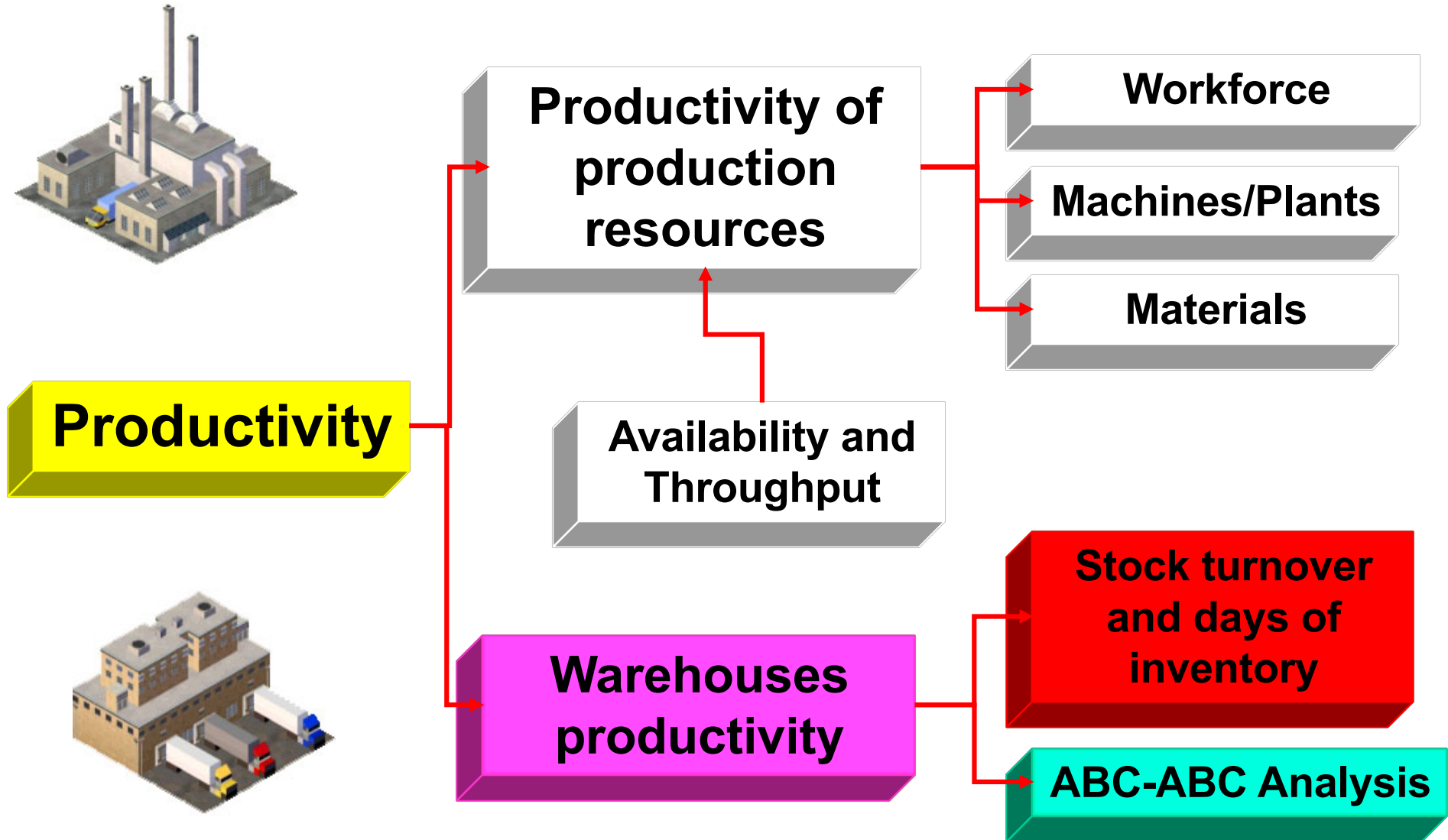


Productivity performance

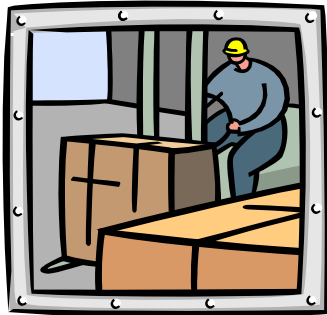


Materials management (warehouse) productivity measures

- In this stream there are the classic measures such as stock turnover and days in inventory
- In addition to these indicators we should also analyze the indicators of stockout and persistence of stock out (a high stock turnover may mean low service level)

Classical measurements of stock level:

- Inventory (or Stock) Turnover Index: corresponds to the average frequency of considered inventory renewal during a given time
- Days of Inventory (or Stock Cover): indicates the number of days (or other time unit) of consumption which the stock can cover.



