

# Chapter 3

## Adaptable Kanban System Maintains Just-In-Time(JIT) Production



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# 3.1 PULLING SYSTEMS

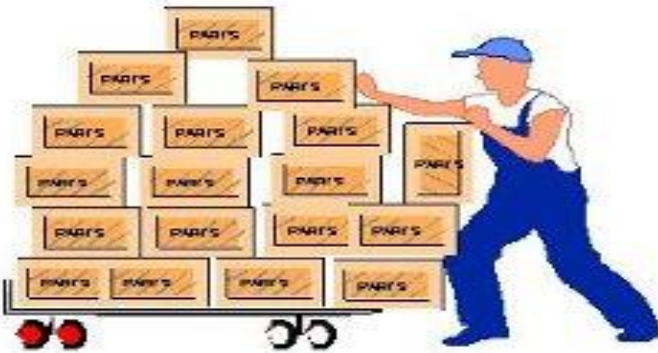
❖ **There exist two main types of production systems:**

- ***Push*** type means ***Make to Stock*** in which the production in one process is based on forecasted demand that is completed and sent to the subsequent process.
- ***Pull*** type means ***Make to Order*** in which the production is based on the actual demand of the subsequent process which determines when and how much output is requested.

# 3.1 PULLING SYSTEMS

## Push vs. Pull

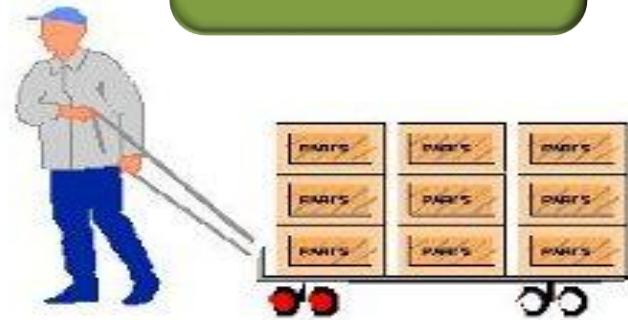
**Make all we can  
just in case.**



- Production Approximation
- Anticipated Usage's
- Large Lots
- High Inventories
- Waste
- Management by Firefighting
- Poor Communication

**Just-In-Time  
Production**

click.



- Production Precision
- Actual Consumption
- Small Lots
- Low Inventories
- Waste Reduction
- Management by Sight
- Better Communication



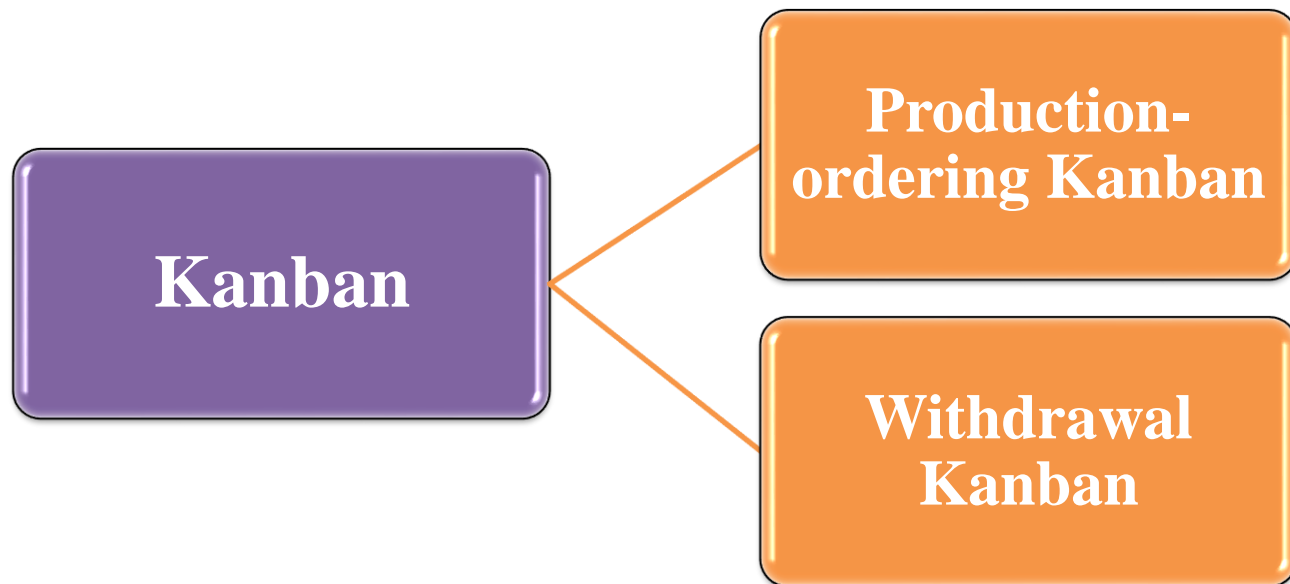
## 3.2 WHAT IS A KANBAN

- ❖ Kanban (看板) is a card which is usually put in a rectangular vinyl envelop.

*Kan* = "signal"    *ban* = "card"

## 3.2 WHAT IS A KANBAN

- ❖ A Kanban is a tool to achieve JIT production.



## 3.2 WHAT IS A KANBAN

- ❖ A *withdrawal* Kanban specifies the kind and quantity of product which the subsequent process should withdraw from the preceding process.

Store		
Shelf No.	5E215	Item Back No. A2-15
Item No. 35670S07		
Item Name Drive Pinion		
Car Type SX50BC		
Box Capacity	Box Type	Issued No.
20	B	4/8

<u>Preceding Process</u>
Forging B-2
<u>Subsequent Process</u>
Machining m-6

FIGURE 3.1  
Withdrawal kanban.

## 3.2 WHAT IS A KANBAN

- ❖ A *production-ordering* Kanban specifies the kind and quantity of product which the preceding process must produce.

Store Shelf No. <b>F26-18</b> Item Back No. <b>A5-34</b>	Process
Item No. <b>56790-321</b>	<b>Machining SB-8</b>
Item Name <b>Crank Shaft</b>	
Car Type <b>SX50BC-150</b>	

FIGURE 3.2



## 3.2 WHAT IS A KANBAN

❖ One example

Part Description				Part Number	
Smoke-shifter, left handed.				14613	
Qty	20	Lead Time	1 week	Order Date	9/3
Supplier	Acme Smoke-Shifter, LLC			Due Date	9/10
Planner	John R.	Card 1 of 2			
		Location	Rack 1B3		

## 3.2 WHAT IS A KANBAN

- ❖ A supplier withdrawal Kanban is used to withdraw products from a supplier.

