



SISTEM PERSEDIAAN

1603B054



UBAYA
UNIVERSITAS SURABAYA

MINGGU	MATERI
1	Introduction to inventory management, ABC analysis & Cost component
2-3	Fixed Order Quantity (FOQ) systems & Sensitivity Analysis
4-5	Perubahan harga: all unit, incremental, special disc & known price increasing
6	FOI Single & Multiple
7	Single & Multi item: FOI & EPQ
UTS	

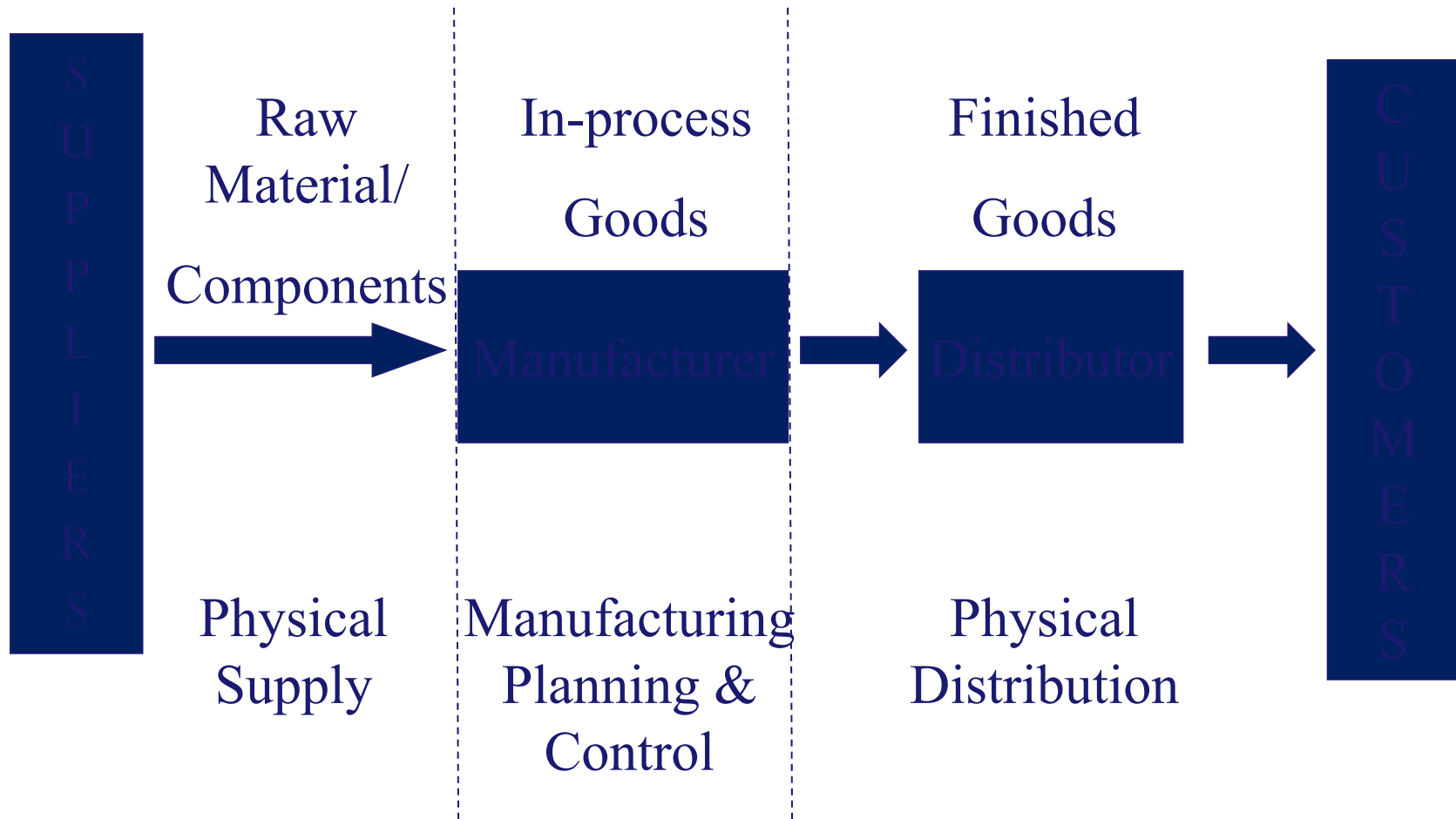
MINGGU	MATERI
8	Excess Model (with solver)
9-11	Probabilistic Inventory Model
12	Single Order Quantity
13 & 14	Multi Item Multi Supplier Inventory Systems
UAS	

