

Average Inventory: KPI, Calculation and Optimisation in Procurement

Average inventory refers to the average quantity of goods, raw materials, semi-finished and finished products held in stock over a given period. It is a key business KPI for procurement, logistics and controlling because it combines inventory costs, capital tied up and supply security in a single value. In practice, it serves as the basis for further metrics such as inventory turnover or inventory coverage. Those who manage average inventory systematically reduce capital costs without jeopardising delivery capability.

Key facts

- Average inventory is typically calculated as the mean of opening and closing stock or as the average of several reference-date values.
- It forms the basis for inventory turnover and capital tied up within working capital.
- High inventory improves availability but incurs storage, capital and obsolescence costs.
- In industry, inventory turnover is often between four and twelve per year depending on the sector.
- JIT and just-in-sequence concepts reduce inventory but increase the demands on delivery reliability.
- The value should always be interpreted together with service level and inventory coverage.

Definition: Average Inventory

Average inventory is the mean quantity of all stocked items within an observation period, expressed in units, weight or value (usually at acquisition cost). It typically comprises raw, auxiliary and operating materials, semi-finished products, finished products, spare parts and trading goods.

Distinction from valuation-based stock

It is important to distinguish between physical quantity and valuation-based stock: the physical stock counts units, while the valuation-based stock multiplies these by a valuation basis (e.g. moving average cost or FIFO). For procurement decisions, the value-based stock is usually decisive because it directly reflects capital tied up and storage interest. With price fluctuations, currency effects or base stocks from advance reports, the two figures can diverge. In practice, separate reporting by warehouse type and product group is recommended in order to draw reliable conclusions.

Legal and accounting classification

For accounting purposes, inventory counts as current assets and is valued in accordance with commercial law and tax regulations; the specific valuation method (e.g. at acquisition cost or the lower value at the balance sheet date) should be reviewed by a tax adviser or auditor on a case-by-case basis. Operational inventory management is additionally subject to internal rules such as minimum and maximum stock levels and safety stocks. This planning level and the accounting level should be clearly kept separate, as different objectives apply to each.

Calculation: Methods and Approach

There are several methods for determining average inventory. The choice depends on the available data basis, inventory dynamics and the intended use of the KPI.

Simple averaging

The most common method is the arithmetic mean of the opening and closing stock for the period: $(\text{opening stock} + \text{closing stock}) / 2$. It is simple to apply but distorts the picture when stock fluctuates sharply, for example due to year-end promotions, large orders or seasonal replenishment. With monotonically growing or shrinking stock, the two-point mean tends to over- or underestimate the actual average holding period.

Time-series and day-precise methods

More precise is averaging several reference-date values, such as month-end or week-end balances, over the period. Ideal is a day-by-day evaluation from the inventory management system in which every stock movement is recorded with a timestamp and the weighted average inventory can be derived directly. In practice, monthly reference dates are usually sufficient for reporting, while day-precise values are advantageous for strategic inventory decisions and working capital analyses.

Value-based or quantity-based view

Depending on the question at hand, average inventory is determined in physical units (item coverage) or in value (capital tied up). For procurement, the value-based view is usually decisive because it sets priorities: expensive A-items tie up a lot of capital despite small quantities. An ABC analysis combined with XYZ classification helps to select the items to be examined and the appropriate level of detail.

Key KPIs around Average Inventory

Average inventory is rarely an end in itself but rather the starting point for further KPIs. Only in combination do they paint a meaningful picture of the inventory situation.

Inventory turnover and storage duration

Inventory turnover is typically derived from the cost of goods sold (or revenue at cost values) divided by average inventory. The reciprocal, multiplied by the length of the period, gives the average storage duration in days. Industrial values commonly range between four and twelve turnovers per year; a single value is only interpretable in an industry and assortment context. Fast movers in series production achieve significantly higher values than spare parts warehouses.