<b>Time to deliver</b> 8:00      24:00 11:00      4:00 15:00 21:00	<b>Store shelf to deliver</b> 3S                      8 - 3 -                      (213)		<b>Name of receiving plant</b> Toyota's Tsutsumi Plant
643604000000007	038982154140110000000010011005		100003603600001
<b>Name of supplier</b> Sumitomo Denko	<b>Item no.</b> <b>82154-14011-00</b>	$\frac{5}{20}$	<b>Place to receive</b> Assembly 36
<b>Store of supplier</b> 4	<b>Item back no.</b> <b>389</b>	<b>Item name</b> Rear Door Wire	
<b>Delivery cycle</b> 1 - 6 - 2	<b>Car type for use</b> BJ-1	<b>Box type</b> S  <b>Box capacity</b> 10	

**FIGURE 3.4**  
Detail of supplier kanban.

## 3.2 WHAT IS A KANBAN

❖ For lot production, a signal Kanban is used.

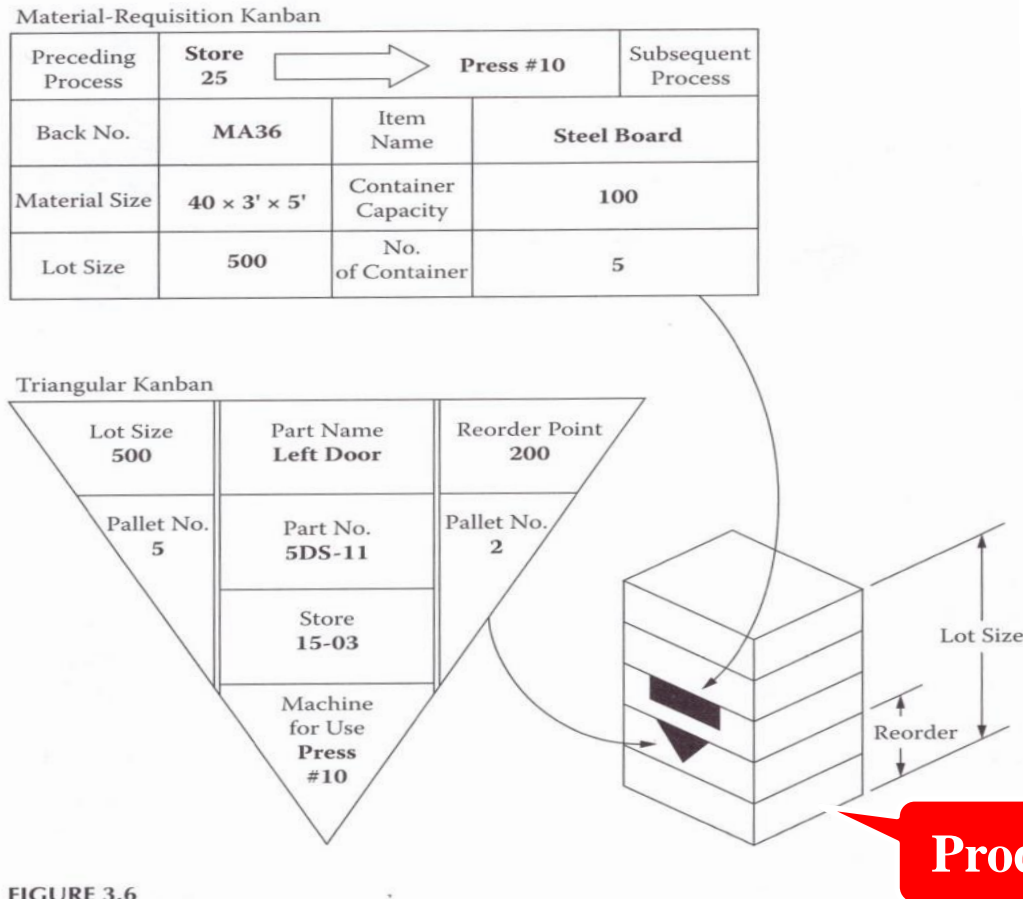
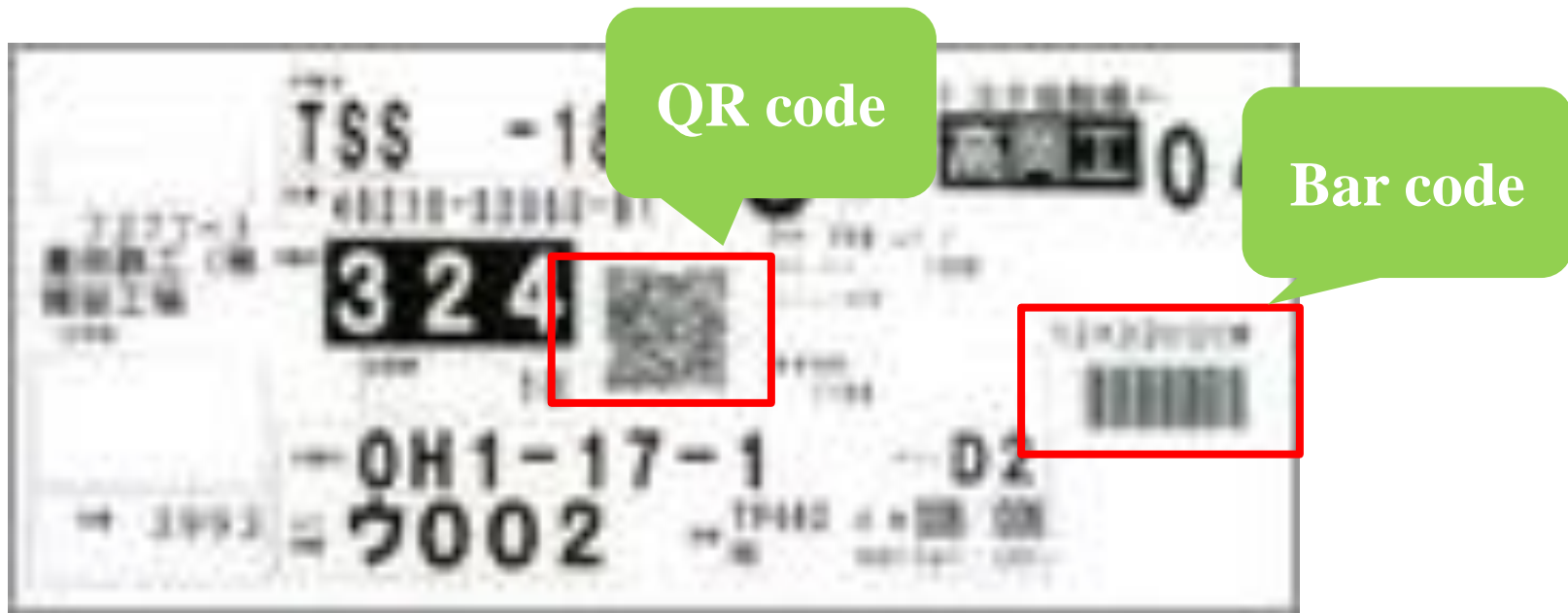


FIGURE 3.6  
Signal kanban.



