1) ABC Classification

$$\text{Usage Value} = \text{Unit Cost} \times \text{Sales Units}$$

Sample Number	Sales Unit Cost (Euro)	Last 12 Month's Sales (Units)	Usage Value (Euro)
1	2.4	100	240
2	3.6	6000	21600
3	1.1	220	242
4	3.5	35400	123900
5	11.3	430	4859
6	17.4	65	1131
7	7	120	840
8	187	40	7480
9	1.5	1260	1890
10	6.25	10	62.5
11	0.6	3560	2136
12	152.5	12	1830
13	1.4	22500	31500
14	12	140	1680
15	89	44	3916
16	755	14	10570
17	80.4	268	21547.2
18	10.2	1250	12750
19	430	430	184900
20	25.6	560	14336

Total Usage Value = 240 + 21600 + 242 + 123900 + 4859 + 1131 + 840 + 7480 + 1890 + 62.5 + 2136 + 1830 + 31500 + 1680 + 3916 + 10570 + 21547.2 + 12750 + 184900 + 14336 = 447409.7 Euro.

Sample	Usage (€)	Cumulative €	% of Total	Classification
19	184900	184900	40.88%	A
4	123900	308800	68.26%	A
13	31500	340300	75.22%	B
2	21600	361900	79.98%	B
17	21547.2	383447.2	84.76%	B
20	14336	397783.2	87.91%	B
18	12750	410533.2	90.76%	C
16	10570	421103.2	93.07%	C
8	7480	428583.2	94.73%	C
5	4859	433442.2	95.79%	C
15	3916	437358.2	96.67%	C
11	2136	439494.2	97.13%	C
9	1890	441384.2	97.54%	C
12	1830	443214.2	97.94%	C
14	1680	444894.2	98.33%	C
6	1131	446025.2	98.58%	C
7	840	446865.2	98.76%	C
3	242	447107.2	98.81%	C
1	240	447347.2	98.86%	C
10	62.5	447409.7	98.87%	C

ABC Classification (per definition):

- **A-items** = Top 20% usage → up to 20% of total → covers:

  o Sample **19** and **4** → **2 items**

  o Total usage: €308,800 (≈68.26% of value)

- **B-items** = Next 30% usage → covers:

  o Sample **13, 2, 17, 20** → **4 items**

- **C-items** = Remaining 50% of items → 14 items

This aligns with the company's guidance:

- A: Top 20% of usage value (not items)

- B: Next 30%

- C: Bottom 50%

☐ **A-items:** Items whose cumulative usage accounts for the top **20% of the total usage value**. Due to highly skewed data, samples 19 and 4 represent approximately **68.26%** of the total usage value and are classified as A-items. These are the highest-value items requiring the most attention and tight inventory control.

☐ **B-items:** Items that make up the **next 30%** of total usage value following A-items. Samples 13, 2, 17, and 20 fall into this category, cumulatively contributing to usage value up to approximately **87.91%**.

☐ **C-items:** The remaining items represent the **bottom 50%** of usage value. These are less critical items with relatively low usage value and are classified as C-items.

Classification	Samples	# Items
A	19, 4	2
B	13, 2, 17, 20	4
C	All remaining (1, 3, 5–12, 14–16, 18)	14

2) *Inventory weeks for each item, for each classification, and for all the items in total*

$$\text{Inventory Weeks} = \left(\frac{\text{Inventory Units}}{\text{Last 12 Month's Sales Units}} \right) \times 52$$

A-Class Items (Samples: 19, 4)

Sample	Inventory Units	Sales Units	Inventory Weeks
19	40	430	4.84
4	8500	35400	12.50
Total	—	—	17.34 weeks
Average	—	—	8.67 weeks

B-Class Items (Samples: 13, 2, 17, 20)

Sample	Inventory	Sales	Inventory Weeks
13	10500	22500	24.28
2	120	6000	1.04
17	6	268	1.16
20	18	560	1.67
Total	—	—	28.15 weeks
Average	—	—	7.04 weeks

C-Class Items (Remaining 14 samples)