Measured in quantity (production or purchase units for single item or similar items); but often (especially when group of items considered) measured in monetary units. In case of monetary units used, the SAME monetary unit for numerator and denominator; i.e., for the single item, the index gives the same result either if measured in € or in units

Monetary units: industrial cost, production cost, variable production cost, purchase cost, selling price, margin, ...

It depends on the situation (e.g., inner or outer WH) and/or decision to be taken (ST/LT)

$$\text{Stock turnover index} = \frac{\Sigma \text{Consumption in a given period}}{\text{Average Stock in a given period}}$$

$$\text{Days of inventory} = \frac{\text{Days (or other time unit) in the given period}}{\text{Stock turnover index}}$$

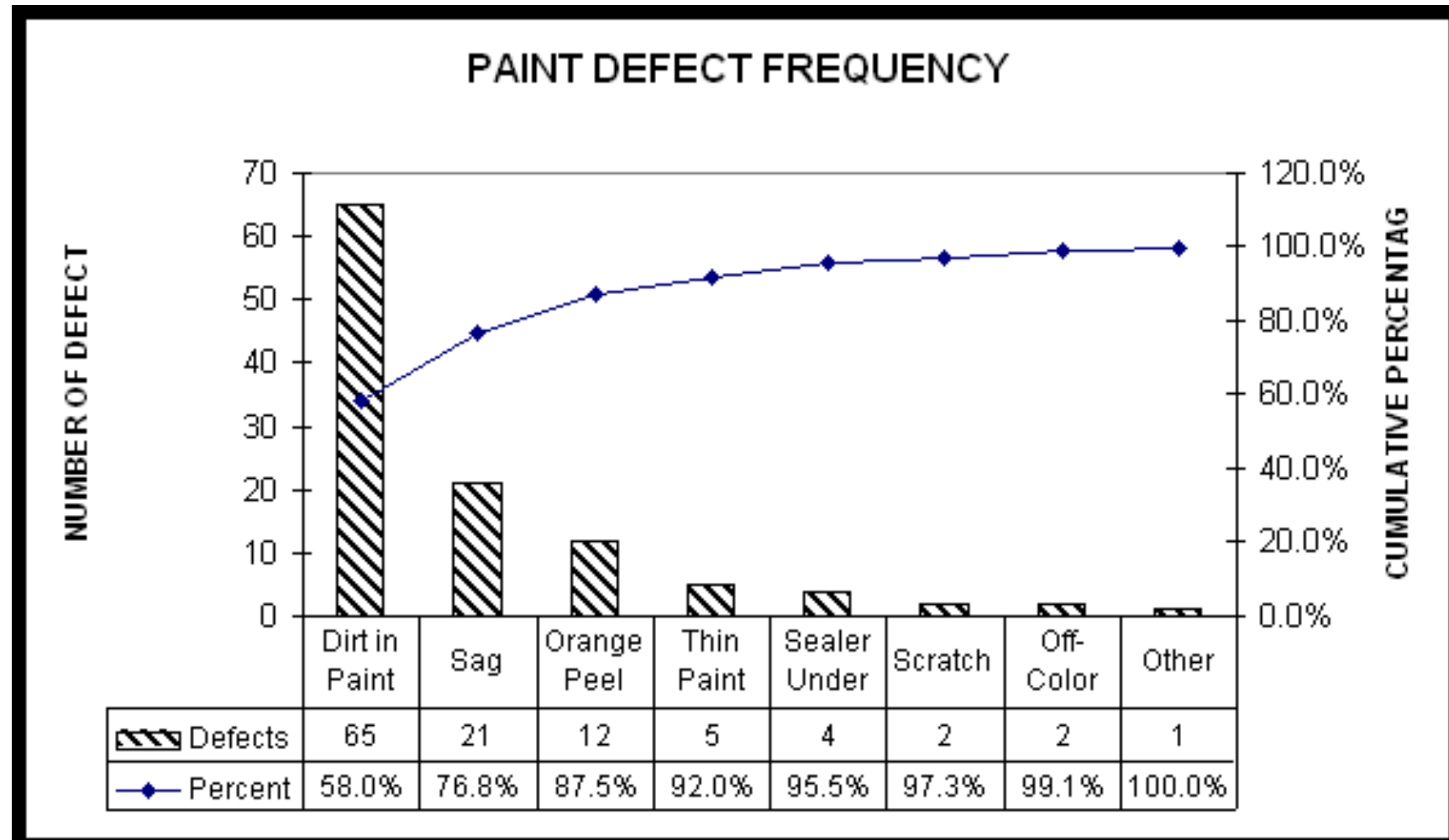
(or other time unit)