## 3.3 HOW TO USE VARIOUS KANBAN

- ❖ With the advanced IT methodologies, the kanban system has been evolved into “*e-kanban*”.





# 3.3 HOW TO USE VARIOUS KANBAN

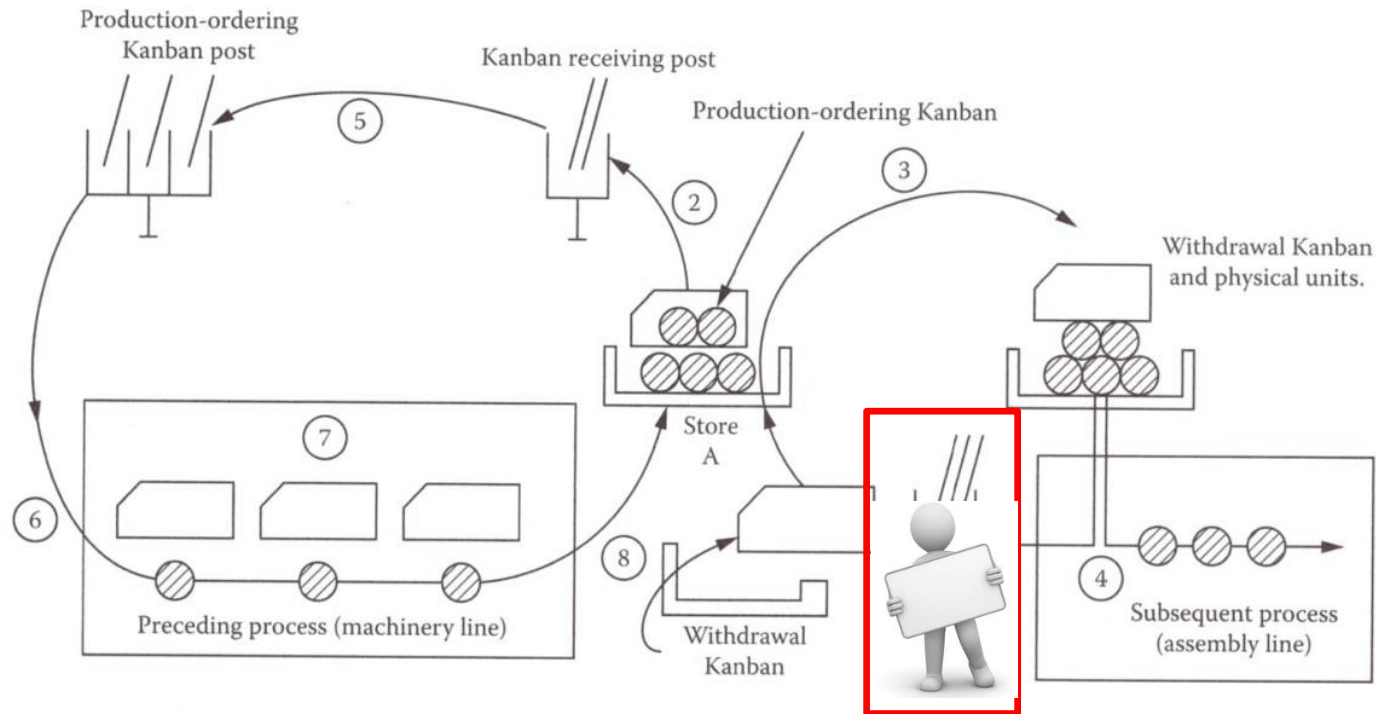


FIGURE 3.9

Steps involved in using a withdrawal and a production-ordering kanban.

1. The carrier of the subsequent process goes to the preceding process with the *withdrawal Kanbans* at regular predetermined times.