EVALUASI

- $NTS (NAS) = 75\% UTS (UAS) + 25\% \text{ Tugas \& Quiz}$
- $\text{Nilai akhir} = 40\% NTS + 60\% NAS$

memahami

- Fungsi manajemen persediaan
- Jenis-jenis persediaan
- Fungsi persediaan
- Komponen biaya persediaan
- Klasifikasi problem persediaan
- Model sistem persediaan

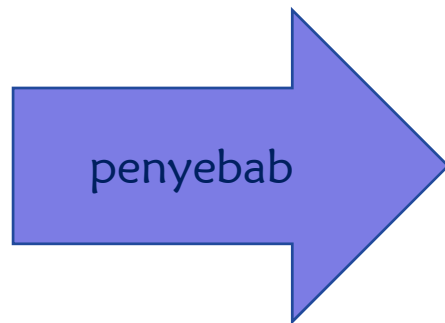


Functional Area	Functional Responsibility	Inventory Goal	Inventory Inclination
Marketing	Sell the product	Good customer service	High
Production	Make the product	Efficient lot sizes	High
Purchasing	Buy required materials	Low cost per unit	High
Finance	Provide working capital	Efficient use of capital	Low
Engineering	Design the product	Avoiding obsolescence	Low

- Mengatur persediaan material mulai dari bahan baku (*raw material*) sampai barang jadi yang akan dikirim ke konsumen
- Dengan tujuan:
 1. Memaksimumkan *customer service*,
 2. Meminimumkan biaya operasional dan
 3. Meminimumkan biaya investasi di persediaan.

Mengapa Perlu Persediaan?

- Jumlah *supply* **tidak selalu sesuai** dengan jumlah permintaan
- Laju datangnya *supply* **tidak selalu sama** dengan laju permintaan



- Time
- Discontinuity
- Uncertainty
- Economy

Jenis Perusahaan	Jenis Persediaan			
	Supplies	Raw Materials	In-process Goods	Finished Goods
A. Sistem Retail				
1. Sale of goods	*			*
2. Sale of service	*			
B. Wholesaler distribution systems				
	*			*
C. Sistem manufaktur				
1. Special project	*	*	*	*
2. Intermittent process	*	*	*	*
3. Continuous process	*	*	*	*

- Working stock (cycle or lot size stock)
- Safety stock (buffer or fluctuation stock)
- Anticipation stock (seasonal or stabilization stock)
- Pipeline stock (transit or work in process)
- Decoupling stock → dependent process
- Psychic stock → promotion

1. Purchase cost (P)
 - a. Internal: production cost
 - b. External: purchasing cost
2. Order/setup cost (C)
 - a. Internal: setup cost
 - b. External: ordering cost
3. Holding/carrying cost (capital costs, taxes, insurance, handling, storage, shrinkage, obsolescence and deterioration)
4. Stockout cost
 - a. Internal: lost in production and a delay in a completion date
 - b. External: backorder cost, present profit loss (potential sale) and future profit loss (goodwill erosion)

REORDER COST.

the cost of placing a repeat order for the item & include allowances for

- drawing-up an order (with checking, getting authorization, clearance and distribution),
- correspondence and telephone costs,
- Receiving (with unloading, checking and testing),
- supervision,
- use of equipment
- costs for quality control, transport, delivery, sorting and movement of received goods

The reorder cost should be the cost of repeat orders and **not first-time purchases**, which might include allowances for

- finding suitable suppliers
- checking their reliability and quality
- requesting quotations
- negotiations with alternative suppliers, and so on.

