LEÓN

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Decentralized Inventory Control for Enhanced Efficiency in a Luxury Automotive Agency

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Leading Brand in Luxury Automotive Excellence

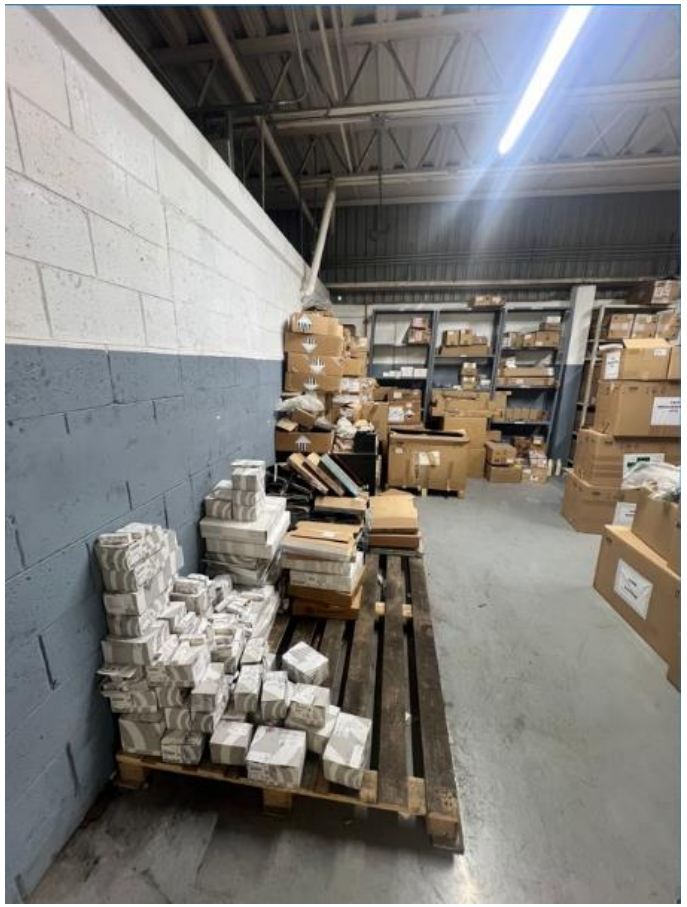
The agency represents a premium global brand recognized for its innovation, engineering precision, and exceptional customer experience.

- Recognized for outstanding performance and quality standards in both vehicles and after-sales service.
- Operates within a complex, high-value supply network, balancing efficiency and customization.
- Integration of data-driven decision-making for enhanced responsiveness and reduced obsolescence.

Problem

Currently, the spare parts management system shows several operational inefficiencies.

- **Inactive capital**
- **Risk of value loss**
- **Slow warehouse flow**
- **Obsolete or non-rotating parts**
- **Overload of work for employees**
- Nearly **7 out of every 10 pesos** invested in inventory are tied up in **obsolete parts**.



Centralized Inventory System

The car agency manages its **inventory and operations through a unified digital platform**.

Key Features:

- Centralized database for parts and vehicles.
- Real-time updates on stock movements.
- Automated replenishment and order control.
- Performance indicators (KPIs) for continuous improvement.

Disadvantages:

- The system prioritizes central control over local needs, affecting service speed.
- Local managers have little autonomy to adjust orders or stock levels promptly.
- The centralized model slows response times.
- Lack of dynamic updates in demand forecasting leads to inefficient inventory management.

Automotive Agency KPIs

KPI	Febreary 28, 2025	March 26, 2025	Objective
Total availability	81.95%	89.97%	> 93%
% Availability stock automatic orders	83.70%	92.50%	> 95%
% Availability stock normal orders	67.65%	69.85%	> 88%
Inventory turnover	2.97	2.98	> 9
% Urgent orders	6.75%	13.10%	< 40%
% Overstock automatic orders	28.86%	33.25%	< 10%
% Overstock normal orders	34.88%	37.45%	< 20%
% References without stock	5.61%	4.50%	< 3.5%
% Obsolete stock value	62.69%	61.03%	< 20%

Key definitions

- **Obsolete** item. An item has less than three picks in 12 months.
- **Overstock** = Actual stock + On-order stock – Planned Objective
- **Order type** = Automatic, Normal, Special, Obsolete

Usual suspects

- **Variable delivery lead-times** (Unlikely). Luxury brands often use centralized logistics with predictable lead times and efficient tracking systems.
- **Supply uncertainty** (Unlikely). Premium manufacturers work with highly standardized, certified suppliers
- **Poor demand forecasting** (Possible). Inaccurate prediction of parts usage for some regions.
- **System parameter errors** (Possible). Incorrect classification level, reorder points, or lead times.