Inventory coverage and safety stock

Inventory coverage indicates how many days or weeks the average stock will cover demand. It links stock levels to supply security and is therefore one of the most important control variables for buyers. Safety stock, in turn, buffers demand and delivery fluctuations; its level depends on lead times, variances and the target service level. Both figures should be regularly compared against average inventory.

Inventory carrying costs and capital tied up

Inventory carrying costs include capital interest, storage space and handling costs, insurance, and risk deductions for obsolescence and shrinkage. In practice, capital interest and storage risk are often

applied together at typically ten to thirty per cent of the inventory value per year, although the exact rate should be verified on a company-specific basis. These rates form the basis for evaluating inventory reductions in business terms and communicating them to management in euro.

Influencing Factors and Levers in Procurement

The level of average inventory is no accident but the result of procurement strategy, supplier structure and planning parameters. Procurement has several effective levers here.

Order quantities, ordering costs and lot sizes

Ordering costs, price effects from volume tiers and the classic optimal order quantity determine how often and how much is procured. Large lots reduce unit costs and ordering costs per unit but increase average inventory. Modern approaches therefore also examine alternatives such as call-off framework agreements, consignment stock or supplier managed inventory, where stock formally remains with the supplier. Supplier capacity alignment also plays a role: if a partner delivers flexibly in small lots, safety stock can be reduced.

Lead times and procurement strategy

Long and variable lead times force high inventory levels. Strategic levers include selecting regional or faster suppliers, supplier consolidation and reliable agreements on replenishment times – for example from a structured negotiation process with skilled negotiation techniques. The Kraljic matrix helps to classify items by supply risk and value and to define different inventory strategies per segment: strategic goods with buffers, routine items with lean processes.

Vertical integration and process speed

The company's own vertical integration also influences inventory: high vertical integration means many intermediate products in stock, while external supply shifts inventory to the interface. What matters is the throughput time across the entire order-to-delivery process, starting with a clean enquiry and supplier qualification check through to the invoice approval workflow chain. The faster procurement and qualification processes run, the lower the safety stock needs to be.

Risks and Controls in Inventory Management

Stock levels that are too low jeopardise delivery capability, while stock levels that are too high tie up capital and create risks. A functioning control system balances both extremes.

Obsolescence, shrinkage and quality risks

Long storage durations increase the risk of obsolete items, especially with electronics, plastics subject to ageing or product-specific components. In addition, quality problems may only become visible late; quality gates before goods receipt and continuous monitoring of incoming quality (PPM) reduce this risk. Regular stocktakes, blocked stock and reorder point analyses are among the standard controls.

Capital tied up and working capital

High average inventory ties up liquidity-relevant capital and worsens KPIs such as the cash conversion cycle. As interest rates rise, the calculated disadvantage of capital tied up increases noticeably. Controls rely on inventory budgets per product group, defined target values for turnover and coverage, and regular reviews – for example in a Quarterly Business Review (QBR) with key suppliers, in which

inventory and call-off topics are also discussed in a binding manner.

Data basis and processes

Unreliable inventory data render every KPI worthless. Clean master data are essential, including through disciplined vendor master record creation, consistent ordering and goods receipt processes up to the commercial invoice in international procurement, and clear responsibilities for one-off orders and legacy stock. Export control may also become relevant if controlled goods are stored; in such cases, inventory levels are subject to documentation requirements and must be examined on a case-by-case basis.

Current Developments: Inventory between Resilience and Efficiency

The logic of 'as lean as possible' that had prevailed for years has been partially revised in light of supply chain disruptions. Companies are now seeking a middle ground between inventory minimisation and resilience.

Resilience and strategic buffers

For critical items, deliberately held strategic stocks, multi-sourcing and contractual supply guarantees are becoming established. Average inventory is thus partly increased, but managed deliberately and assessed by risk. A clean spend taxonomy is helpful for identifying critical material groups and segmenting inventory strategies. The reporting and documentation obligations surrounding the Corporate Sustainability Reporting Directive (CSRD) also raise documentation requirements along the supply chain and indirectly affect inventory and procurement decisions.