Materials management productivity measures (ABC-ABC Analysis)

- Another framework for the analysis is the ABC-ABC analysis.
- It consists of identifying the classification parameters (e.g. stock and consumption) and analyzing the items according to ABC classifications.
- The objective is to enhance the focalization of improvement actions.

- A simple method for separating the major causes (the “vital few”) of a problem from the minor ones (“trivial many”)
- Pareto Analysis can help prioritize and focus resources where they are most needed. It can also help you measure the impact of an improvement
- Often called “80-20” rule - a large proportion of problems resulting from a small proportion of the causes
- Data is collected, analyzed and a Pareto (or ABC) diagram constructed
- It will help focusing on the small proportion of causes that have very large number of problems (the left of the diagram)

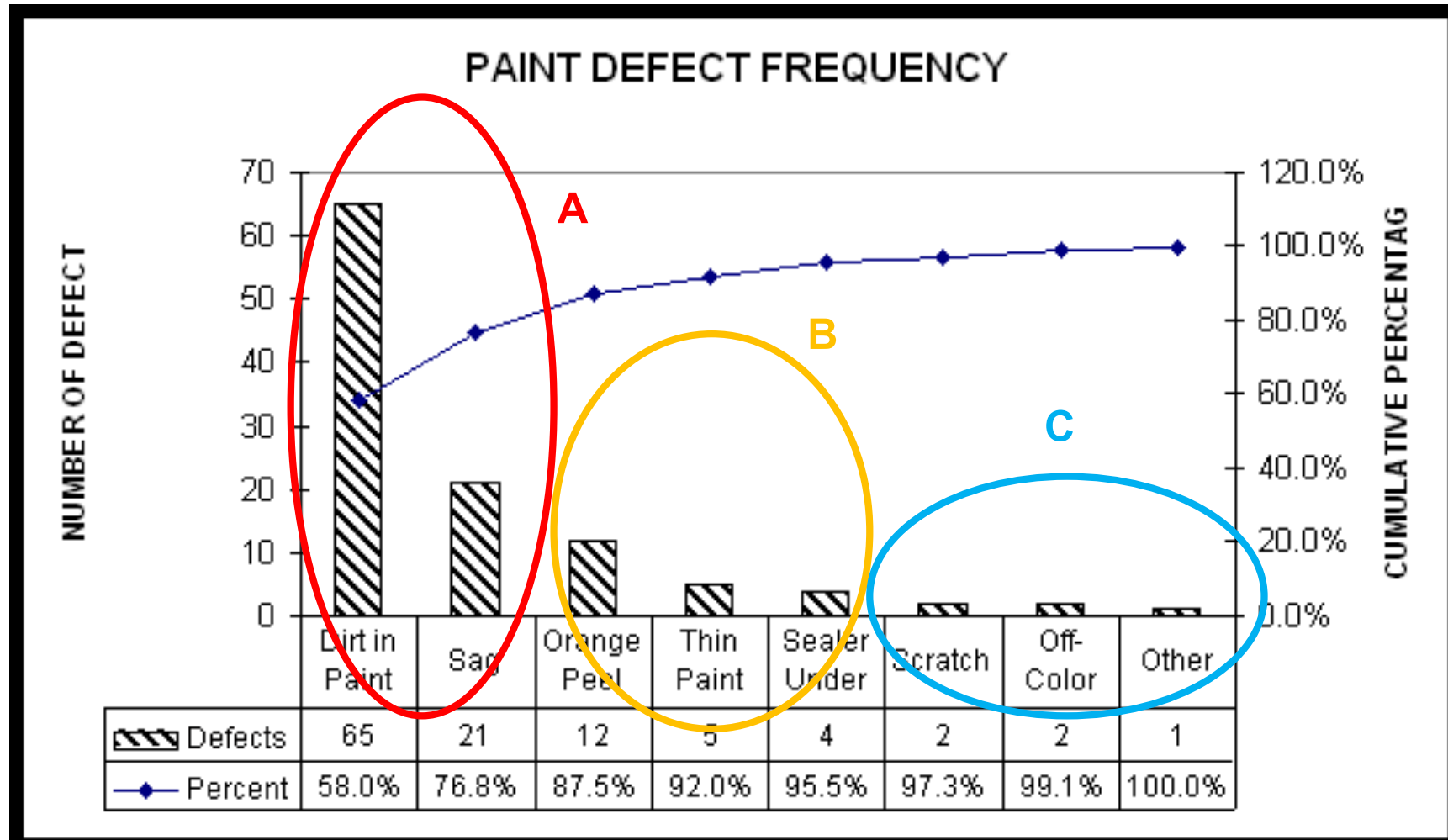
ABC (Pareto) diagram example



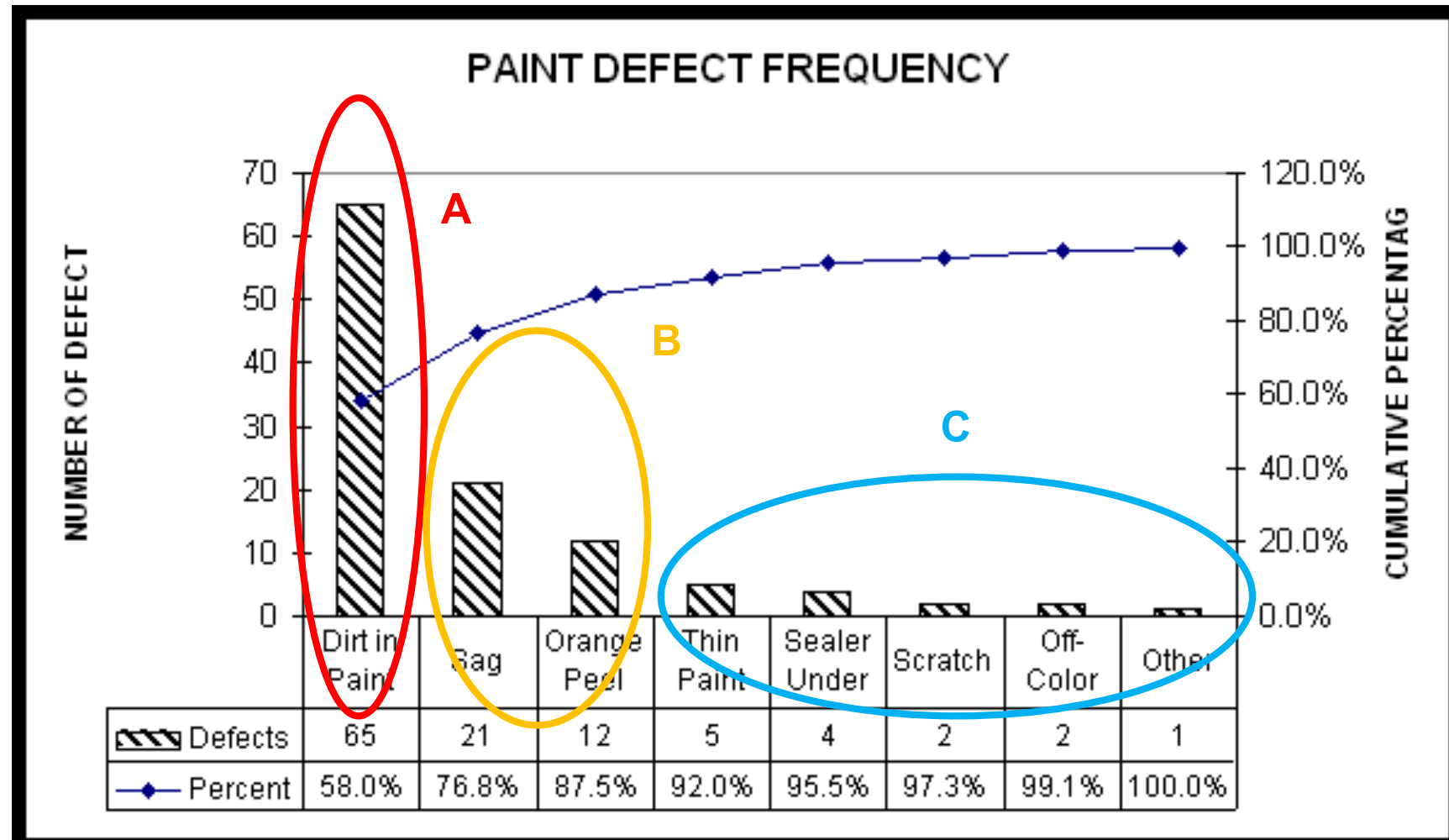
ABC (Pareto) diagram example

- Divides defect causes into three classes based on weekly number of defects
 - Class A - high weekly number of defects (e.g., 80%)
 - Class B - medium weekly number of defects (e.g., 15%)
 - Class C - low weekly number of defects (e.g., 5%)
- Used to establish policies that focus on the few critical causes and not the many trivial ones

ABC (Pareto) diagram example



ABC (Pareto) diagram example



Simple ABC Analysis: Stock Value