Not so usual suspects

- **Inflexible replenishment rules** (Likely cause). Systems may maintain high safety stock to ensure availability, causing accumulation of slow-moving parts.
- **Service level** (Likely cause). Maintaining very high service levels (e.g. parts always available, minimal back orders) requires carrying extra safety stock, critical parts, and even rarely used variants.
- **Product proliferation** / too many SKUs (Likely cause). High model diversity and low rotation of luxury car parts inflate total inventory.

Possible solutions

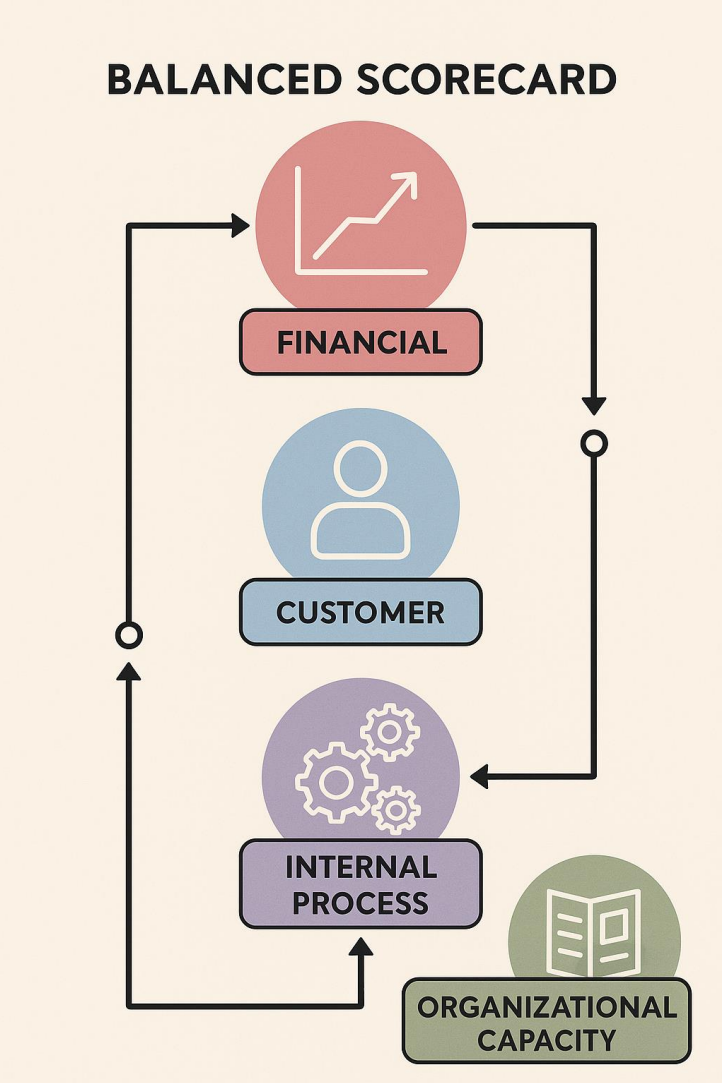
- **Promotional or sales discounts**. Luxury car agencies don't use discounts or promotions to move inventory because affect brand perception and value.
- **Regular inventory review & clean-up**. Discounting or clearance may conflict with brand image — must coordinate with corporate policy; obsolete parts should be phased out carefully.
- **Reorder Point & Safety Stock Review.** Must distinguish between *critical parts* (must always be available) versus *rarely used parts* where over-stocking is costly, or other classification. Very hard to include in the actual system.
- **Decentralized control.** It might increase responsiveness to local market needs, reduce mismatches between real demand and centralized forecasts, and improve service levels. This may also lead to speculation as in the famous beer game.

Balanced Scorecard (BSC)