# 3.3 HOW TO USE VARIOUS KANBAN

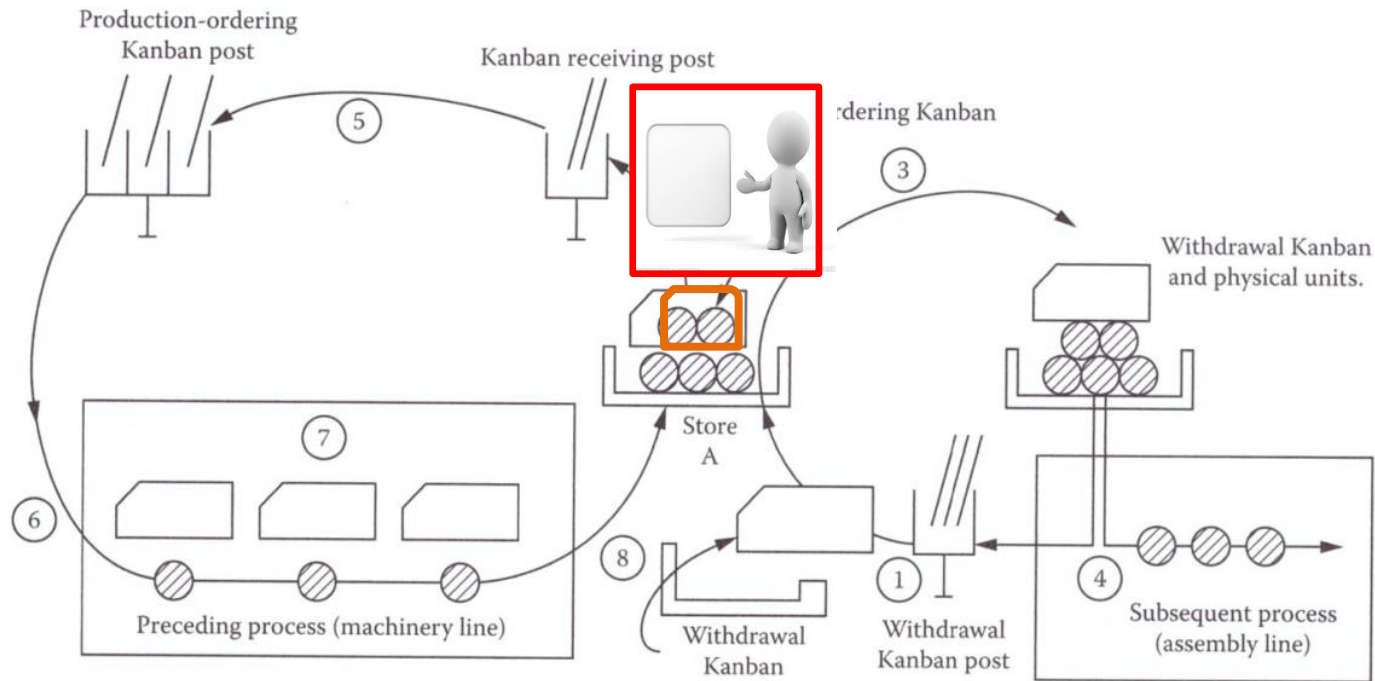


FIGURE 3.9

Steps involved in using a withdrawal and a production-ordering kanban.

2. The carrier detaches the *production-ordering Kanbans* attached to the products and place these Kanbans in the receiving post.

# 3.3 HOW TO USE VARIOUS KANBAN

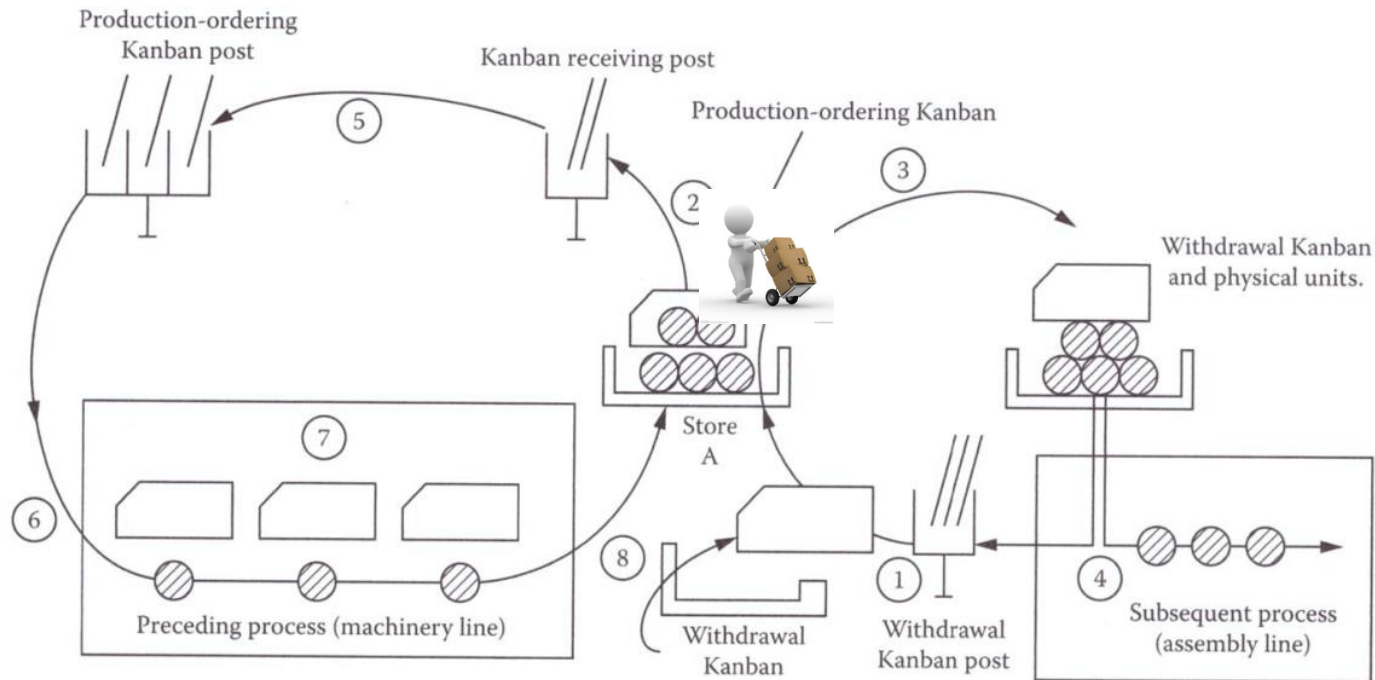


FIGURE 3.9

Steps involved in using a withdrawal and a production-ordering kanban.