Sample	Inventory	Sales	Inventory Weeks
1	0	100	0.00
3	420	220	99.27
5	120	430	14.53
6	20	65	16.00
7	160	120	69.33
8	2	40	2.60
9	0	1260	0.00
10	16	10	83.20
11	12	3560	0.18
12	44	12	190.67
14	24	140	8.91
15	2	44	2.36
16	5	14	18.57
18	172	1250	7.16
Total	—	—	512.78 weeks
Average	—	—	36.63 weeks

Classification	Total Inventory Weeks	Average Inventory Weeks
A-items	17.34	8.67
B-items	28.15	7.04
C-items	512.78	36.63
Overall	558.27	27.91 (÷ 20 items)

Does this suggest that Pierre Lamouche's estimate of inventory weeks is correct?

- Pierre Lamouche estimated an average of 10 weeks, but the real average is ~27.9 weeks, nearly 3× higher.
- The figure is heavily skewed by C-items with extremely high weeks (e.g., sample 12: 190.67 weeks, sample 3: 99.27 weeks).
  - A- and B-items are close to or under Pierre's estimate → better managed.
- C-items are overstocked, poorly managed.

3) What is your estimate of the overall inventory at the end of the base year, and how much might that have increased during the year?

$$\text{Inventory Value} = \text{Inventory Units} \times \text{Unit Cost}$$

Sample	Unit Cost (€)	Inventory Units	Inventory Value (€)
1	2.4	0	0.00
2	3.6	120	432.00
3	1.1	420	462.00
4	3.5	8500	29,750.00
5	11.3	120	1,356.00
6	17.4	20	348.00
7	7.0	160	1,120.00
8	187.0	2	374.00
9	1.5	0	0.00
10	6.25	16	100.00
11	0.6	12	7.20
12	152.5	44	6,710.00
13	1.4	10500	14,700.00
14	12.0	24	288.00
15	89.0	2	178.00
16	755.0	5	3,775.00
17	80.4	6	482.40
18	10.2	172	1,754.40
19	430.0	40	17,200.00
20	25.6	18	460.80
TOTAL	—	—	78,327.80

Estimated Inventory Value at Year-End = €78,328 (approx.)

- Turnover grew by 25%

- But inventory grew faster than turnover

- We must estimate what the base year inventory was before the growth

Assume:

Let's call:

- This year's inventory = I_1 = €78,328

- Growth = x%

- Turnover increased 25% ⇒ if sales last year were S, this year it's 1.25×S

- Inventory grew *faster* than sales ⇒ say inventory increased ~35%

Inventory Last Year (I_0) = I_1/1.35

$$= 78328/1.35$$

$$\approx 58{,}024$$

Estimated Last Year's Inventory = €58,024
Estimated Increase = €78,328 − €58,024

$$= €20,304$$

- Estimated Year-End Inventory: €78,328

- Estimated Inventory Last Year: ~€58,024

- Estimated Increase in Inventory: ~€20,304 (≈ 35% growth)

4) Root Cause Analysis of Availability Issues

1. Inaccurate Inventory Weeks

- Actual average inventory cover from Q2 = ~28 weeks, not 10.

- This means too much capital is tied up in excess stock, yet they still face 500 SKUs out of stock.

- The issue is not just having too little stock, but imbalanced stock — too much of the wrong items, not enough of the critical ones.

2. Outdated Reorder Levels and Quantities

- Most ROLs and ROQs were set years ago and never updated.

- Sales trends have shifted, and these static settings can't reflect fast movers vs slow movers.

- High-selling items may now stock out frequently, while others pile up unused.

3. Forecast-Based ROQs Are Unreliable

- Forecast-based ordering for new products isn't stable.

- Without feedback loops or demand tracking, the company risks understocking fast movers or overstocking low-demand items.

4. Too Many SKUs & Poor ABC Focus

- Many low-usage C-class items have extremely high inventory weeks (e.g. Sample 12 = 190.67 weeks).

- These create dead stock, consuming warehouse space and capital.

- Meanwhile, A-items have lower inventory weeks (~8.7 weeks) and might be more prone to stockouts if demand spikes.

5. Manual, Costly Ordering Process

- Average order cost = €50, and manual processing delays responsiveness.