- Divides inventory into three classes based on annual dollar volume
 - Class A - high annual dollar volume
 - Class B - medium annual dollar volume
 - Class C - low annual dollar volume
- Used to establish policies that focus on the few critical parts and not the many trivial ones

(Prentice Hall)

Simple ABC Analysis: Stock Value

Item Stock Number	Percent of Number of Items Stocked	Annual Volume (units)	x	Unit Cost	=	Annual Dollar Volume	Percent of Annual Dollar Volume	Class
#10286	20%	1,000		\$ 90.00		\$ 90,000	38.8%	} 72% A
#11526		500		154.00		77,000	33.2%	
#12760		1,550		17.00		26,350	11.3%	} 23% B
#10867	30%	350		42.86		15,001	6.4%	
#10500		1,000		12.50		12,500	5.4%	

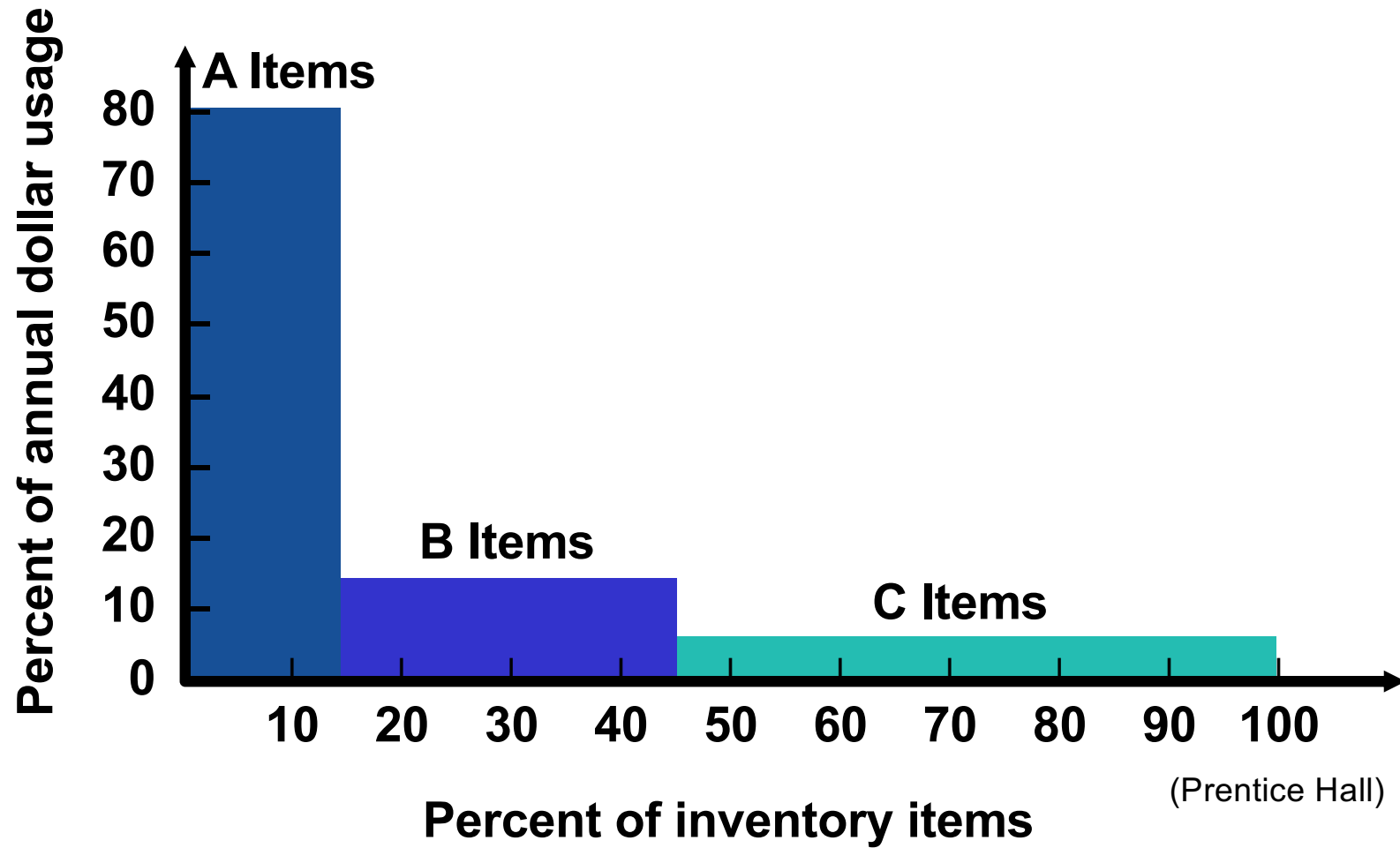
(Prentice Hall)