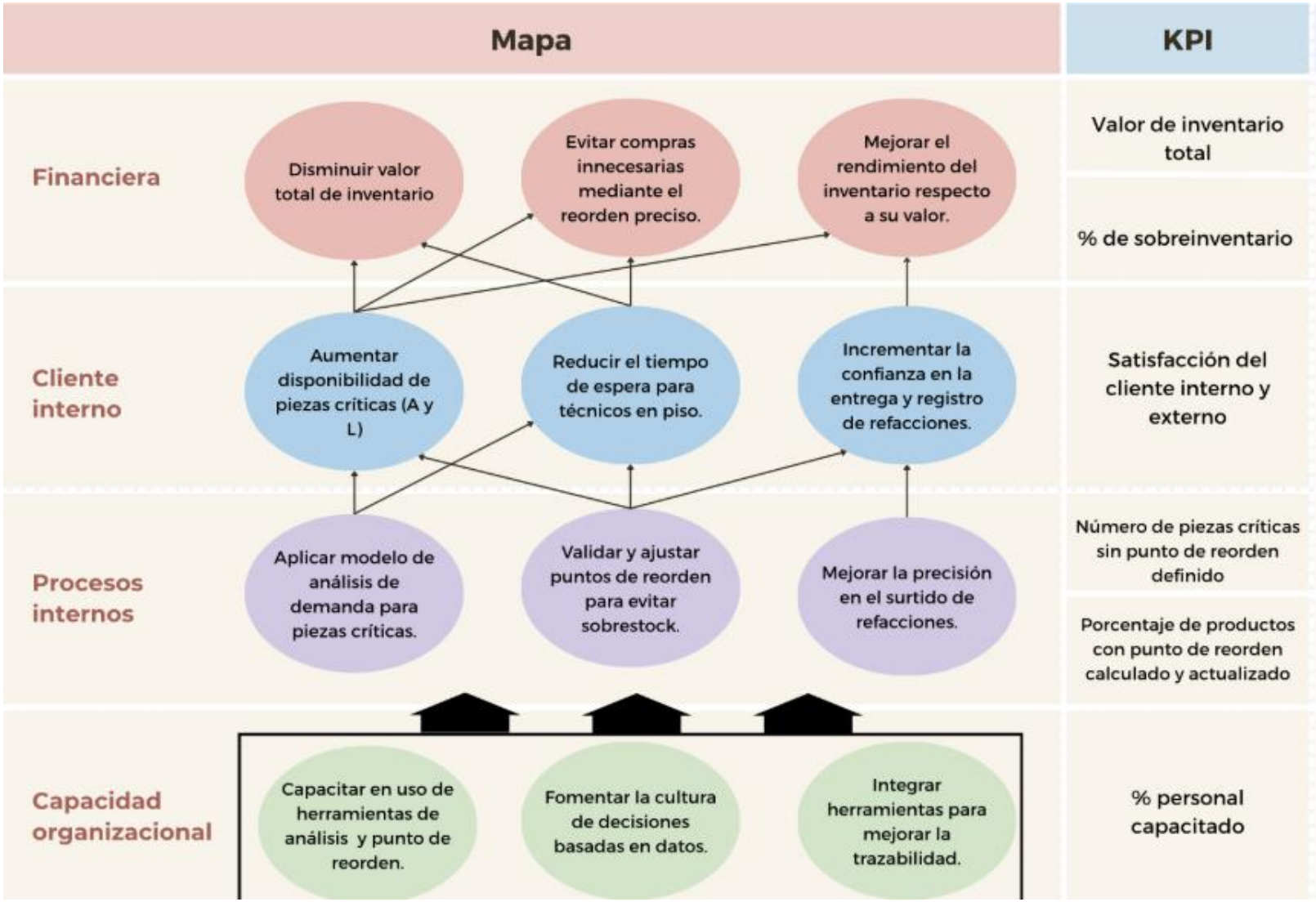
Thanks to the BSC approach, we moved from reacting to strategically planning. We visualized the problem and broke it down into clear objectives, achievable goals, and shared responsibilities. This tool provided us with visibility, control, and direction.

By applying this approach, we avoid:

- Uncontrolled inventories.
- Unnecessary purchases.
- Inefficient operations.
- Immobilized capital.



BSC


Mapa
KPI
Financiera
Disminuir valor total de inventario
Evitar compras innecesarias mediante el reorden preciso.
Mejorar el rendimiento del inventario respecto a su valor.
Valor de inventario total
% de sobreinventario
Cliente interno
Aumentar disponibilidad de piezas críticas (A y L)
Reducir el tiempo de espera para técnicos en piso.
Incrementar la confianza en la entrega y registro de refacciones.
Satisfacción del cliente interno y externo
Procesos internos
Aplicar modelo de análisis de demanda para piezas críticas.
Validar y ajustar puntos de reorden para evitar sobrestock.
Mejorar la precisión en el surtido de refacciones.
Número de piezas críticas sin punto de reorden definido
Porcentaje de productos con punto de reorden calculado y actualizado
Capacidad organizacional
Capacitar en uso de herramientas de análisis y punto de reorden.
Fomentar la cultura de decisiones basadas en datos.
Integrar herramientas para mejorar la trazabilidad.
% personal capacitado