HOLDING COST.

the cost of holding one unit of an item in stock for one period of time.

- The most obvious cost of holding stock is money tied up – which is either borrowed (in which case there is **interest** to pay), or
- could be put to other use (in which case there are opportunity costs).

Other holding costs are due to

- storage space (supplying a warehouse, rent, rates, heat, light, etc.)
- loss (due to damage, obsolescence and pilferage)
- handling (including all movement, special packaging, refrigeration, putting on pallets, etc.)
- administration (stock checks, computer updates, etc.)
- insurance.

SHORTAGE COST

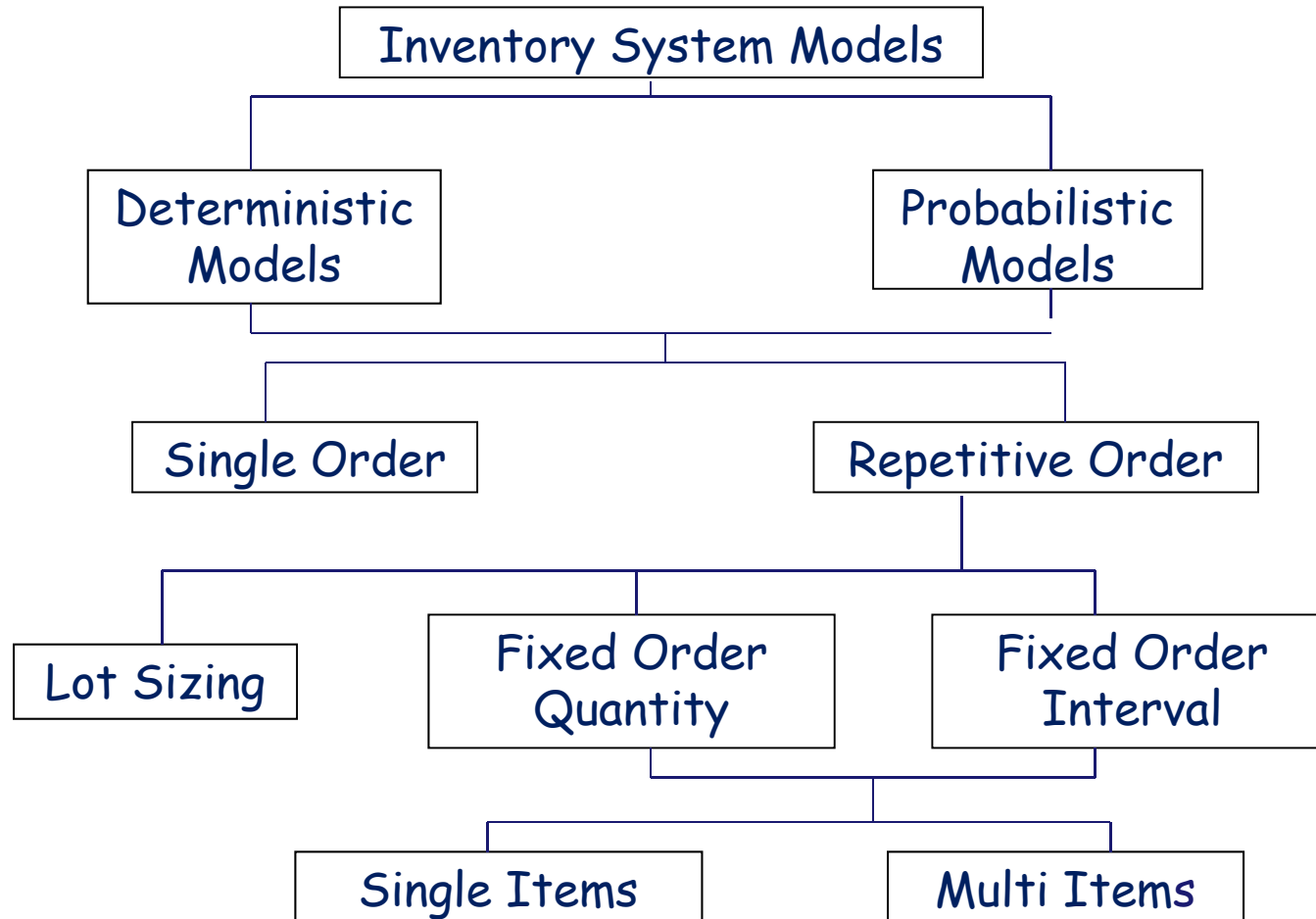
The cost that is associated with the **shortage occurred** . In the simplest case a retailer **might lose the profit** from a lost sale. Usually, though, the effects of shortages are wider than this and include:

- loss of goodwill,
- loss of future sales,
- loss of reputation, and so on.

Shortage costs might also contain allowances for positive action **to counteract the shortage**, such as:

- sending out emergency orders,
- paying for special deliveries, using alternative and more expensive suppliers,
- storing partly finished goods.

1. Repetitiveness (single or repeat order)
2. Supply source (outside or inside supply)
3. Knowledge of demand
 - a. Constant or variable demand
 - b. Independent or dependent demand
4. Knowledge of lead time (constant or variable lead time)
5. Inventory system (perpetual, periodic, MRP, DRP, SOQ)



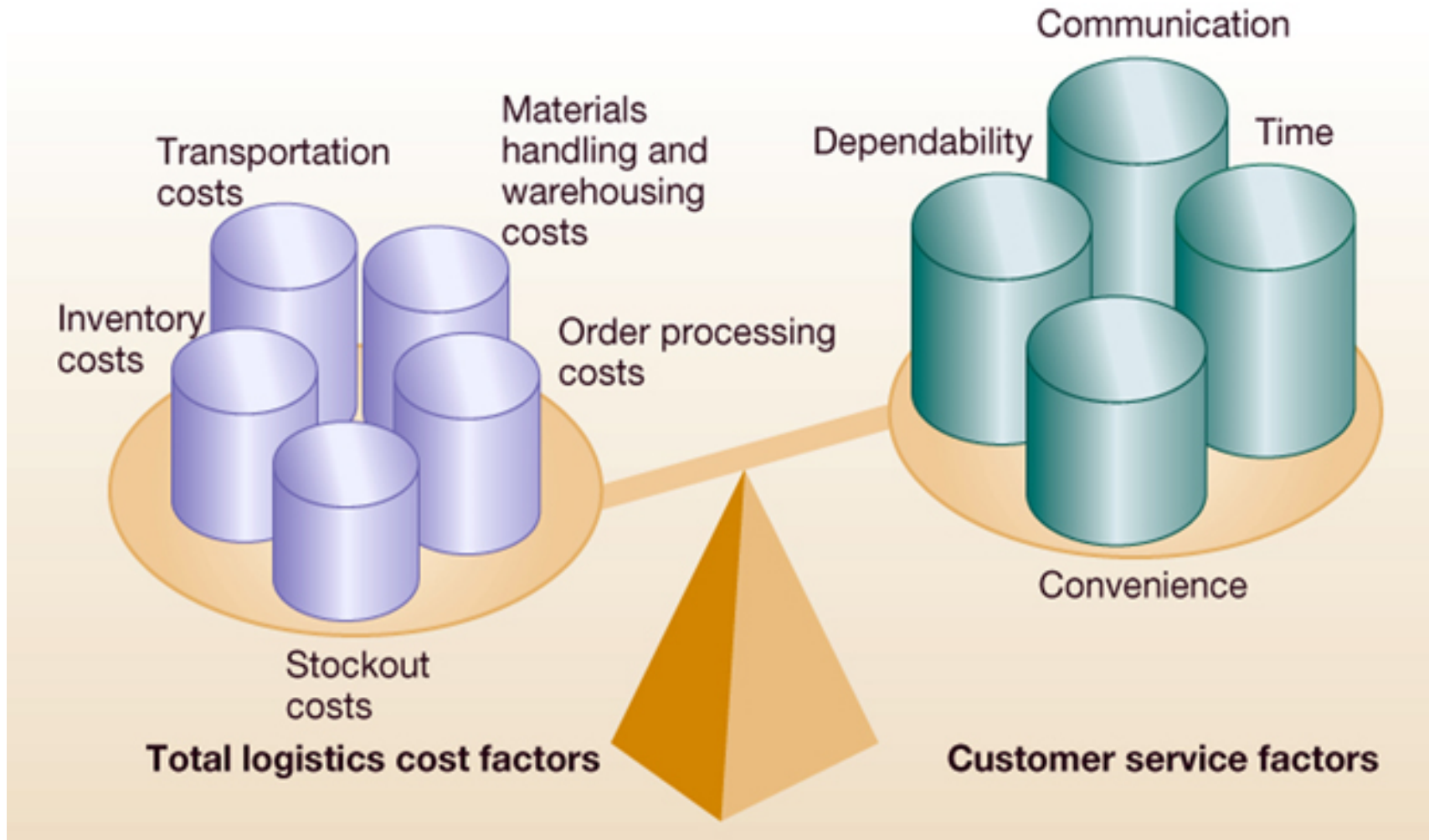
1. Sebutkan jenis persediaan apa saja yang terdapat pada industri kertas
2. Sebutkan fungsi persediaan pada distributor
3. Apa tujuan adanya manajemen persediaan dalam perusahaan?
4. Sebutkan komponen biaya persediaan dan bagaimana cara menentukan besarnya fraksi simpan dan biaya kekurangan
5. Faktor apa saja yang perlu diperhatikan dalam pemilihan model sistem persediaan?