- This discourages frequent small-batch orders, leading to bulk overstocking instead of responsive replenishment.

6. Lack of Systematic Review

- No ongoing inventory performance monitoring, no EOQ or safety stock review, no alerts for service level degradation.

- This results in a reactive rather than proactive approach to inventory management.

Issue	Effect
Outdated ROL/ROQ	Understocking fast sellers, overstocking others
Inaccurate demand forecasting	Leads to mismatched stock levels
Skewed ABC focus	Low-value items take up excessive inventory space
Manual order placement	Slow reaction times, higher costs, less flexibility
Lack of system updates	No visibility into shifting trends or usage patterns

5) *the EOQs for the A-items.*

$$\text{EOQ} = \sqrt{\frac{2DS}{H}}$$

Where:

- D = Annual demand (last 12 months sales)

- S = Order cost (€50)

- H = Annual holding cost per unit = Unit cost × 15% (holding cost rate)

A-items (from ABC analysis):

These are:

- Sample 19, Sample 4

Sample 19:

- Unit Cost = €430
- D = 430 units
- H=430×0.15=64.50

$$EOQ = \sqrt{\frac{2 \times 430 \times 50}{64.50}} \approx \sqrt{665.12} \approx 25.8 \Rightarrow \boxed{26 \text{ units}}$$

Sample 4:

- Unit Cost = €3.5
- D = 35,400 units
- H=3.5×0.15=0.525

$$EOQ = \sqrt{\frac{2 \times 35400 \times 50}{0.525}} \approx \sqrt{6,742,857} \approx 2,596.7 \Rightarrow \boxed{2,597 \text{ units}}$$

Sample	D (Units)	Unit Cost (€)	H (€)	EOQ (Units)
19	430	430.0	64.50	26
4	35,400	3.5	0.525	2,597

6) Recommendations to Improve Inventory Management

1. Implement ABC-Based Inventory Policy

Why: Inventory weeks and EOQs vary significantly between item classes.

Actions:

- A-items (high-value, high-volume): Tight control, frequent reviews, automate EOQ ordering.

- B-items: Moderate control, review quarterly.

- C-items: Use two-bin system or longer reordering cycles to reduce overhead.

2. Recalculate ROL and ROQ Based on Current Data

Why: Most reorder levels are outdated and do not reflect demand shifts.

Actions:

- Use recent 12-month sales data to recalculate reorder levels.

- Set dynamic ROLs based on lead time demand + safety stock.

- For A-items, use statistical forecasting and safety stock for stockout protection.

3. Adopt EOQ for A-Items Immediately

Why: A-items make up the majority of usage value and should be optimized first.

Actions:

- Use calculated EOQs (from Q5) to place economically efficient orders.

- This will minimize ordering and holding costs without sacrificing service levels.

4. Phase Out or Consolidate Slow-Moving C-Items

Why: Many C-items have extremely high inventory weeks (e.g., 190+), tying up capital.

Actions:

- Identify obsolete or low-turnover items.

- Consider bundling, discounting, or discontinuing items with low sales and high stock.

- Use Make-to-Order or Just-in-Time approach for niche items.

5. Digitize & Streamline Ordering Process

Why: Each manual order costs €50 and many suppliers don't accept online orders.

Actions:

- Prioritize onboarding suppliers to EDI or online portals.

- Integrate an automated replenishment system based on sales/inventory data.

- Use batch ordering for B/C items to reduce order frequency.

6. Invest in Inventory & Demand Planning Tools

Why: Demand volatility and misalignment between forecast and reality cause both stockouts and overstocking.

Actions:

- Use tools like forecasting software, or ERP systems with inventory modules.

- Implement alerts for unusual usage patterns or SKU imbalances.

- Regularly analyze inventory KPIs (e.g., turnover ratio, stockout rate, aging inventory).

7. Improve Service Levels with Real-Time Inventory Visibility

Why: Currently, ~500 SKUs are out of stock at any time — impacting customer satisfaction.

Actions:

- Implement real-time stock visibility, linked to website and internal systems.

- Use safety stock buffers for fast-moving A-items.

- Track fill rate and order cycle time to ensure customer needs are met.