Simple ABC Analysis: Stock Value

Item Stock Number	Percent of Number of Items Stocked	Annual Volume (units)	x	Unit Cost	=	Annual Dollar Volume	Percent of Annual Dollar Volume	Class
#12572		600		\$ 14.17		\$ 8,502	3.7%	} 5% C
#14075		2,000		.60		1,200	.5%	
#01036	50%	100		8.50		850	.4%	
#01307		1,200		.42		504	.2%	
#10572		250		.60		150	.1%	
		8,550				\$232,057	100.0%	

(Prentice Hall)

Simple ABC Analysis: Stock Value



- ◆ Policies employed may include
 - ◆ More emphasis on supplier development for A items
 - ◆ Tighter physical inventory control for A items
 - ◆ More care in forecasting A items

(Prentice Hall)

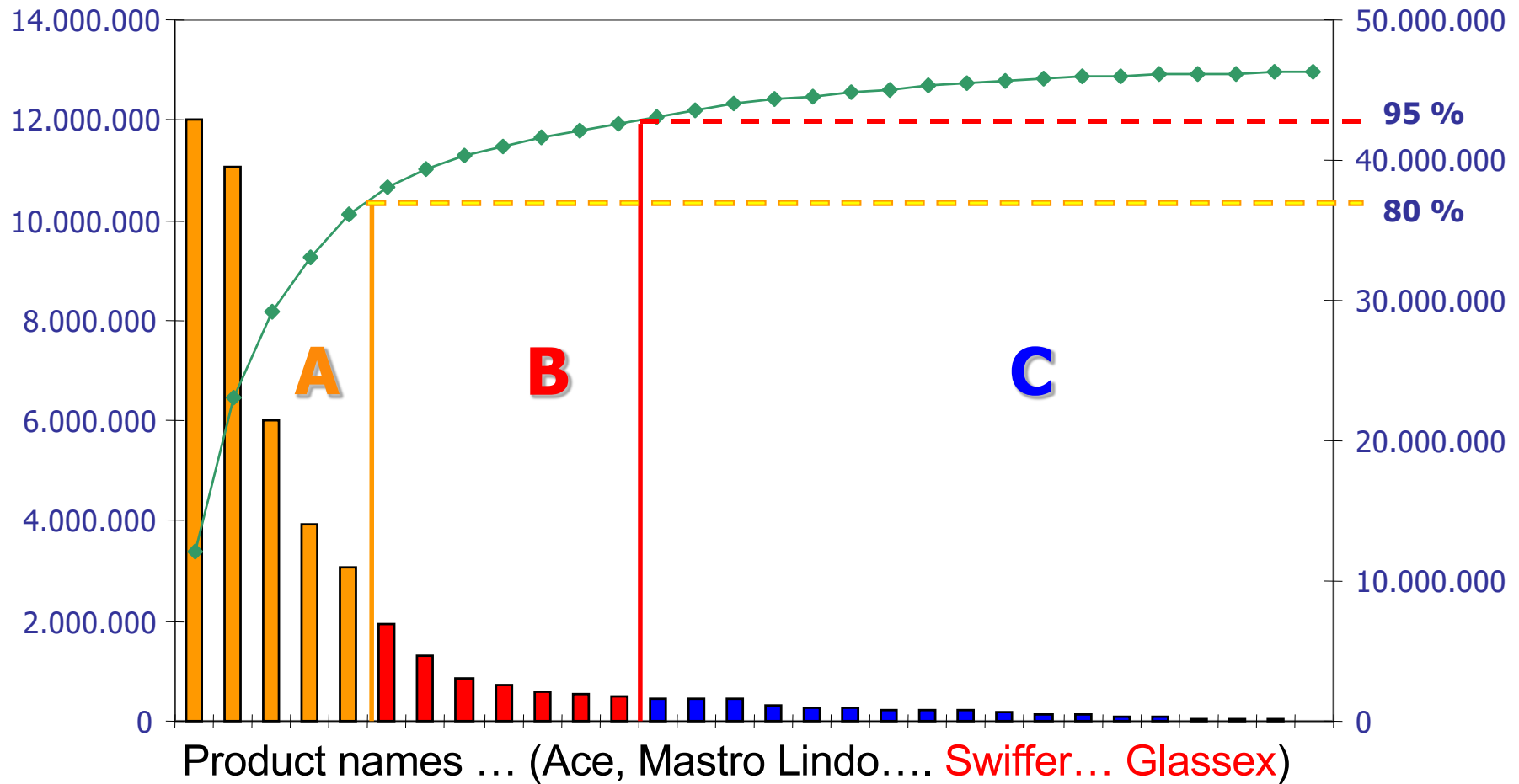
Simple ABC Analysis: Other Criteria for Classification

