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Kanban

Key Learning Points

1. Describe the Kanban concept.
2. Explain how Kanban cards and boards are used.
3. Utilize Kanban in improvement projects.

What is Kanban?

Kanban is one of the primary tools of the just-in-time system that is used to facilitate an even flow of production and an even distribution of work among the various stages of manufacturing and transportation. Kanban maintains an orderly and efficient flow of goods, materials, and information throughout an entire process.

The kanban system takes its name from the cards that track production within a factory.

In a value stream, a kanban is a signal, usually a card authorizing production or delivery of required materials, and is initiated by consumption.

Origins of Kanban

The first Kanban system was developed by Taiichi Ohno for Toyota Automotive in Japan in the 1940s to improve manufacturing efficiency.

Kanban is the Japanese word for “visual signal” or “card.” Toyota line workers used a kanban (an actual card) to signal steps in the manufacturing process.

The system was highly visual in nature, and allowed teams to communicate more easily on what work needed to be done and when.

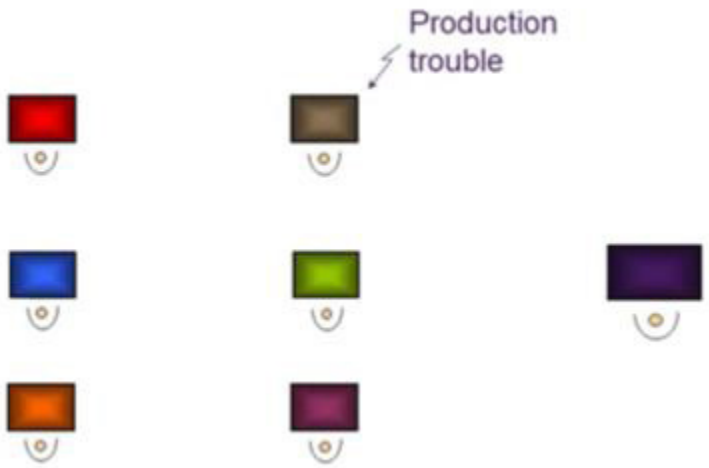
It also standardized cues and refined processes, which helped reduce waste and maximize value.

Operation

One key indicator of the success of production scheduling based on demand, pushing, is the ability of the demand-forecast to create such a push. Kanban by contrast, is part of an approach where the pull comes from demand and products are made to order.

Push System

A push production system continues to make a product to schedule as long as resources and materials are available.



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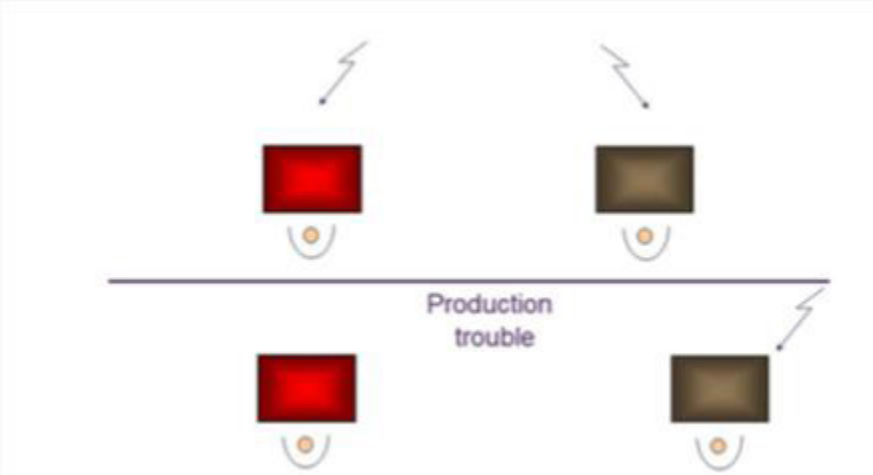
Pull System

A pull production system only makes a product when the upstream customer needs it.