Dataset

The data provided by the agency was the inventory record at three dates:

- March 27, 2025
- April 30, 2025
- May 20, 2025

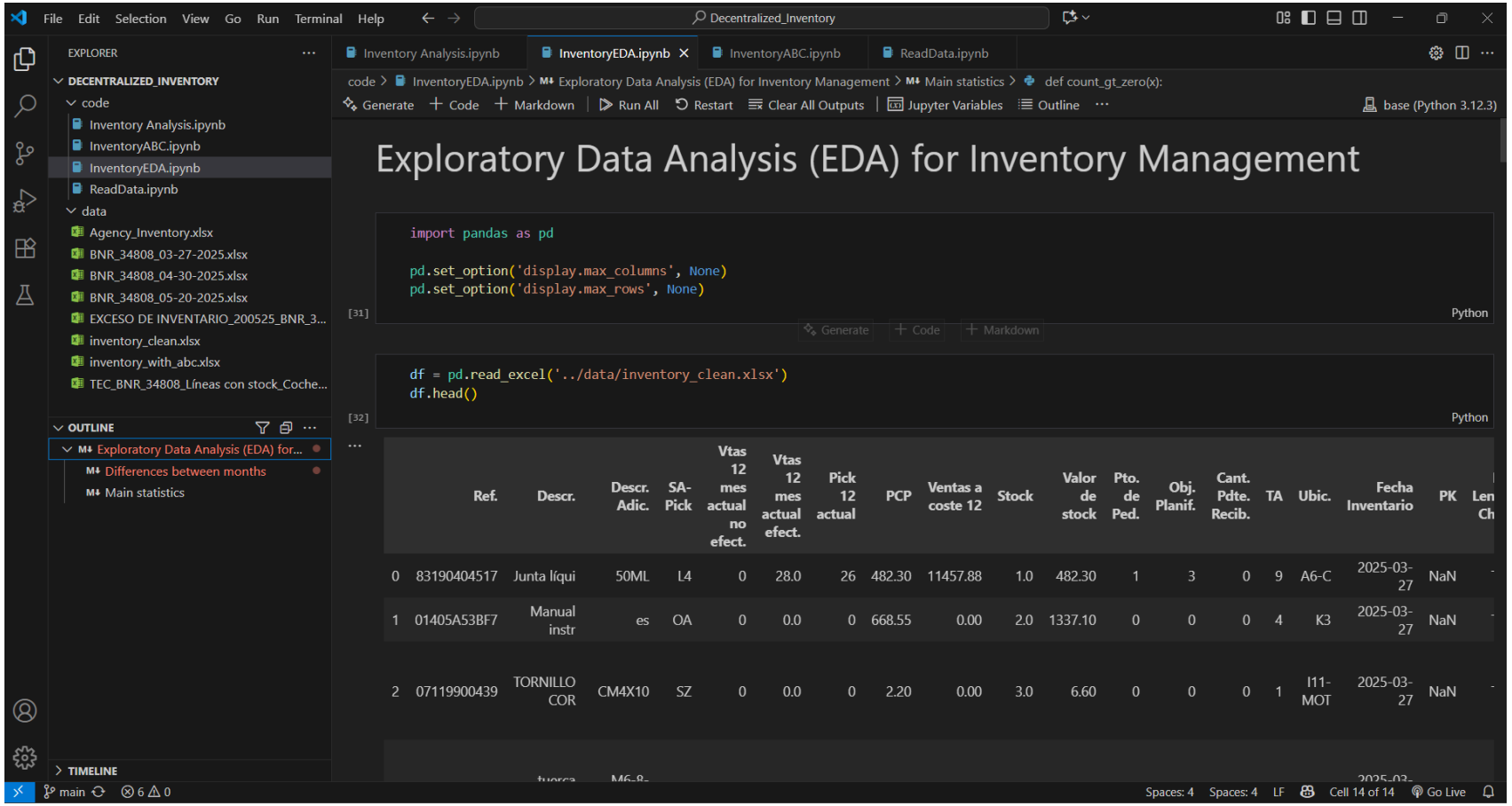
Each file contained 17 columns or variables. The main variables were:

- Reference number (11 characters)
- Description
- Two code classification (Ax, Nx, Ox, Sx)
- Annual sales
- Stock
- Stock value
- Point of reorder
- Maximum level
- Location