ABC ANALYSIS



UBAYA
UNIVERSITAS SURABAYA

Logistics Cost vs Customer Service



What is ABC analysis?

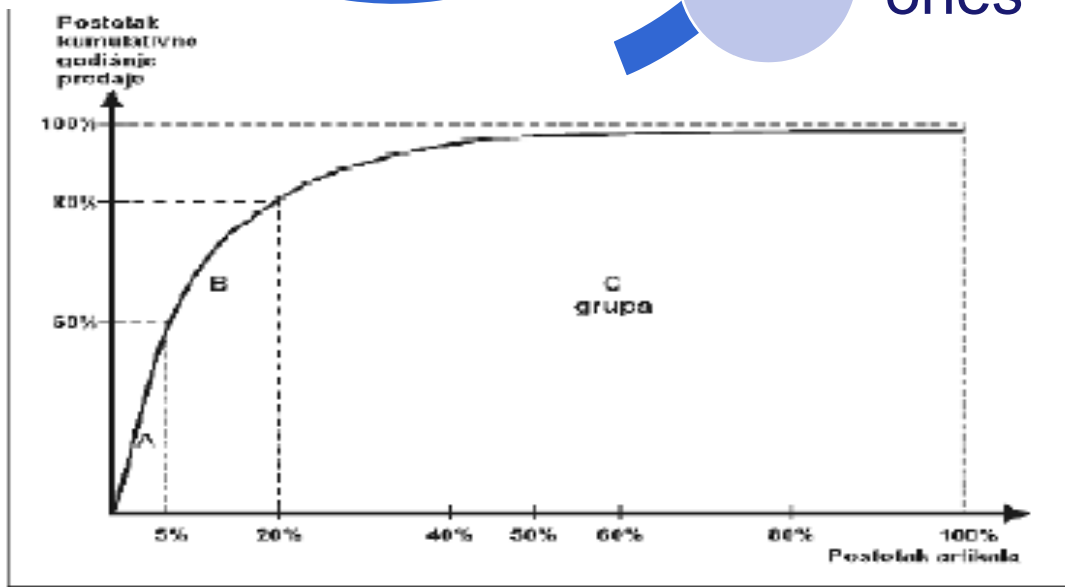
an *inventory categorization method* which consists in dividing items into three categories

A. being the most valuable items

Manager attention

B. being the middle valuable ones

C. being the least valuable ones



The ABC approach states that a company should rate items from A to C, basing its ratings on the following rules:



A-items are goods which annual consumption value is the highest; the top 70-80% of the annual consumption value of the company typically accounts for only 10-20% of total inventory items.