- Besides annual dollar volume, the following criteria can be also used for classification:
 - Anticipated engineering changes (obsolete)
 - Delivery problems
 - Quality problems
 - High unit cost

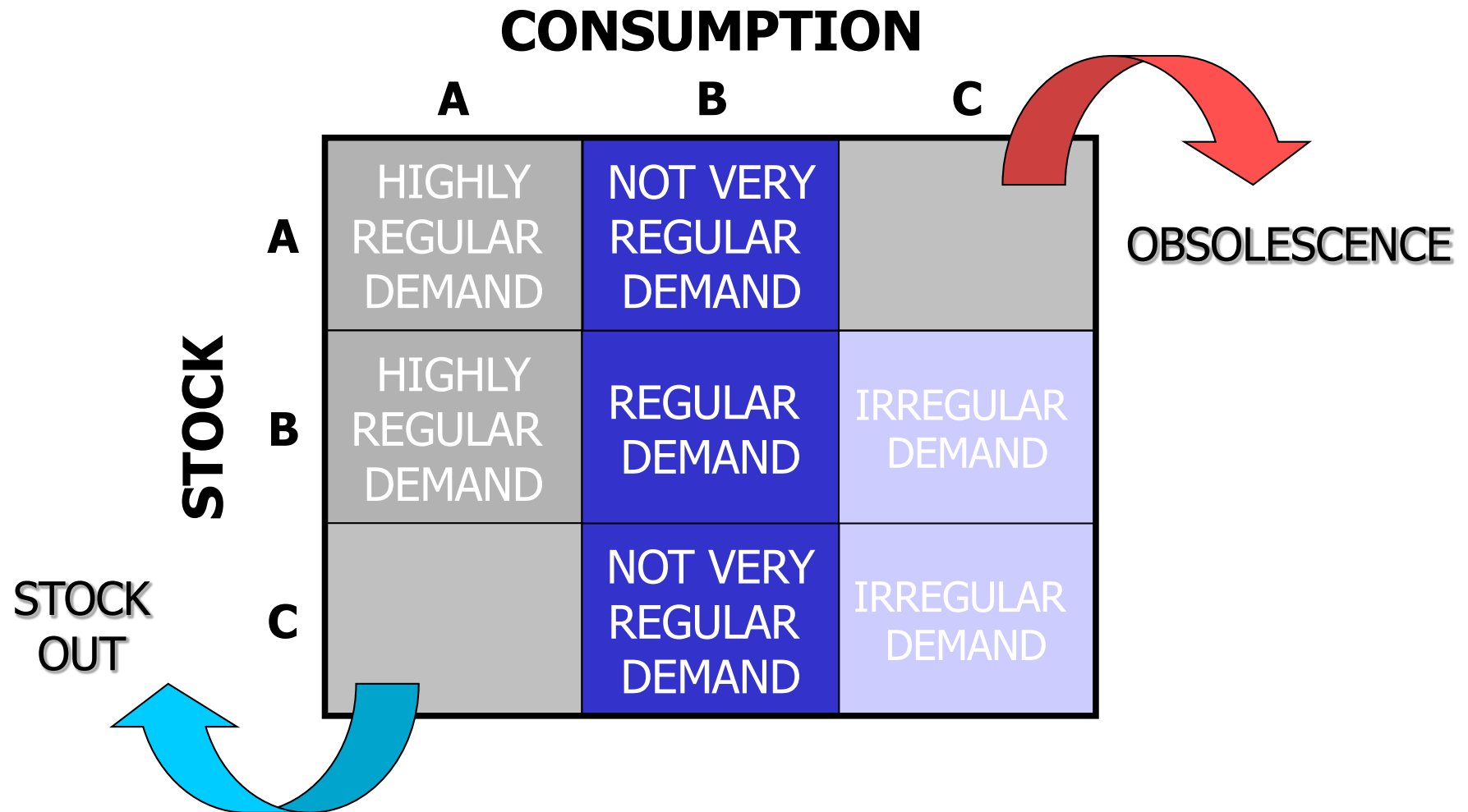
(Prentice Hall)

