

Kanban: Demand-driven control of material flows in procurement

Kanban is a demand-driven control principle in which material replenishment is only triggered once actual consumption has taken place. In industrial procurement, Kanban often replaces classic replenishment methods such as nervous order- or forecast-based demand calculation and delivers lower inventories and a more stable supply. For buyers and supply chain managers, the system fundamentally changes their role: instead of planning individual purchase orders, they shape framework conditions, supplier relationships and replenishment processes. The following article explains how Kanban works, its prerequisites, KPIs and practical implementation in manufacturing and procurement.

Key facts

- Kanban is a pull system: replenishment is triggered by actual material consumption, not by forecasts.
- Typical signal carriers are cards, electronic Kanbans or bins used as a visual signal.
- The most common implementation in the supply environment is the two-bin system with supplier call-off.
- Kanban typically reduces inventories considerably, but requires reliable lead times and stable demand.
- Framework agreements concluded with the supplier, plus self-collection or consignment arrangements, are common accompanying instruments.
- Electronic Kanban (eKanban) combines the principle with ERP and supplier systems and improves the data basis.

Definition: Kanban

Kanban (Japanese for "card" or "signal") is a method of demand- and consumption-driven material planning. The consumption of a material at the point of use automatically triggers a replenishment signal that initiates the transport or production of a defined quantity. Kanban is thus a central element of the pull principle and lean philosophy.

Origin and basic principle

Kanban was developed in the automotive industry as part of the Toyota Production System to organise material flows in a self-controlling manner without a central planning authority. The basic principle is: only what has actually been consumed is produced, procured and transported. Every quantity is tied to a signal, usually a card showing the item number, quantity, originator and destination. This visual control makes shortages and excess inventory immediately visible.

Push versus pull in procurement

Classic planning works on a push basis: based on forecasts and bills of materials, demand is pre-calculated and ordered, creating inventory risks and backorder rate effects when planning is wrong.

Kanban turns this logic around: actual consumption drives replenishment, and inventories settle close to demand. For procurement, this means that forecast-based individual orders are replaced by long-term framework agreements with automated call-offs.

Methods and approach: how Kanban works in practice

Introducing Kanban follows a clearly structured approach: identify suitable items, size the Kanban loops, define the rule set and align with suppliers. Not every material is Kanban-capable – the selection determines the success or failure of the system.

Item suitability analysis

In practice, Kanban is best suited to A and B items with even, high consumption intensity and low handling costs, as well as C items with a low goods value where the simplification of planning outweighs the effort. The decisive filter is the availability and delivery reliability of the source: with long, variable replenishment lead times or highly critical parts with containment requirements in the quality process, Kanban is unsuitable. A sound demand analysis provides consumption history and variance measures as the decision basis.

- Suitable: even demand, short to medium lead times, reliable supplier
- Conditionally suitable: seasonal fluctuations, multiple uses
- Unsuitable: spare parts with rare demand, prototypes, parts in ramp-up phases

Sizing the Kanban loops

The Kanban loop consists of the point of consumption, buffer stock, replenishment trigger point and the supplier or internal production. The number of cards or bins typically results from daily demand multiplied by circulation time (lead time plus safety factor), divided by packaging unit sizes and bin contents. In practice, safety stock for fluctuations in demand and lead time is additionally included. The sizing is reviewed regularly and adjusted to changed demand – a stable deviation workflow for quantities helps to review adjustments systematically rather than decide ad hoc.

Contract and process design with suppliers

Kanban only works with long-term, concluded agreements: a framework agreement covering prices, terms and lead times, supplemented by call-off mechanisms and rights in the event of demand changes. Common models include milk runs with self-collection, consignment-like arrangements or call-offs on demand. For data exchange, simple call-off signals, eKanban interfaces or formats such as cXML are used. Scheduling management at the dock – for example via dock appointment systems – smooths the higher delivery frequencies.

Key KPIs and control variables for Kanban

Kanban reduces planning effort, but shifts procurement's attention to process metrics. Without continuous monitoring, creeping inventory build-up or supply gaps loom, which only become visible at the point of consumption.

Supply and process metrics

The key metric is the delivery service level from the perspective of the points of consumption: how often was the buffer empty before replenishment arrived? In addition, coverage and inventory development per Kanban item are monitored in order to detect over-sizing. For suppliers, on-time delivery and

quantity adherence are decisive, since a single failure can disrupt the loops of several items. Electronic systems automatically provide reports that would have to be captured manually in classic card-based Kanban.

Inventory and efficiency metrics

The success of Kanban shows in falling cost of capital tied up, reduced handling effort and higher stock turnover. The number of planning purchase orders per buyer typically also falls considerably, freeing up capacity for strategic tasks such as supplier benchmarking, market segmentation in procurement or co-development. For many companies, this freed-up time is at least as important a benefit as the inventory reduction itself.

Risks and controls in Kanban

Kanban is robust, but not free of risks. The main dangers lie in incorrect sizing, unreliable suppliers and uncritical application to unsuitable items.

