AUEB - Exec 2025 02

Team performance

Total cost
€8639

Final On-time Sales
88.1%
342/388

Average Stock
246 units

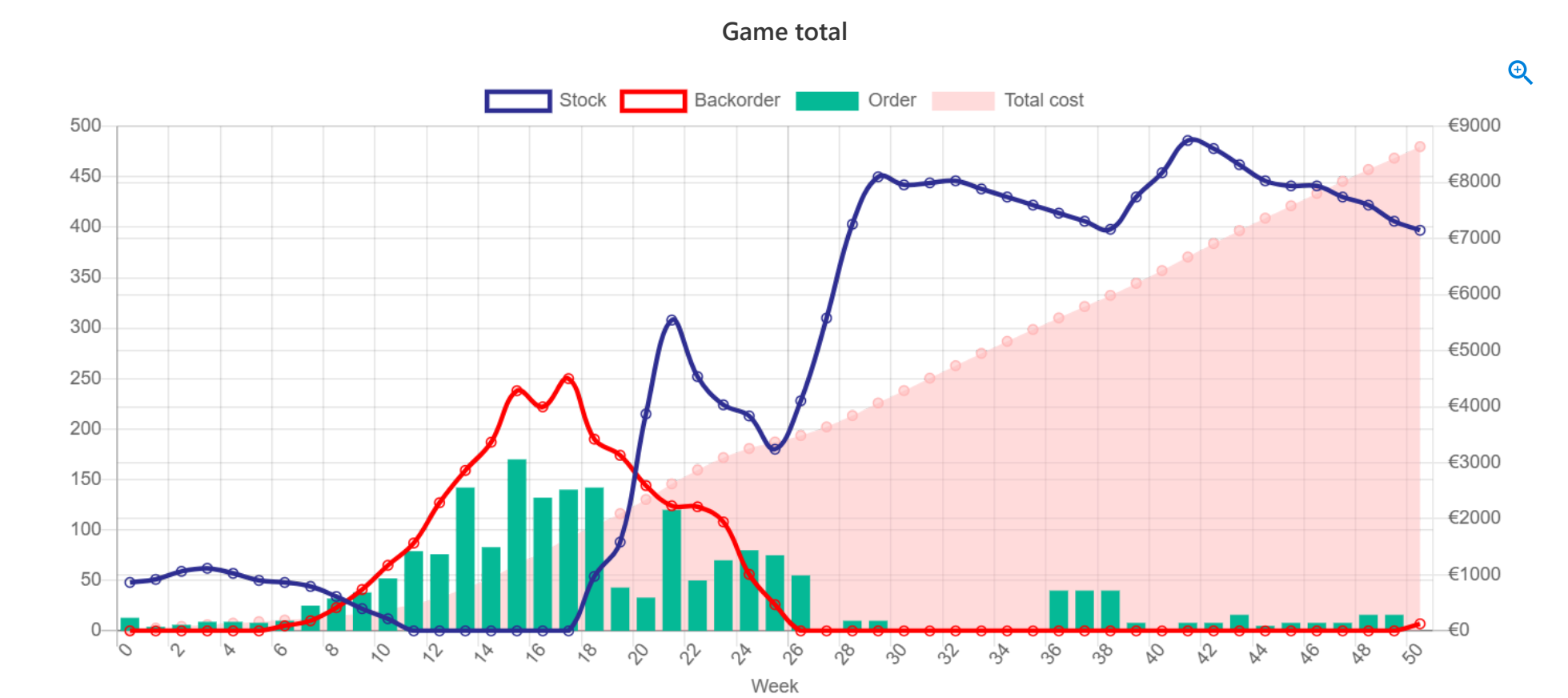
Backorders duration
21 /50 weeks

Individual performance

Metrics Name	Retailer Σωκράτης Ζαβάκος	Wholesaler Myrto	Distributor Konstantinos	Manufacturer Paris
Cost	-€963	-€2018	-€2130	-€3529
% Shipped on time	88.1%	58.3%	73.9%	78.1%
Average Stock	25.9	25.5	68	126.6
Average Backorder	5.9	26.8	7.8	5.9
Average Orders	7.6	7.4	9.2	14.5