Materials management productivity measures (ABC-ABC Analysis)

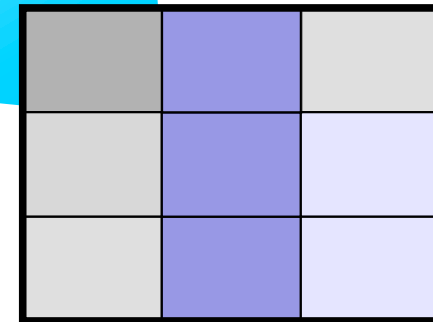
ABC Analysis: Stock (Value) (€)



Materials management productivity measures (ABC-ABC Analysis)

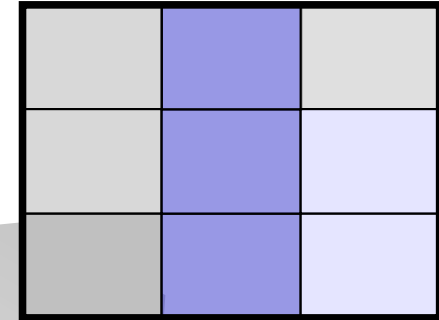


- High opportunity and high risk
- Usually low N° of items: possibility to be more analytical in doing deeper analysis
- Specific situations:
 - constant stock, frequent fulfillments and in small quantities: **reduce safety stock**
 - constant stock, rare fulfillments and in big quantities: **remove the constraints to fulfillment policies**
 - cyclical stock, frequent fulfillments and in small quantities: **eliminate seasonality of fulfillment**
 - cyclical stock, rare fulfillments and in big quantities: **eliminate seasonality of fulfillment and remove the constraints to fulfillment policies**



- Hopefully low N° of items; if it is not, “objective zero”
- Specific situations:
 - obsolete items : **do not produce/buy any more and get rid of them** by promotions, discounts in different markets/channels; even destroy
 - new products and spare parts: **control**

Grey	Blue	Grey
Grey	Blue	Light Blue
Grey	Blue	Light Blue



- Usually low N° of items; “objective increase”
- Low level of stock or we do not sell adequately? **Observe and control carefully stock out occurrence**
- Specific situations:
 - items produced/bought **to order**
 - items managed with a **Just In Time** logic

Grey	Dark Blue	Grey
Grey	Dark Blue	Light Blue
Grey	Dark Blue	Light Blue

- Usually really high N° of items
- Items of no interest for both stock managers and sales managers
- Items burdensome for warehouses management: warehouse data updating, space, etc.
- Specific situations:
 - if the items are of no interests: check the opportunity to **eliminate (i.e. terminate offering) them**
 - if sales are low because the item is not available: **improve stock management and control stock out occurrence**