Supplier and demand risks

Because Kanban relies on reliability, delivery fluctuations affect production directly. Price changes – such as material cost increases covered by a price escalation clause or a freight surcharge – must be contractually regulated, since replenishment runs automatically without individual orders. Cancellation and call-off commitment clauses also deserve attention when Kanban loops are reduced or items are removed from the system. In international procurement, payment and hedging mechanisms such as letters of credit can conflict with recurring call-offs and require adapted contract structures.

Organisational controls

Successful users establish regular reviews of the Kanban loops: is the number of cards still appropriate, how high is the supply rate, which items should move into or out of the system? Changes to bills of materials or packaging sizes must be systematically incorporated into the Kanban parameters, otherwise shortages or excess inventory arise. Quality-relevant items need clear escalation paths and, if applicable, containment processes that also work in the Kanban environment.

Current developments: eKanban, digital interfaces and agile procurement

Kanban remains a proven concept, but is experiencing a second phase through digitalisation. Electronic Kanbans, sensors and ERP integrations make the system data-capable and significantly expand its range of applications.

eKanban and system integration

With eKanban, the physical signal is replaced by digital capture: scanning, sensors or booking events in the ERP trigger replenishment and simultaneously provide data for reporting. This improves data quality – a high data quality score in master data and consumption values is a prerequisite for reliable sizing. eKanban can also be combined with availability promises such as capable to promise (CTP) in order to state realistic delivery dates for customer orders.

Kanban as an element of the lean and agile movement

The principle has spread beyond manufacturing: in development and procurement processes too,

Kanban is used to visualise workflows, for example in the context of a design sprint or as part of agile procurement. For technical procurement, the trend means: Kanban is less an isolated planning method than a building block of a comprehensive lean management approach that equally addresses procurement objectives such as capital tied up, availability and process costs.

Typical metrics

Delivery service level for Kanban items: > 98 %

Proportion of consumption events without buffer stock-outs; below 95 %, line stoppages threaten

Inventory coverage: typically 1–3 weeks

depending on lead time and item class; deviations indicate incorrect sizing

Supplier on-time delivery: > 95 %

prerequisite for stable Kanban loops; monitor closely

Reduction in purchase orders: often > 80 %

compared with individual requisitioning in the first year of introduction

Practical example

A mid-sized mechanical engineering company with around 300 active standard and purchased parts switched classic demand planning to Kanban for standard fasteners, small sheet-metal parts and hydraulic fittings. Previously, a planner spent a considerable part of their capacity on small orders whose transaction costs frequently exceeded the goods value of the parts.

- Suitability analysis based on 18 months of consumption history; 84 items with even demand identified
- Switch to a two-bin system with milk runs and consignment stock at the supplier
- Framework agreements with fixed prices for twelve months and an agreed adjustment mechanism for material cost changes
- Result after one year: significantly reduced purchase order volumes, noticeably lower inventories and no relevant shortages at the line

Conclusion

Kanban shifts the control of material flows from planning into the process itself: consumption triggers replenishment, and inventories move closer to actual demand. For procurement, this creates a twofold benefit – lower capital tied up and considerably less planning effort, alongside higher delivery reliability through more stable process chains. Prerequisites are Kanban-suitable items, reliable suppliers and cleanly sized loops that are reviewed regularly. Those who establish these foundations can extend Kanban step by step from the C-parts range towards value-adding parts. Combined with eKanban and modern framework agreement structures, the principle thus remains a viable control model in digitalised procurement too.

Frequently asked questions

What does Kanban mean in simple terms?

Kanban is a system in which the consumption of a material automatically triggers replenishment – usually via a card, a bin or an electronic signal. Only what has actually been used is ordered or

produced. As a result, inventory levels fall and the material flow is controlled visually and without complex planning.

When does Kanban pay off in procurement, and for which parts?

Kanban is suitable for items with even, predictable consumption, acceptable lead times and reliable suppliers – typically standard parts, standard components and high runners. Unsuitable are spare parts with sporadic demand, parts in ramp-up phases and materials with long, variable replenishment lead times. An analysis of consumption history is indispensable before any introduction.

What is the difference between Kanban and eKanban?

In classic Kanban, the signal is a physical card or an empty bin that is transported or passed on manually. With eKanban, consumption is recorded electronically – for example via scanning or sensors – and directly triggers replenishment in the system. eKanban also provides data for reporting and can be integrated with ERP and supplier systems.

How many Kanban cards or bins are needed?

The usual formula is: daily demand multiplied by circulation time (lead time plus safety allowance), divided by the bin contents. In practice, at least two loops per item are used, often more, to buffer fluctuations. The number should be reviewed regularly and adjusted when demand changes.

How does Kanban work with external suppliers?

The supplier delivers on the basis of a framework agreement without individual purchase orders: consumed quantities are reported via the Kanban signal, milk runs or electronic call-offs, and replenishment happens automatically. Prices, terms, lead times and change rights are governed long-term in the framework agreement. High delivery frequencies are often organised through scheduling coordination at the dock.

What are the disadvantages of Kanban?

Kanban reacts sluggishly to sharp demand jumps, as the loops must first be re-dimensioned, and it requires suppliers to deliver reliably. With unsuitable items or incorrect sizing, shortages or excess inventory arise. In addition, the system requires more initial organisation in terms of contracts and processes than classic individual ordering.