3. For each *production-ordering Kanban* detached, he attaches in its place one of his *withdrawal Kanbans*.



# 3.3 HOW TO USE VARIOUS KANBAN

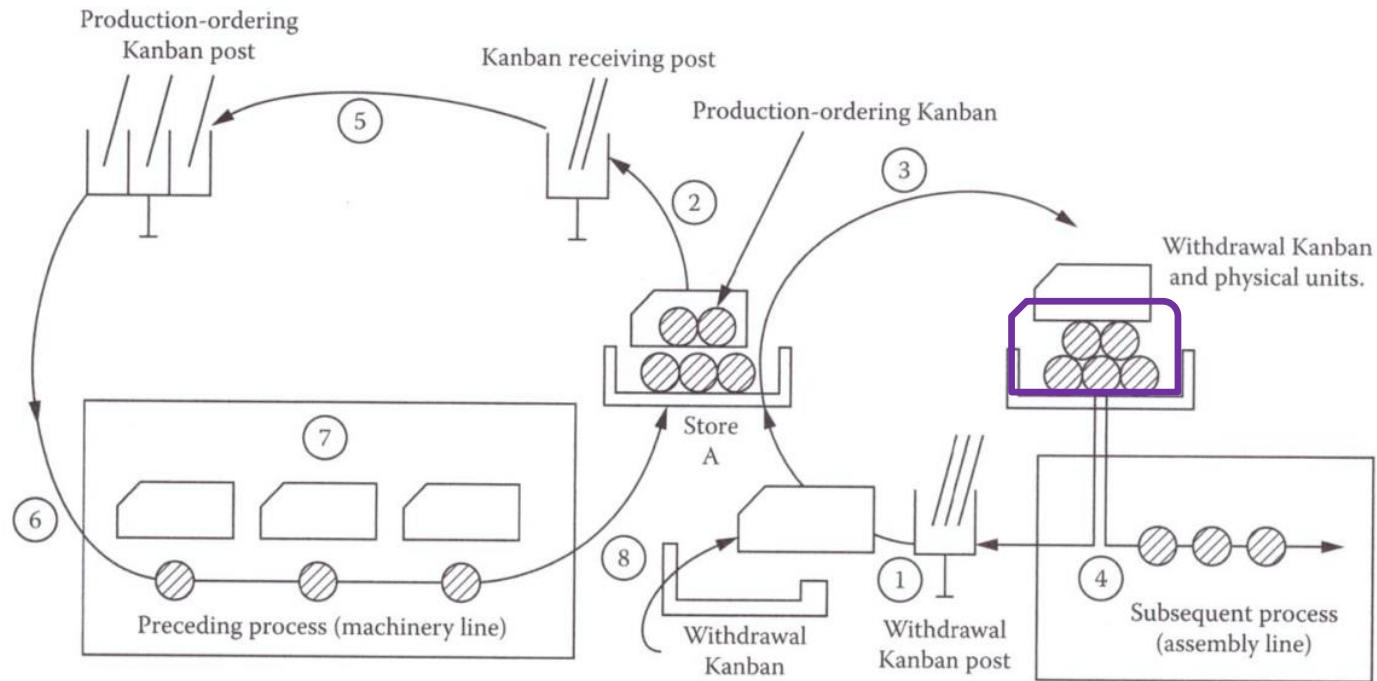


FIGURE 3.9

Steps involved in using a withdrawal and a production-ordering kanban.

4. When work begins in the subsequent process, the *withdrawal Kanbans* must be put in the *withdrawal Kanban* post.



## 3.3 HOW TO USE VARIOUS KANBAN

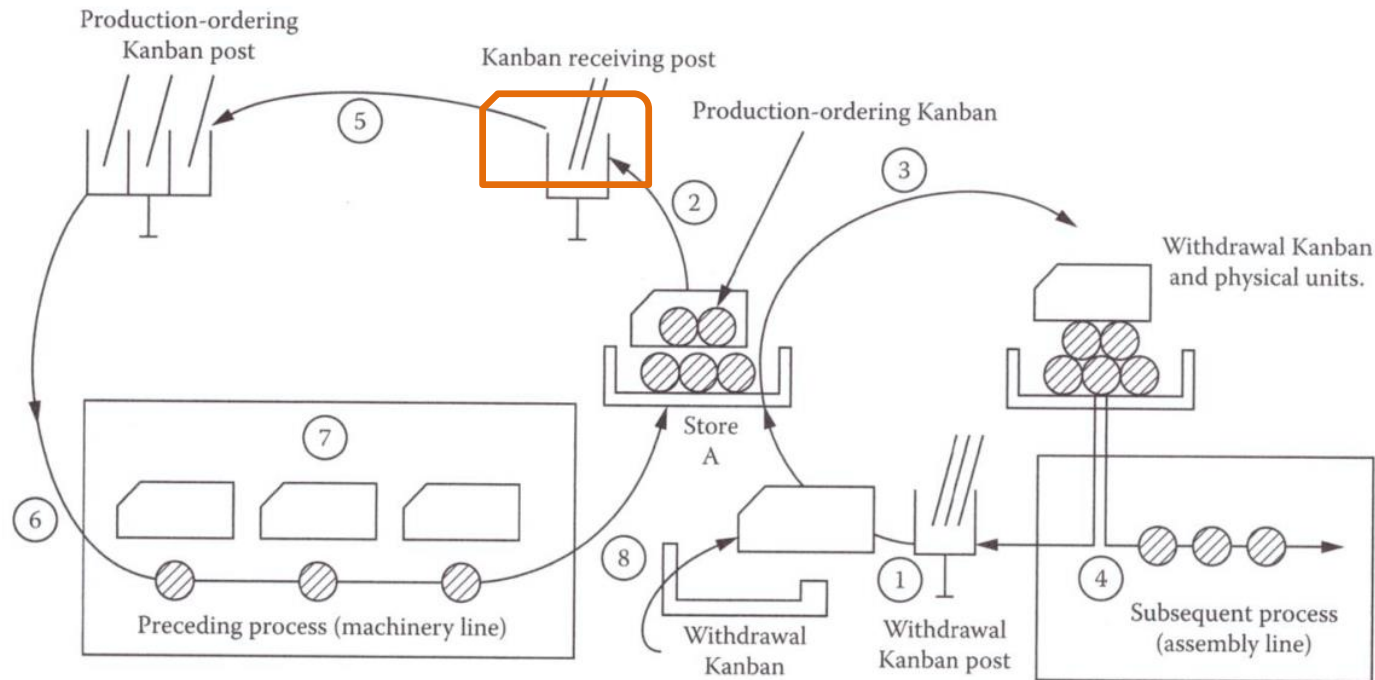


FIGURE 3.9

Steps involved in using a withdrawal and a production-ordering kanban.