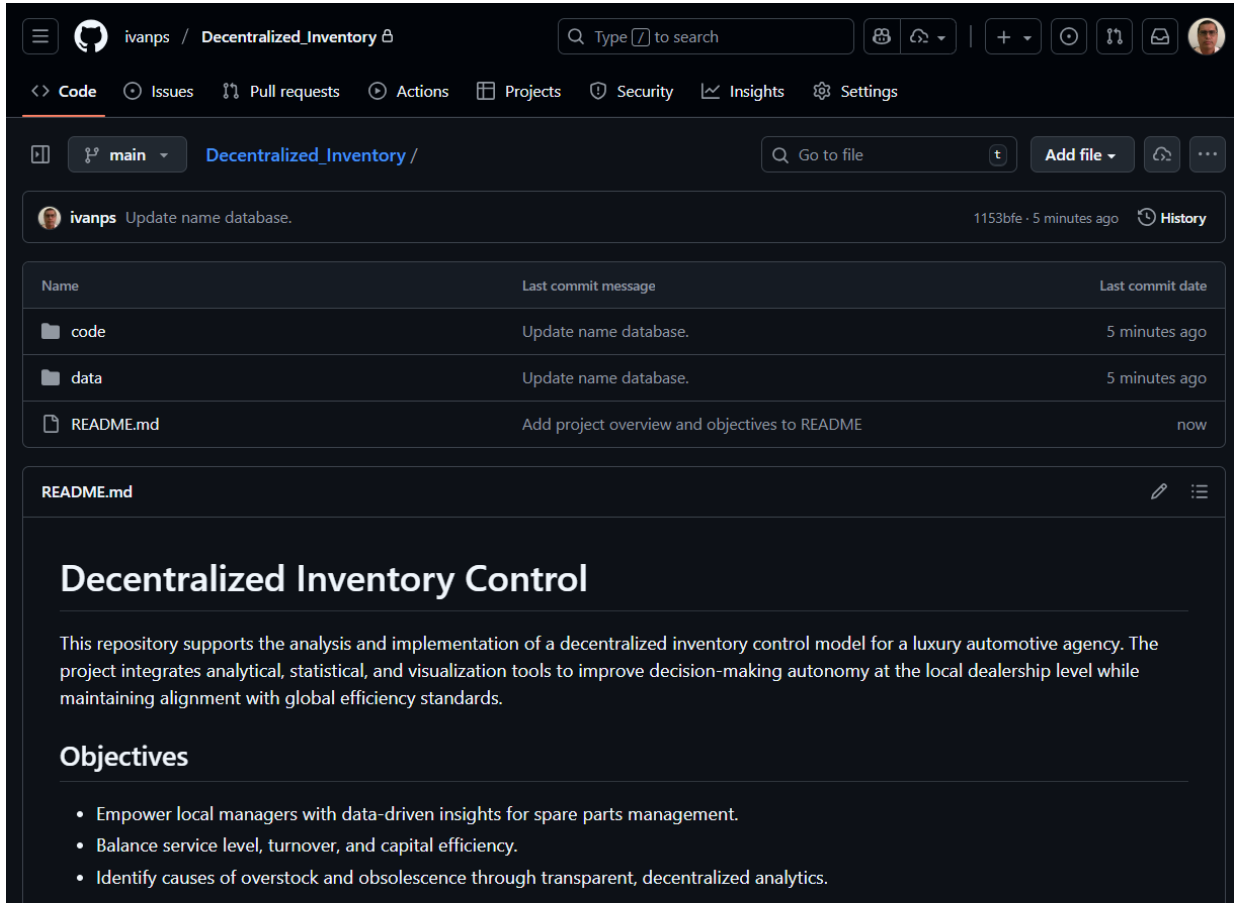
Tools supporting Decentralized Inventory Control

Microsoft Excel	Initial data organization and calculations.
Minitab	Descriptive statistics and plots.
Python (Jupyter Notebook in VS Code)	Automatic data processing and computation of key indicator.
GitHub (Private Repository)	Team collaboration for scripts and datasets.
Looker Studio Dashboard	Visualization and performance monitoring for managers.