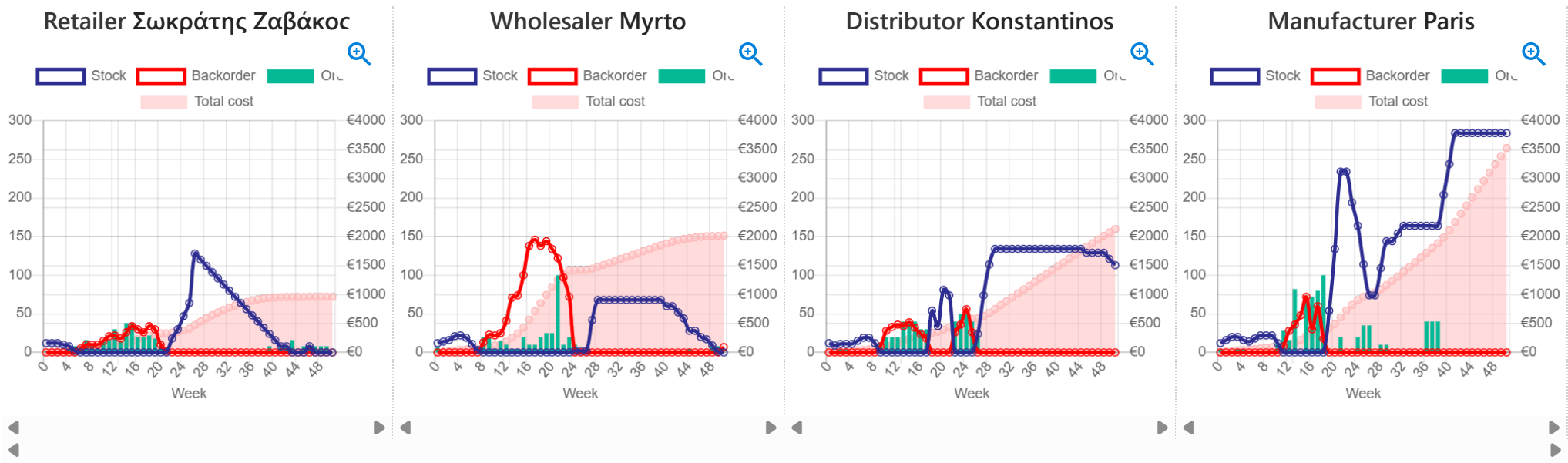
Supply Chain Evolution

See below the evolution of key metrics throughout the game, all stages combined.



