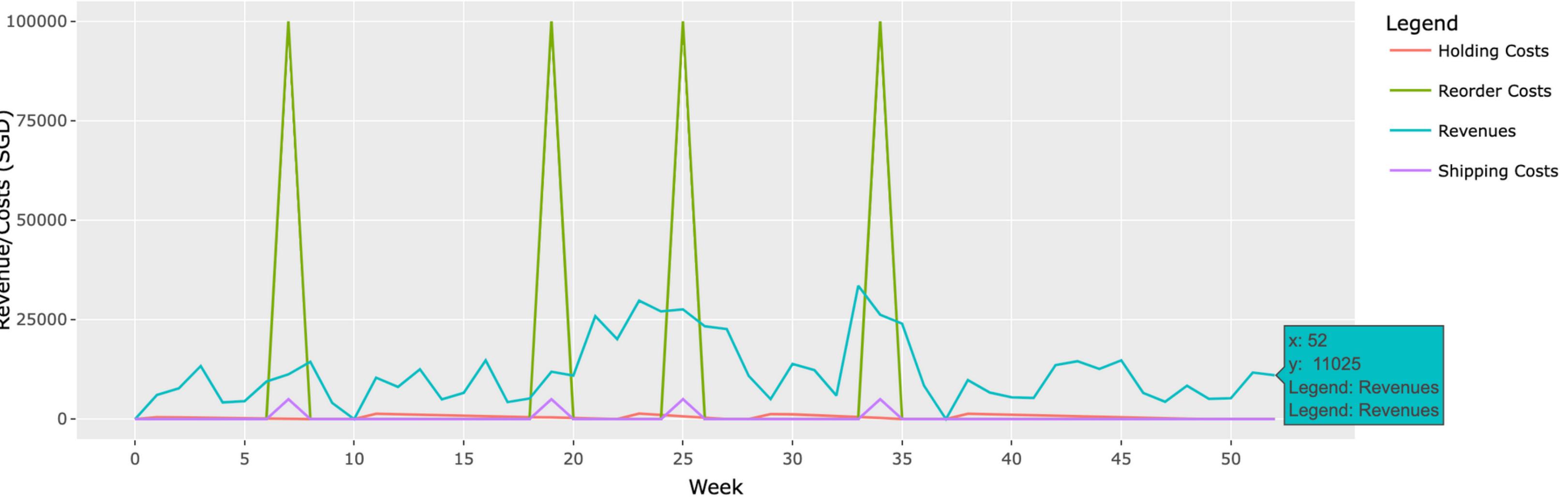
OUTPUTS OF THE GAME



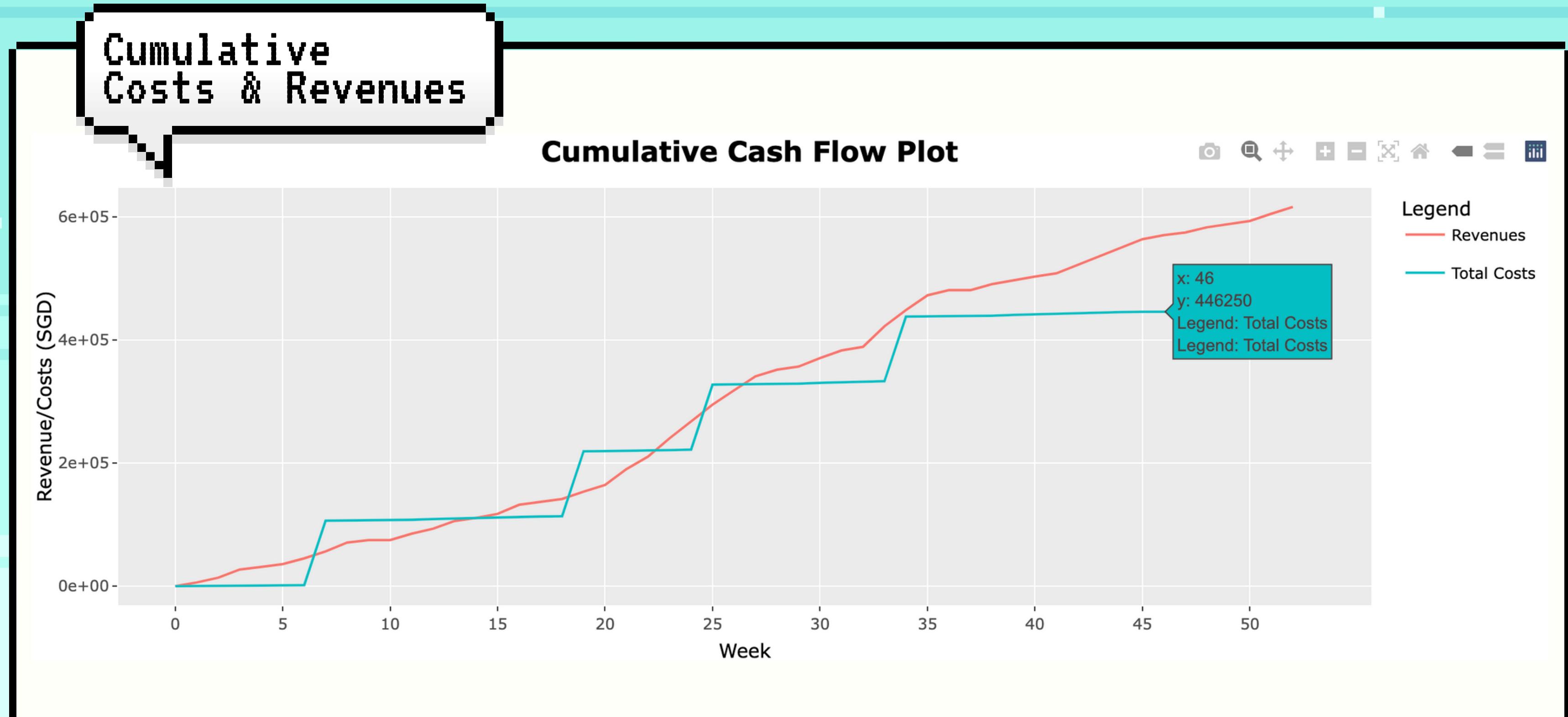
OUTPUTS OF THE GAME

Costs & Revenues
of Each Week

Weekly Cash Flow Plot



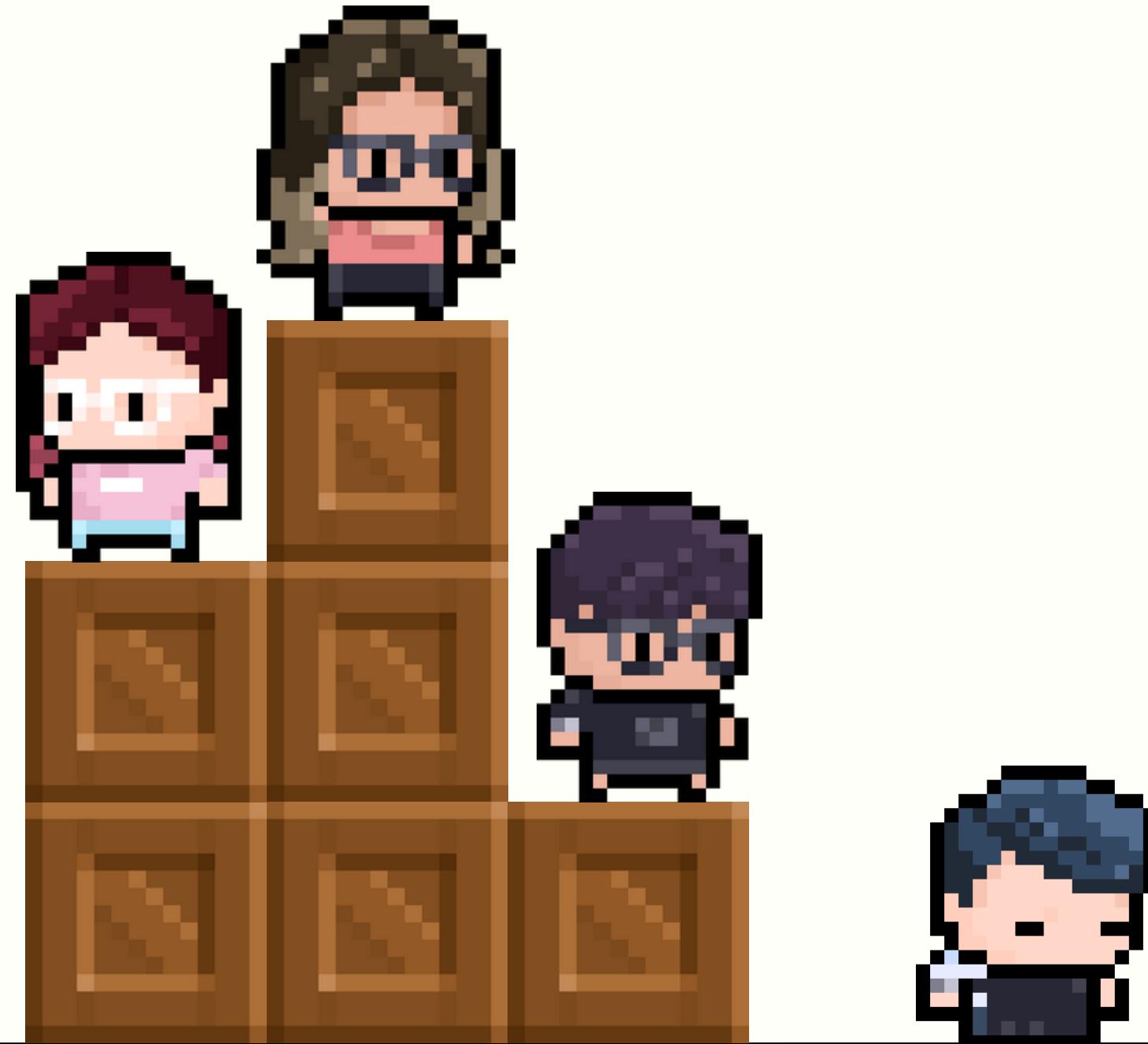
OUTPUTS OF THE GAME



OUTPUTS OF THE GAME

Leaderboard

	PlayerName	Cash Balance
1	davina	1178975
2	asta	1178350
3	yakfang	1127850
4	davina	1073700
5	ken	1073550
6	davina	1016050
7	asta	937275



EDUCATIONAL MESSAGE

- Effectively handle your inventory and forecast future demand to plan for reordering, especially during peak periods throughout the year.
- Ensure sufficient stock by carefully monitoring it and choosing the suitable transportation method based on varying lead times.
- As the game is about to end, predict the order quantity wisely to avoid buying too much or too little.
- Optimize cash flow by balancing holding and shipping costs efficiently.

REFERENCE FROM THE INDUSTRY



QUALITY WINES PTE LTD
Est. 2006



EU Wine Co., Ltd.
Estd 2011

RESEARCH AND REFERENCES

- EU Wine Co., Ltd (<http://www.euwine.wine>)
- Quality Wines Pte Ltd (<http://www.qwines-sg.com>)
- Store management: A winning business formula for retailers in 2023
(<https://www.magestore.com/blog/what-is-store-management/>)
- The Drinks Entrepreneur's Guide to Business Ownership
(<https://daily.sevenfifty.com/the-drinks-entrepreneurs-guide-to-business-ownership/>)
- Why Is Inventory Management Important for Your Small Business?
(<https://www.fool.com/the-ascent/small-business/inventory-management/articles/importance-of-inventory-management/>)



VIDEO



<https://youtu.be/BbzxFoV8wio>