The Supermarket

A supermarket is a group of products or materials that is stored to respond to instantaneous demand. Supermarket stock levels are determined through an understanding of typical demand patterns, service policy, and the time it takes to replenish stock. Supermarkets are one type of strategic inventory.

Supermarket “Pull” Signal

- A strategic inventory approach creates a buffer of planned inventory after an operation to mitigate lead time and potential capacity constraints.
- A variation of a min/max approach; this approach would typically include a Kanban signaling device pointing back to the prior operation.

How to Pull

1. Begin at the end of the value stream at a process step that you can control. This is referred to as the pacemaker.
2. Alleviate bottlenecks (constraints) at the pacemaker step, therefore creating capacity to pull items from further up the value stream.
3. Signal upstream process steps when capacity is free or scheduled to be available.
   Pull items to the available capacity in a single piece flow if possible.

Pulling in Service Organizations

Pull is a method of controlling the flow of resources based on actual demand or consumption. In its most basic sense it is a decision tool. In manufacturing, it

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helps organizations decide what to make and when to make it, and what to buy and when to buy it. In offices and service organizations the resources that need to be controlled often are information and people. The same pull concepts used in manufacturing can be applied to office and service organizations. They can help office and service workers decide what to work on, and when to work on it in order to maintain customer service, while preventing overproduction.

With pull production, a signal is sent to trigger work (value creation) in sync with customer demand. In sequential processing, this often means the signal is sent back to previous steps in the process to pull forward sufficient work to replenish only what has been consumed or moved forward in the process. In some service processes, a signal is sent to pull resources to enable timely delivery of service to the customer.

Examples of Pull Production in Service Value Streams:

- Sending a signal to restock a product in a retail store
- Positioning of airline staff in advance of plane arrival at an airport gate based upon predicted arrival time
- Sending reports or information based upon a signaled request/need rather than through automatic distribution

Rules

Taiichi Ohno stated that, to be effective, kanban must follow strict rules of use.

For example at Toyota there are six simple rules and close monitoring of these rules is a never-ending task, ensuring that the kanban does what is required.

Toyota's six rules are:

- Do not send defective products to the subsequent process.
- The subsequent process comes to withdraw only what is needed.
- Produce only the exact quantity that was withdrawn by the subsequent process.
- Level the production.
- Kanban is a means of fine tuning.
- Stabilize and rationalize the process.

Kanban Cards

Kanban is usually a printed card in a clear plastic cover that contains specific information such as part description, part number, and quantity or lot size.

This card is affixed to the various containers, bins, and racks that hold the parts.

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These Kanban cards are used to withdraw additional parts from the preceding process to replaces the ones that are used.

It is the concept of "sell one, buy one." In so doing, only the right parts are used, in the right quantities and at the right time.

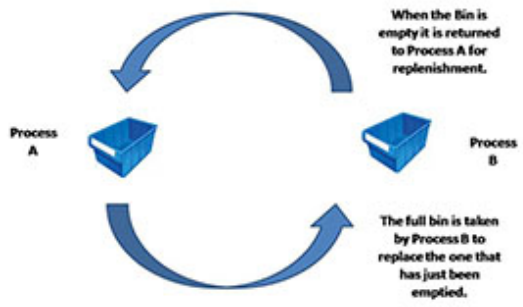
You might look at it as a waste-free means of producing and conveying materials.

Two-Bin System

A two-bin system is - quite literally - a system which uses two physical bins to manage inventory, usually of small, but critical parts (such as fasteners and class C components). It's a simple pull system, where the parts are supplied by two rotating containers.

The system works simply by supplying workers with two plastic storage bins, which contain inventory that they pull from to fill orders or to provide supplies to various departments. The speed at which the individual items are used will determine how many of the items are placed in the bins.

The workers pull from one bin until it is empty, and then they switch to the second bin while at the same time placing an order to replenish the items in the first bin. The amount of items required to replenish the first bin is predetermined, so that there is little risk of running low on stock (which could slow down production).