Visual Studio Code (Copilot)



GitHub Repository



ABC Classification

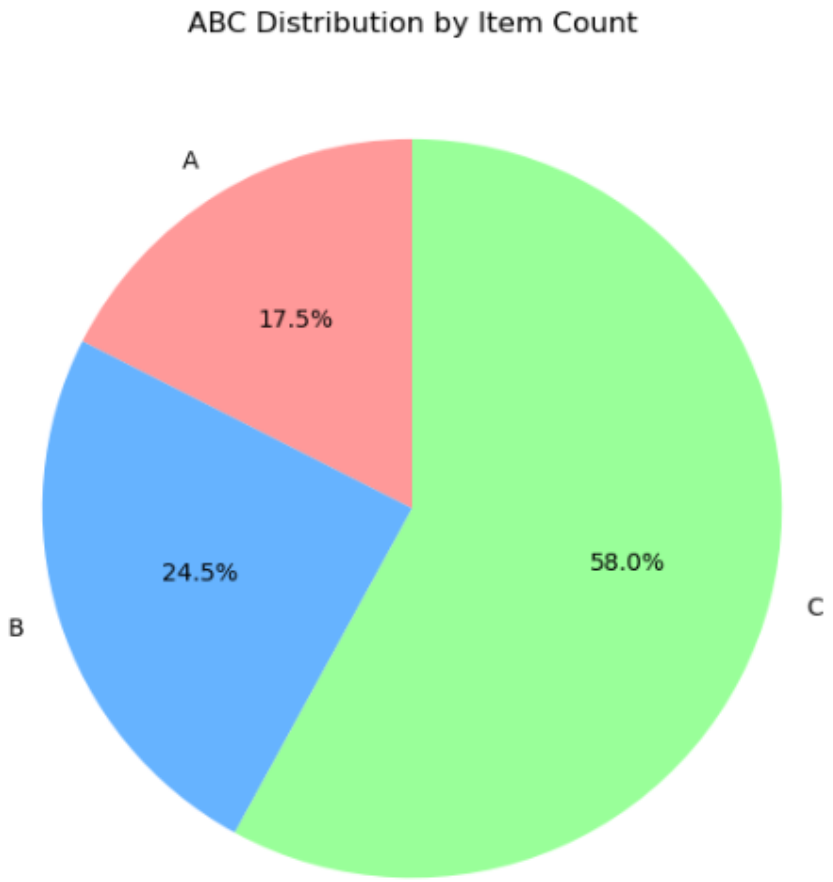
Objective.

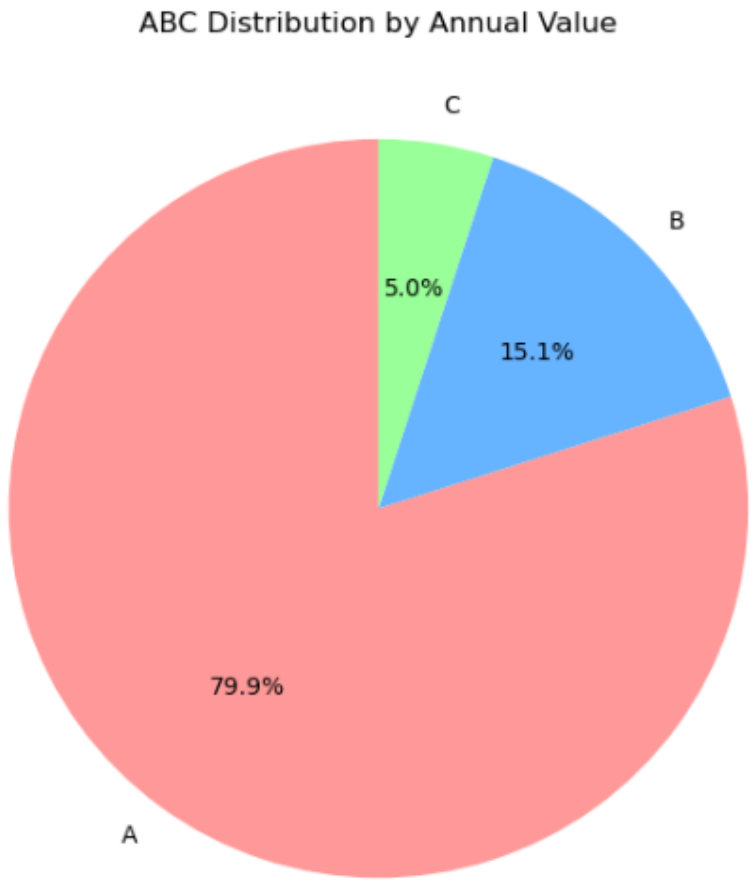
- Focus efforts and capital on the most critical and high-value parts to improve stock efficiency, reduce obsolete inventory, and increase turnover.

Why to use ABC?