B-items are the interclass items, with a medium consumption value; those 15-25% of annual consumption value typically accounts for 30% of total inventory items



C-items are, on the contrary, items with the lowest consumption value; the lower 5% of the annual consumption value typically accounts for 50% of total inventory items.

Each item should receive a treatment corresponding to its class:



A-items

The diagram illustrates the ABC inventory classification. It features three downward-pointing chevrons on the left side, labeled 'A-items' (blue), 'B-items' (red), and 'C-items' (green). To the right of each chevron is a rounded rectangular box containing specific management policies for that class. The 'A-items' box is white with a blue border, the 'B-items' box is white with a red border, and the 'C-items' box is white with a green border. The background of the slide is dark blue with a lighter blue horizontal band at the top.

- A-items should have **tight inventory control**, more secured storage areas and better sales forecasts; reorders should be frequent, with weekly or even daily reorder; **avoiding stock-outs** on A-items is a priority

B-items

- B-items benefit from an intermediate status between A and C; an important aspect of class B is the **monitoring of potential evolution** toward class A or, in the contrary, toward the class C

C-items

- Reordering C-items is made less frequently; a typically inventory policy for C-items consist of **having only 1 unit on hand**, and of reordering only when an actual purchase is made; this approach leads to stock-out situation after each purchase which can be an acceptable situation, as the C-items present both low demand and higher risk of excessive inventory costs

The results of an ABC Analysis extend into a number of other inventory control and management processes:

- **Review of stocking levels:** “A” items will generally **have greater impact** on projected investment and purchasing spend, and therefore **should be managed more aggressively** in terms of minimum and maximum inventory levels; inactive items will fall to the bottom of the prioritized list; the bottom of the “C” category is the best place to start when performing a periodic obsolescence review.
- **Cycle counting:** the higher the usage, the more activity an item is likely to have; to ensure accurate record balances, higher priority items are cycle counted more frequently; “A” items are counted once every quarter; “B” items once every 6 months; and “C” items once every 12 months.

The results of an ABC Analysis extend into a number of other inventory control and management processes:

- ***Identifying items for potential consignment or vendor stocking:*** since “A” items tend to have a greater impact on investment, these would be the best candidates to investigate the potential for alternative stocking arrangements that would reduce investment liability and associated carrying costs.

VILFREDO PARETO (1848-1923)

- 20% of population owns 80% of nations wealth
- 20% of employees cause 80% of problems
- 20% of items accounts for 80% of firms expenditure

- The annual consumption value is calculated with the formula:

$$\textit{(Annual demand) x (item cost per unit)}$$

- Through this categorization, the supply manager can identify inventory hot spots, and separate them from the rest of the items, especially those that are numerous but not that profitable.

Steps for the classification of items:

1. Find out the unit cost and the usage of each material over a given period;
2. Multiply the unit cost by the estimated annual usage to obtain the net value;
3. List out all the items and arrange them in the descending value (Annual Value);
4. Accumulate value and add up number of items and calculate percentage on total inventory in value and in number;
5. Draw a curve of percentage items and percentage value;
6. Mark off from the curve the rational limits of A, B and C categories.

	Percentage of items	Percentage value of annual usage	
Class A items	About 20%	About 80%	Close day to day control
Class B items	About 30%	About 15%	Regular review
Class C items	About 50%	About 5%	Infrequent review

Example 1

Item number	101	102	103	104	105	106	107	108	109	110
Unit cost	5	11	15	8	7	16	20	4	9	12
Annual demand	48000	2000	300	800	4800	1200	18000	300	5000	500

Calculate the total spending per year

Item number	Unit cost	Annual demand	Total cost per year
101	5	48,000	240,000
102	11	2,000	22,000
103	15	300	4,500
104	8	800	6,400
105	7	4,800	33,600
106	16	1,200	19,200
107	20	18,000	360,000
108	4	300	1,200
109	9	5,000	45,000
110	12	500	6,000
Total usage			737,900