5. In the preceding process, the *production-ordering Kanban* should be collected from the receiving post.

# 3.3 HOW TO USE VARIOUS KANBAN

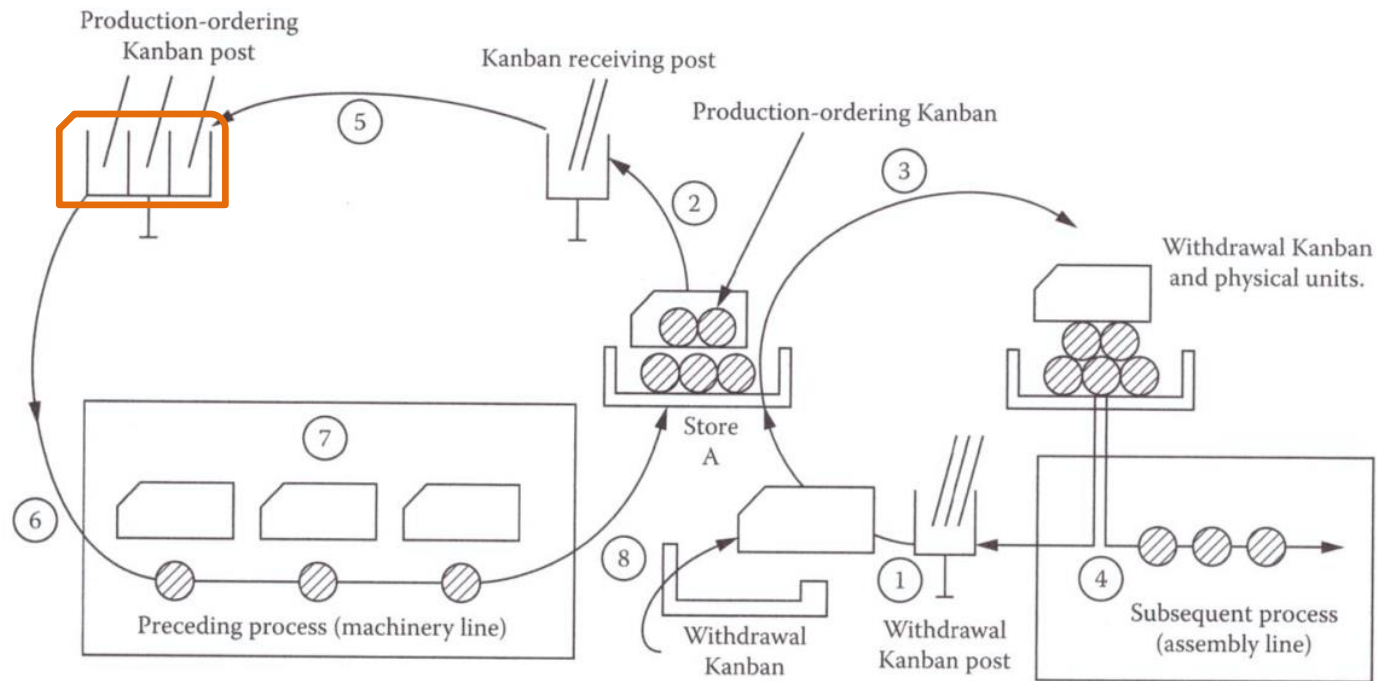


FIGURE 3.9

Steps involved in using a withdrawal and a production-ordering kanban.

6. In the preceding process, production is conducted according to the original sequence of the *production-ordering Kanban* in the post.

# 3.3 HOW TO USE VARIOUS KANBAN

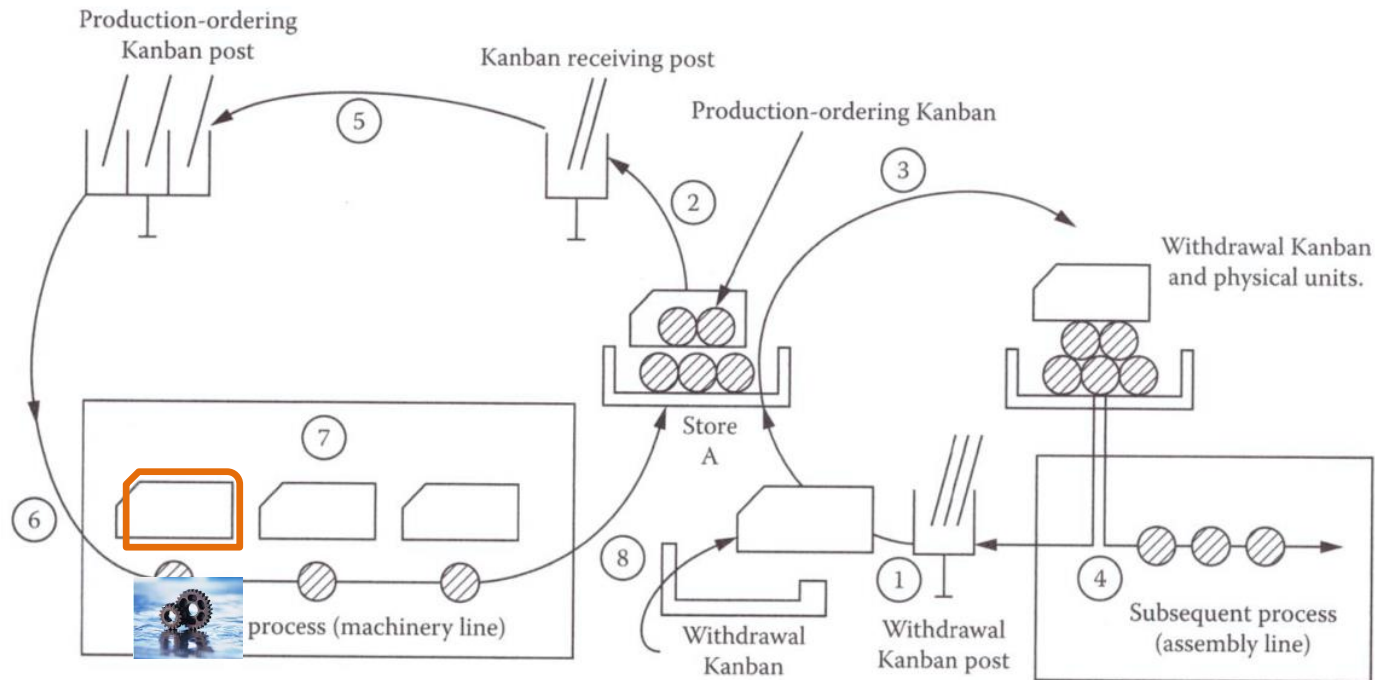


FIGURE 3.9

Steps involved in using a withdrawal and a production-ordering kanban.