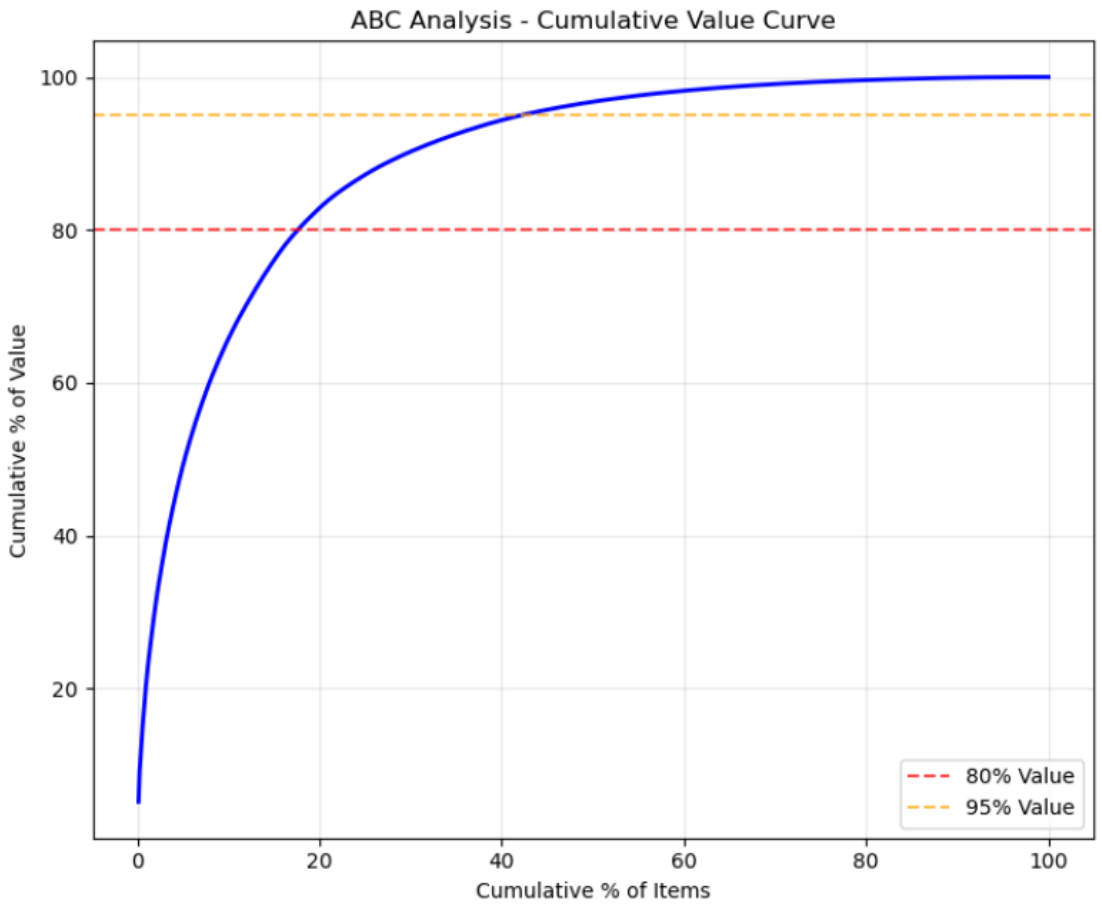
- Identifies which parts contribute most to value (Pareto principle).
- Allows prioritized management: more attention on “A” items, lighter control over “C” items.
- Helps set appropriate safety stock and reorder points by class.
- Highlights slow-moving or obsolete parts for possible write-off or special review.