Total cost per year: Unit cost * total cost per year

Calculate the usage of item in total usage

Item number	Unit cost	Annual demand	Total cost per year	Usage as a % of total usage
101	5	48,000	240,000	32,5%
102	11	2,000	22,000	3%
103	15	300	4,500	0,6%
104	8	800	6,400	0,9%
105	7	4,800	33,600	4,6%
106	16	1,200	19,200	2,6%
107	20	18,000	360,000	48,8%
108	4	300	1,200	0,2%
109	9	5,000	45,000	6,1%
110	12	500	6,000	0,8%
Total usage			737,900	100%

Usage as a % of total usage = usage of item/total usage

Sort the items by usage

Item number	Cumulative % of items	Unit cost	Annual demand	Total cost per year	Usage as a % of total usage	Cumulative % of total
107	10%	20	18,000	360,000	48,8%	48,8%
101	20%	5	48,000	240,000	32,5%	81,3%
109	30%	9	5,000	45,000	6,1%	87,4%
105	40%	7	4,800	33,600	4,6%	92%
102	50%	11	2,000	22,000	3,0%	94,9%
106	60%	16	1,200	19,200	2,6%	97,5%
104	70%	8	800	6,400	0,9%	98,4%
110	80%	12	500	6,000	0,8%	99,2%
103	90%	15	300	4,500	0,6%	99,8%
108	100%	4	300	1,200	0,2%	100%
Total usage				737,900	100%	

Results of calculation

Category	Items	Percentage of items	Percentage usage (%)	Action
Class A	107, 101	20%	81,6%	Close control
Class B	109, 105, 102, 106	40%	16,2%	Regular review
Class C	104, 110, 103, 108	40%	2,5%	Infrequent review

Category	Percentage of items	Percentage of usage
Class A items	5-25%	40-80%
Class B items	20-40%	15-40%
Class C items	40-75%	5-20%

$A \leq B \leq C$

Example 2

Step 1

Item number	Annual quantity used	Unit value
1	75	80
2	150,000	0,9
3	500	3,0
4	18,000	0,20
5	3,000	0,30
6	20,000	0,10
7	10,000	2

Item number	Annual quantity used	Unit value	Usage per year
1	75	80	6,000
2	150,000	0,9	135,000
3	500	3,0	1,500
4	18,000	0,20	3,600
5	3,000	0,30	900
6	20,000	0,10	2,000
7	10,000	2	20,000
Total usage			169,000

Item number	Annual quantity used	Unit value	Usage per year	Percentage in total usage (%)
1	75	80	6,000	3,51%
2	150,000	0,9	135,000	79,8%
3	500	3,0	1,500	0,87%
4	18,000	0,20	3,600	2,1%
5	3,000	0,30	900	0,53%
6	20,000	0,10	2,000	1,18%
7	10,000	2	20,000	11,8%
Total usage			169,000	

Step 3

Item number	Cumulative % of items	Annual quantity used	Unit value	Usage per year	Percentage in total usage (%)	Cumulative % of total
2	14%	150,000	0,9	135,000	79,8%	79,8%
7	29%	10,000	2	20,000	11,8%	91,6%
1	42%	75	80	6,000	3,51%	95,11%
4	56%	18,000	0,20	3,600	2,1%	97,21%
6	71%	20,000	0,10	2,000	1,18%	98,39%
3	84%	500	3,0	1,500	0,87%	99,46%
5	100%	3,000	0,30	900	0,53%	100%
Total usage				169,000		

Category	Items	Percentage of items	Percentage of usage (%)	Action
Class A items	2	15%	79,8%	Close control
Class B items	7, 1	30%	15,31%	Regular review
Class C items	3, 4, 5, 6	55%	4,89%	Infrequent review

- The boundary between class A and class B might not be as sharply defined;
- The purpose of this classification is to ensure that purchasing staff use resources to maximum efficiency by concentrating on those items that have the greatest potential savings → selective control will be more effective than an approach that treats all items identically.