Digitalisation and planning tools

Digital planning tools, inventory forecasts based on historical consumption data and automated replenishment reduce planning effort and improve forecast quality. Digital platforms also support rapid supplier identification and the development of alternative sources of supply, which can reduce safety stock. Innovative supplier solutions – such as joint developments with less inventory-intensive manufacturing processes – can be systematically identified through formats such as a Supplier Innovation Day. Processes from demand to contract can be digitised and accelerated via Source-to-Contract (S2C).

Typical metrics

Inventory turnover: typically 4–12 per year

highly industry-dependent; only interpretable in the context of assortment and industry

Inventory coverage: commonly 30–90 days

define a target value per product group and monitor regularly

Inventory carrying costs (capital interest + risk): typically 10–30 % of inventory value p. a.

calculate on a company-specific basis, including interest rate and obsolescence risk

Service level (delivery reliability): > 95 %

counterweight to the inventory target; inventory reduction must not jeopardise delivery capability

Practical example

A medium-sized mechanical engineering company with around 30,000 active items found, as part of a working capital programme, that its average inventory value had risen steadily over three years even though revenue grew only moderately. An ABC/XYZ analysis showed that a large proportion of the capital tied up was attributable to a few high-value standard components with long lead times. The company adjusted its planning parameters, introduced call-off framework agreements with monthly releases for critical parts, and thereafter discussed inventory targets in regular supplier meetings. Within one year, average inventory fell significantly while the service level remained stable.

- ABC/XYZ analysis to identify the item groups tying up capital
- Adjusting safety stocks and lot sizes to current lead times
- Call-off framework agreements and supplier managed inventory for A-items
- Quarterly inventory reviews with defined target values for turnover and coverage

Conclusion

Average inventory is more than a statistical figure: it links procurement decisions, supplier behaviour and liquidity in a single KPI. What matters is not to view it in isolation but to interpret it together with service level, inventory coverage and inventory turnover. The right value depends on industry, item structure and risk profile – blanket targets lead astray. Companies that manage inventory systematically, keep their data basis clean and involve their suppliers achieve noticeable effects on capital tied up and inventory costs in practice. Getting started usually works best with an ABC analysis and clear target values per product group.

Frequently asked questions

How is average inventory calculated?

The simplest approach is to take the average of the opening and closing stock for the period. With fluctuating stock levels, averaging several month-end or week-end balances is more accurate. The most precise method is a daily evaluation from the inventory management system, weighted over dwell time.

What is a good average inventory level?

There is no generally good value; it depends on the industry, item structure and service level. What matters is the relationship to cost of goods sold, expressed in inventory turnover and inventory coverage. In industry, four to twelve turnovers per year are typically common, with significant industry-specific deviations.

What costs does high inventory cause?

Inventory carrying costs include capital interest, storage space, handling, insurance, and risks from obsolescence and shrinkage. In practice, these costs are often estimated at ten to thirty per cent of the inventory value per year. The exact amount should be calculated on a company-specific basis.

How can procurement reduce average inventory?

Effective levers include shorter and more reliable lead times, smaller lot sizes, call-off framework agreements, consignment models and better forecast quality. Collaborating with flexible suppliers also reduces safety stock. It is important to monitor the service level at the same time so that delivery capability is not compromised.

What is the difference between average inventory and inventory coverage?

Average inventory is an absolute stock quantity in units or value. Inventory coverage relates this stock to average consumption and shows how long the warehouse will cover demand. Both KPIs complement each other and should be interpreted together.

How does average inventory relate to inventory turnover?

Inventory turnover is derived by dividing the cost of goods sold by the average inventory. A higher inventory level with the same cost of goods sold therefore means lower turnover and longer storage duration. This KPI is well suited for time series and benchmark comparisons.