7. In the preceding process, the products and the *production-ordering Kanban* should move as a pair.



# 3.3 HOW TO USE VARIOUS KANBAN

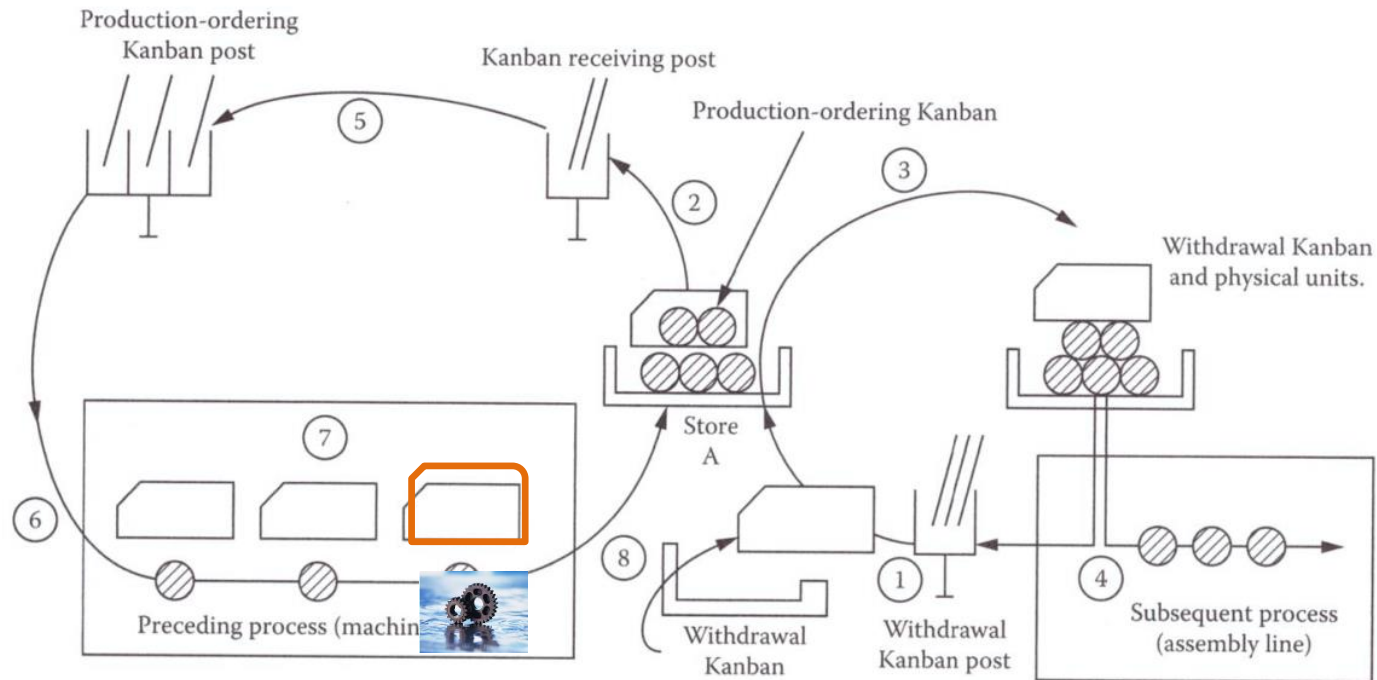


FIGURE 3.9

Steps involved in using a withdrawal and a production-ordering kanban.

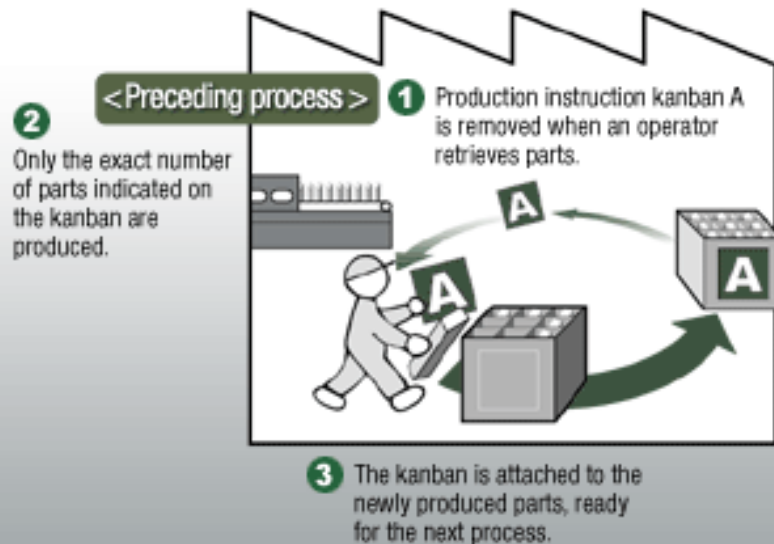
8. When the production is completed, the products and the *production-ordering Kanban* are placed in store A.



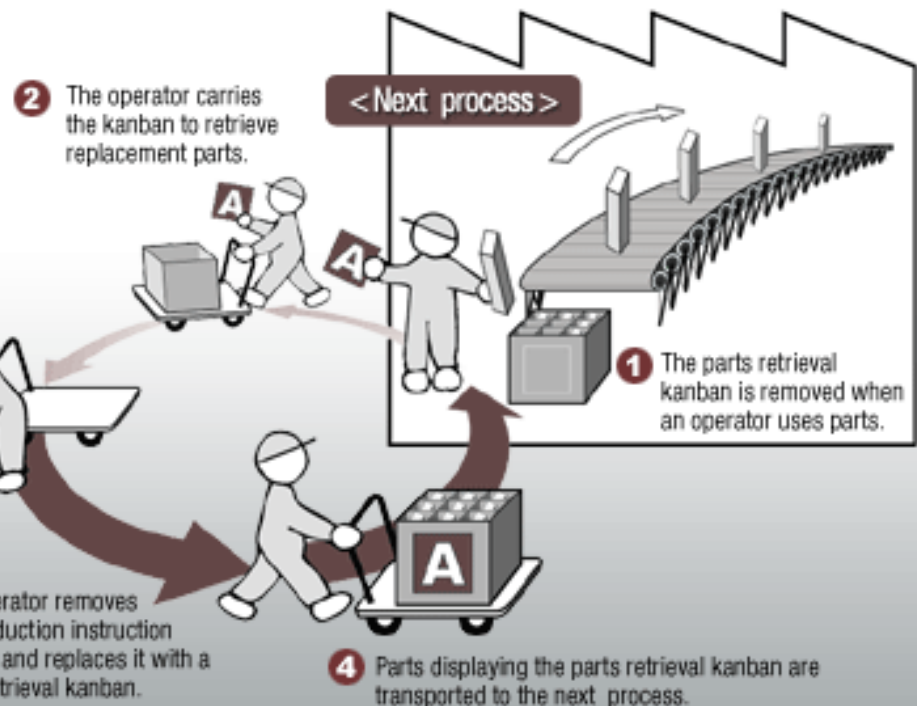
# 3.3 HOW TO USE VARIOUS KANBAN

Conceptual diagram of the Kanban System

## Operational Flow of Production Instruction Kanban A



## Operational Flow of Parts Retrieval Kanban A



[http://www.toyota-global.com/company/vision\\_philosophy/toyota\\_production\\_system/just-in-time.html](http://www.toyota-global.com/company/vision_philosophy/toyota_production_system/just-in-time.html)

## 3.4 KANBAN RULES

- ❖ Rule 1. The subsequent process should withdraw the necessary products from the preceding process in the necessary quantities at the necessary point in time.
- ❖ Rule 2. The preceding process should produce its products in the quantities withdrawn by the subsequent process.