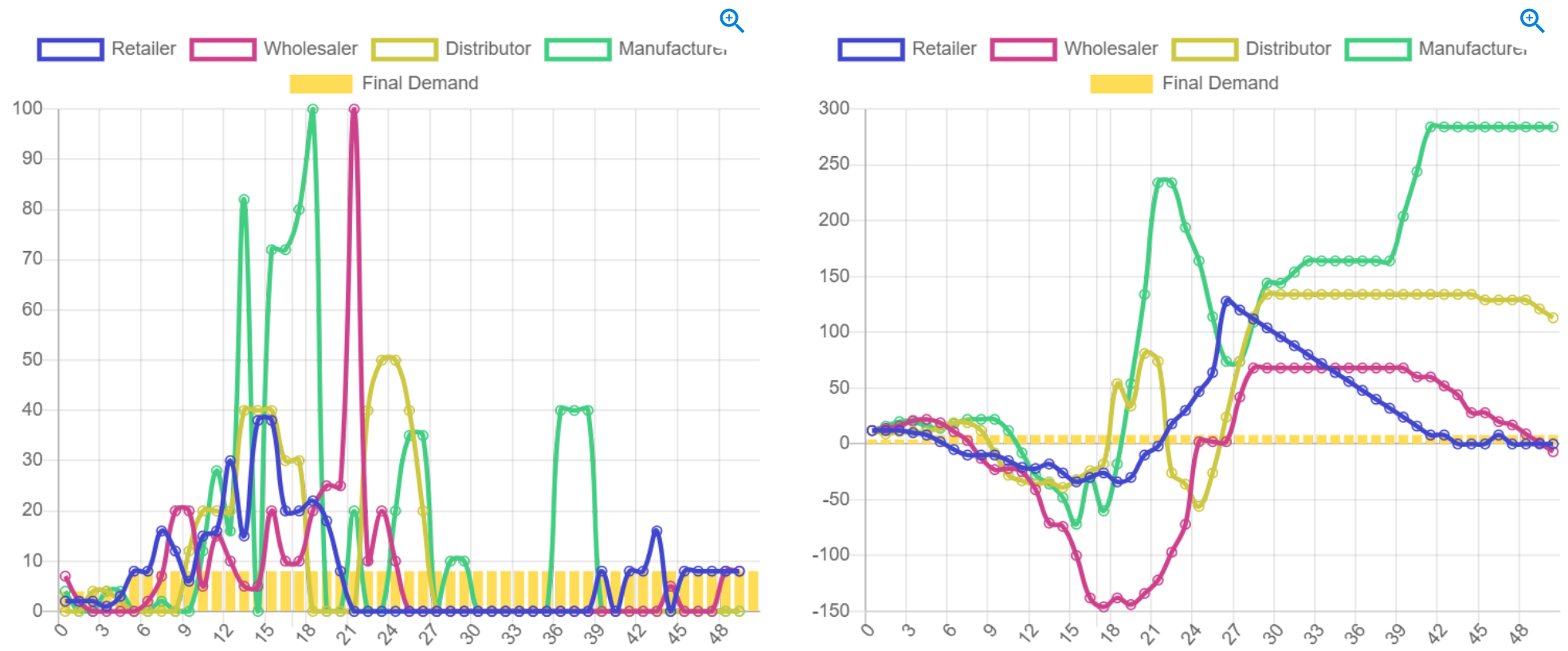
Stages Evolution

See below the evolution of key metrics throughout the game, for each stage.



Response to Demand

The graphs below compare the end consumer demand to the response of the industrial partners : orders and stock.
Do you see a gap between the input signal and the reaction inside the supply-chain system ?



We often see supply-chains alternate between phases of over-stock and out-of-stock.
The amplitude of variations increase as we move upstream from retailer to manufacturer.
This phenomenon is called the **Bullwhip effect**.

Variability

You must have felt it was a challenge to cope with a changing and uncertain demand.
Small variabilities in the final consumer orders may have big impacts on the industrial chain.

8 units
Biggest order of the final consumer
vs. 100 units
Biggest order by the Wholesaler on cycle 21

7.7 units
Average demand of the final consumer
vs. 9.7 units
Average orders in the supply chain

1.1 units
Standard deviation of the final consumer demand
vs.16.7 units
Standard deviation of the supply chain orders

14%
Coef. of variation (StDev / Mean) of the final consumer demand
vs. 171%
Coefficient of variation of the supply chain orders

Lead times

In our example, each node adds lead times for both information and material flows. It results in an end-to-end supply chain which is **12 weeks** long.
The more delays in the system, the bigger the variability and amplification of information, which leads to distorted and delayed material flows.

Very few managers are aware of the long trajectories that their order must complete before being fulfilled. We tend to expect the goods to arrive with the next truck. But in reality each delivery to the consumer is the result of a demand signal sent at least 12 weeks ago!

Total lead time: ***12 weeks***

To Go Further

The best supply-chains manage fluctuations of the demand in a smooth way : they are reactive, agile and sustainable 👌
Find below a few questions to stimulate your thinking...

Which parameters may have an influence on the Bullwhip effect ?

- Lead times make supply-chains less reactive to changes of demand. This also increases the tendency to 'secure' stock and order more than needed.
- The number of stages in the chain has a negative impact. Each level tries to avoid backorders and secure their own stock, which creates tension in the chain.
- Batch sizes and Minimum Order Quantities (MOQ) reduce costs (thanks to economies of scale) - but reduce flexibility.
- The lack of visibility on the stocks/demand make it impossible to anticipate production. When industrials master their whole supply-chain's capacity, they can take better stock decisions.

How could we improve the processes in the Supply-Chain ?

- More communication between stages, and more visibility on the whole chain. Typically, we could implement a Sales and Operations Planning (S&OP) process, or Vendor Managed Inventory (VMI).
- Improving the planning methods, for example using a Kanban approach, or DDMRP, to base the orders on the final demand and reduce peaks inside the supply chain.
- Implement better forecasts, by communicating more with the marketing/commercial departments, use statistical approches, or even machine learning algorithm.
- We could improve the visibility on the delivery due dates by using a RTTV system (Real-Time Transportation Visibility).

Could a different distribution network improve performance ?

- Reducing the number of stages would be quite beneficial. Some industrials choose a 'direct to consumer' strategy: they have their own distribution network or sell though e-commerce. It reduces the intermediaries and allows better information sharing.
- Having alternative sources of supply can reduce risk and improve reactivity. In the same sense, a factory having flexible production lines can smooth its productions depending on demand.
- In product development, making use of generic components can reduce their variability and obsolescence risk. Industrials should try to design products with a late differentiation (ex: using the same bottles for different beer brands).
- We can prioritize local sourcing (work with suppliers closer to the end consumer). Although it may seems more costly, this strategy will reduce the lead times and the risk of disruption.

Cite a few technical innovations that might reduce the Bullwhip effect

- ERPs are now deployed to the cloud. This improves visibility and access to standardized information in the whole chain.
- New production methods such as 3D-printing allow more flexibility and late customization.
- Artificial Intelligence and 'Demand Sensing' techniques can boost forecast quality, stock decision-makings and reactivity.