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Cons of Two-Bin System

The two-bin Kanban system is very effective to order seamlessly while minimizing WIP inventory. There are several elements that must be considered to make it effective. For example, the time it takes to reach the bottom of a bin must be longer than the time needed to order and receive the replacement inventory. If not, the production bin could become empty before the replacement stock arrives. Many companies choose to only use the two-bin method for small parts that are needed in small volumes that they know they can order and receive quickly.

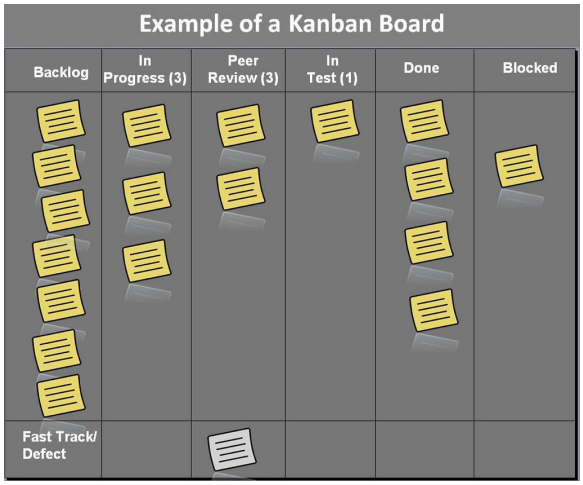
Although two-bin systems seem easy, they can become incredibly complex when scaled across hundreds and hundreds of bins. Often, if employees find that they are always cutting it close with inventory replacements, they'll add more parts to each bin. Seems logical, right? But actually, it's counter-intuitive - adding more parts to each bin will further delay the ordering process, slowing the entire system down. This is where two-bin systems often fail - so it's important, before implementing any sort of inventory management process, to do the math and ensure that the proposed system will effectively meet the needs of your supply chain.

Kanban Board

Although Kanban does not require that the team or organization use a Kanban board, it is the preferred way to see the flow of work, get the participation of the team, and manage work.

A Kanban board shows how work moves from left to right, each column represents a stage within the value stream. For that reason unlike Scrum task boards, Kanban boards can span many teams, and even whole departments or organizations.

The image to the left is a typical view of a simplified Kanban board, where work items move from left to right. In addition Kanban recommends that each column has a work in progress limit. This means that each column can only receive a fixed amount of work items, these limits encourage focus, and make system constraints evident.



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Electronic Kanban

Many manufacturers have implemented electronic kanban (sometimes referred to as E-kanban systems. These help to eliminate common problems such as manual entry errors and lost cards.

E-kanban systems can be integrated into enterprise resource planning (ERP) systems, enabling real-time demand signaling across the supply chain and improved visibility.

Data pulled from E-kanban systems can be used to optimize inventory levels by better tracking supplier lead and replenishment times.

E-kanban is a signaling system that uses a mix of technology to trigger the movement of materials within a manufacturing or production facility. Electronic kanban differs from traditional kanban in that it uses technology to replace traditional elements such as kanban cards with barcodes and electronic messages such as email or Electronic data interchange.

A typical electronic kanban system marks inventory with barcodes, which workers scan at various stages of the manufacturing process to signal usage. The scans relay messages to internal/external stores to ensure restocking of products. Electronic kanban often uses the internet as a method of routing messages to external suppliers and as a means to allow a real-time view of inventory, via a portal, throughout the supply chain.

When to Use Kanban

- Traditional Kanban systems are useful in production or service environments desiring continuous flow while minimizing WIP inventories.
- Kanban Boards are great alternatives for service processes or knowledge workers to schedule and prioritize work.
- Electronic Kanban efficiently ties Kanban practices with fast-moving inventory, especially with large numbers of stock items.

Pitfalls to Avoid

- Kanban systems will not succeed without sticking to accurate math and established rules.
- Rules concerning Kanban quantities and replenishment must match actual flow, demand, and replacement times. Failing to calculate correctly will create outages and flow disruptions.
- Stick to the rules: Material and tasks must be moved according to procedure. Hoarding and advanced movements will break the system.

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