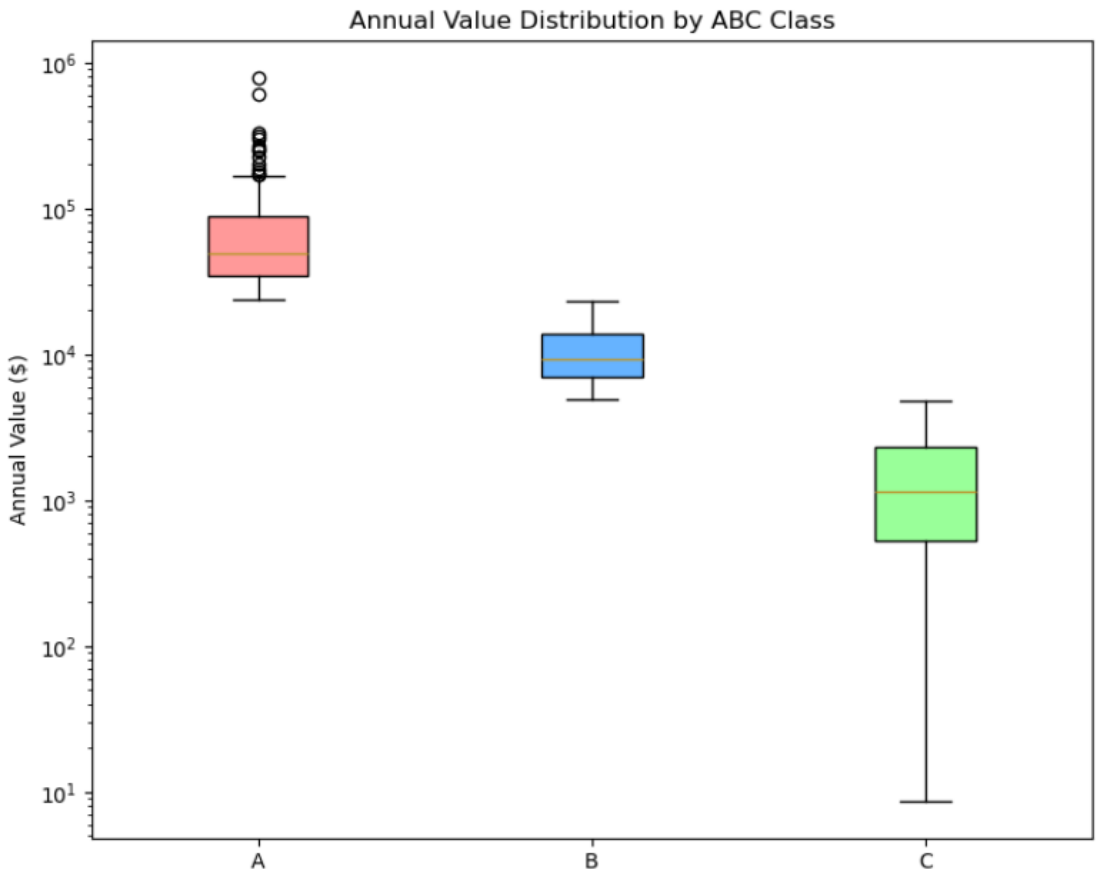
ABC Visualization





ABC Visualization





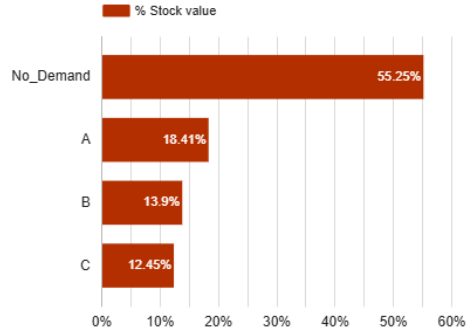
Looker Studio Dashboard

Luxury Automotive Inventory

Date of inventory

Total Items	Stock	Overstock
6,739	18,044.9	14,474.6

Order Type	Items	Stock	% Stock value	Overstock	Overinventory
Obsolete	1,875	9,975	65.36%	10,164	72.16%
Special	674	2,173	15.92%	2,281	20.24%
Automatic	209	3,748	11%	1,216	4.32%
Normal	179	2,148.9	7.73%	813.6	3.28%



Item description	Stock	% Stock value	Annual sales
Disco de fre	120	4.69%	0
Juego rep. p	138	4.33%	0
Parabrisas v	30	1.73%	0
Disco freno	43	1.68%	3
Unidad de ma	32	1.56%	0
MINI T-Shirt	357	1.48%	0
Faro LED AHL	9	1.45%	0
Alfombra mal	27	1.35%	0
Sensor de ul	54	1.35%	0
Juego de esc	71	1.31%	0

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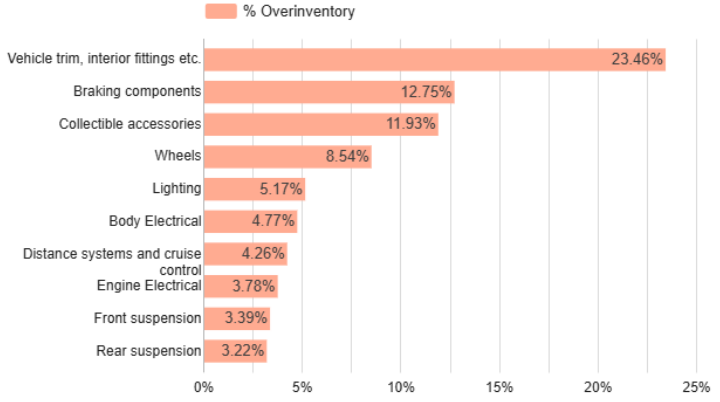

Future work

- Automated weekly inventory reports.
- Dynamic safety stock and reorder point adjustment.
- Local vs Central control framework.
- Enhanced dashboard capabilities.

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Thank you