## 3.4 KANBAN RULES

- ❖ Rule 3. Defective products should never be conveyed to the subsequent process.
- ❖ Rule 4. The number of Kanbans should be minimized.
- ❖ Rule 5. Kanban should be used to adapt to small fluctuations in demand.

## 3.5 OTHER TYPES OF KANBANS

- ❖ Express Kanban is issued when there is a shortage of a part (only in extraordinary situations).
- Step 1. The carrier issues the express Kanban for a part.
- Step 2. The carrier pushes a button for the machining line making the part.
- Step 3. A light corresponding to the part will be activated.
- Step 4. The worker in the machining line must produce the part.



## 3.5 OTHER TYPES OF KANBANS

- ❖ Emergency Kanban is issued temporarily when some inventory is required to make up for
  - Defective units
  - Machine troubles
  - Extra insertions
  - A spurt in a weekend operation

## 3.5 OTHER TYPES OF KANBANS

### ❖ Other types of Kanbans

➤ Job-order Kanban



➤ Through Kanban



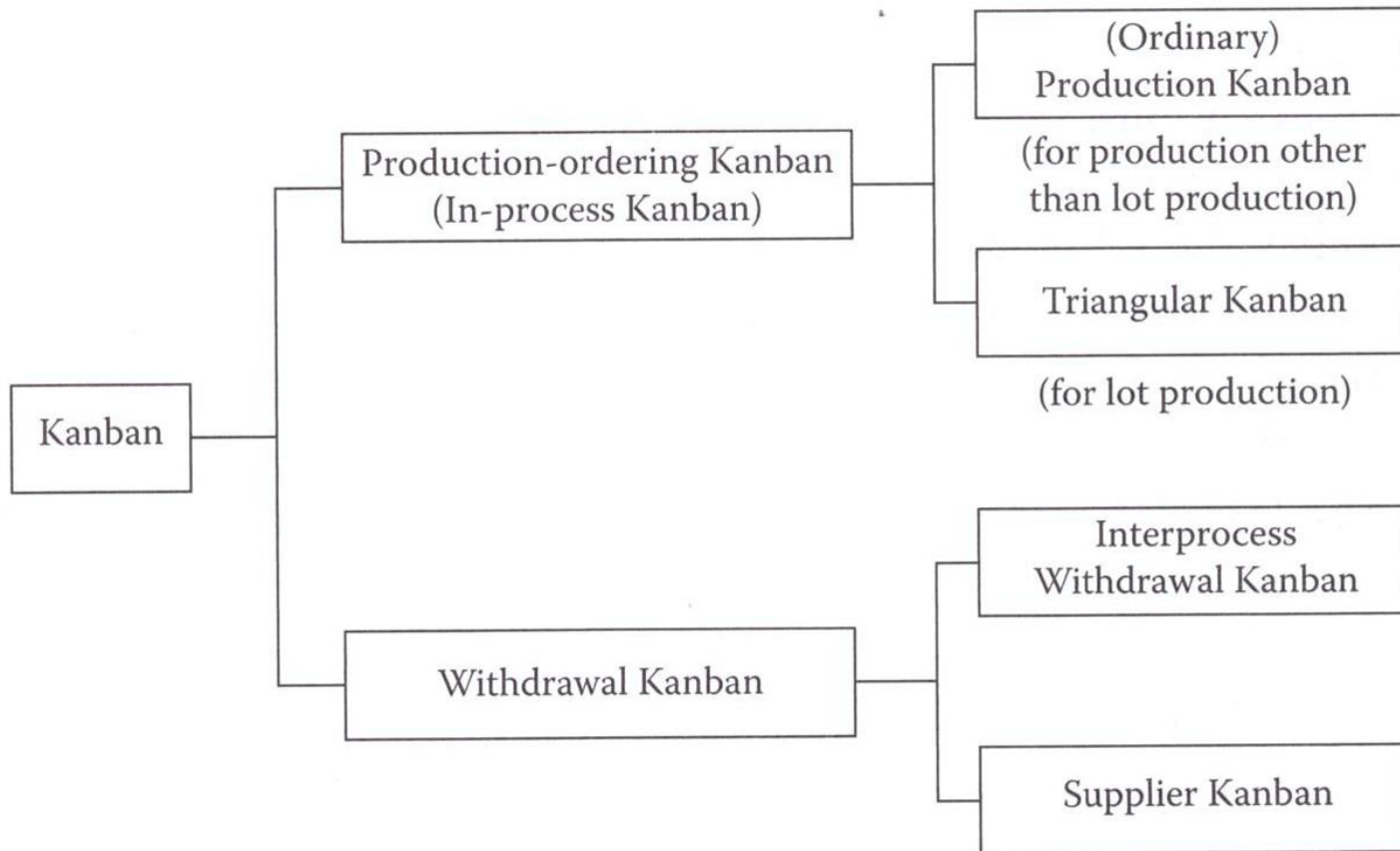
➤ Common Kanban



➤ Cart or truck as a Kanban



# SUMMARY OF MAIN TYPES OF KANBANS



**FIGURE 3.8**

Framework of the main types of kanban.

## 2.1 PULLING SYSTEMS

- ❖ Just-In-Time (JIT) production harmoniously controls the production in the necessary quantities at necessary time in every process of a factory and also among companies.





## 2.5 OTHER TYPES OF KANBANS

- ❖ A job-order Kanban is prepared for a job-order production line and is issued for each job order.



## 2.5 OTHER TYPES OF KANBANS

- ❖ If two or more processes are so closed connected that they can be seen as a single process, a common sheet of Kanban is used by these plural processes.
- ❖ Such Kanban is called a through Kanban or tunnel Kanban.
  - Similar to the “through ticket” for two adjacent railways



## 2.5 OTHER TYPES OF KANBANS

- ❖ A withdrawal Kanban can be used as a production-ordering Kanban if the distance between two processes is very short and one supervisor is supervising both processes.



## 2.5 OTHER TYPES OF KANBANS

- ❖ When the number of some large unit parts is decreased to a certain reorder point, the carrier will bring the empty cart to the preceding process.
- ❖ The number of carts has the same meaning as the number of Kanbans.
- ❖ The preceding process cannot continue to make the parts unless an empty cart remains.

