

BAFS

Course Title: Working Capital Management

Professional Development Programme on Enriching
Knowledge of the Business, Accounting and Financial Studies
(BAFS) Curriculum <Elective Part>

Expected Learning Outcomes

- Upon completion of this course, teacher participants should be able to:
 - Explain the importance of working capital management (營運資金管理);
 - Describe the basic principles of cash management (現金管理) and the relevance of cash budgeting (現金預算);

Expected Learning Outcomes

- Analyse factors affecting the formulation of accounts receivable (應收帳款) and accounts payable (應付帳款) policies;
- Explain the objectives of inventory management (存貨管理) and application of simple inventory control techniques: Economic Order Quantity (經濟訂貨量), and Re-order Level (再訂貨水平) methods .

Syllabus in HKDSE Examination

- Importance of working capital management
- Basic principles of cash management and the relevance of cash budgeting
- Factors affecting the formulation of accounts receivable and accounts payable policies
- Objectives of inventory management and application of simple inventory control techniques: Economic Order Quantity (EOQ) and re-order level method

Contents (1)

- Working capital management (Illustration 1)
- Comparison of working capital in three HK listed companies (Illustration 2)
- Changes of working capital in SME companies (Illustration 3)
- Cash management and cash conversion cycle (Illustration 4)
- Receipts and payments in a company (Illustration 5)
- Cash budget control and minimum cash balance (Illustration 6, 7 & 8)
- Accounts receivable management and cash discounts offered to customers (Illustration 9)
- Accounts **payable** management and cash discounts offered by suppliers (Illustration 10 & 11)

Contents (2)

- Six cost elements in inventory control (Illustration 12)
- Inventory management and Economic Order Quantity (EOQ) decision model (Illustration 13 & 14)
- The relevant costs in EOQ by calculation (Illustration 15) and by graph (Illustration 16)
- Application of Just-in-time system for inventory management
- Re-order level of inventory control under certain and uncertain conditions (Illustration 17 & 18)

The Importance of Working Capital

- What is working capital ?
 - Current assets minus current liabilities.

(Note:

Current assets including stocks, account receivables, bank and cash;

Current liabilities mainly including account payables, accruals, and bank overdrafts)

What is working capital management ?

- to **control** the amount of stocks, accounts receivables, cash **and** current liabilities.
- to minimize the average stock turnover days, and accounts receivables turnover period.
- to keep **optimum money** in bank and cash, and optimum order quantity of inventory.
- to appropriately increase the accounts payable turnover period.

Illustration 1: Extracted balance sheets of Success Ltd in Dec., 2010 and 2009.

(\$'000)	2010	2009
Current Assets:		
Inventory	1,000	100
Accounts receivable	5,500	1,000
Bank & cash	8,800	3,000
Current Liabilities:		
Accounts payable	7,000	1,500
Other payables	500	400

How does Success Ltd's working capital change over the two years?

- Working capital is determined by :
(Current Assets – Current Liabilities)
=>Y2009 =\$2,200,000
=>Y2010 =\$7,800,000
- The working capital **increased** from Y2009 to Y2010. This is confirmed by the increase in accounts receivable and cash balances over the two years.

Is Success Ltd's Working Capital Management effective?

- Before we can assess the company's working capital management, the following assets and liabilities must be examined:
 - inventory → any excessive inventory being held → leading to obsolete stocks, and turnover period increased and hard to sell them all in a short period of time.

Is Success Ltd's Working Capital Management effective?

- Accounts receivable → if **too lenient** trade credit is granted to debtors, bad debts will increase. Debtors turnover period will increase but **liquidity** will **decrease**;
- Cash and Bank → **too much cash** in hand will lead to decrease in overall return (profitability) to the company. This is the opportunity cost due to **reduction** in **investment income**.

Is Success Ltd's Working Capital Management **effective?**

--Accounts payable → an increase in creditors turnover period will lead to a **decrease** in **cash requirement** now because creditors are only **repaid** in a **future** period of time, and vice versa.

What is Success's liquidity position compared to Industry ?

(\$'000)	2010	2009	Industry Average
Current Ratio:	2.04	2.16	2.01
Liquidity Ratio:	1.91	2.11	1.50

Explanation: For both current and liquidity ratios, they are better than industry norms.
Success Ltd --**no risk of insolvency** !

What is Success's profitability compared to Industry ?

(\$'000)	2010	2009	Industry Average
Profit margin	16%	19%	22%
Return on equity	10%	13%	15%

Explanation: From above data, we conclude that Success Ltd attains poorer performance than industry norm.

Success Ltd partially inefficient use of working capital !

Illustration 2: Extracts of Current Assets and Current Liabilities from three listed companies in HK

\$'million	123 Yuexiu Property (12/ 2010)	728 China Telecom (12/2010)	627 U-Right Int'l Ltd (3/2011)
Non-current Assets	16,019	424,229	---
Current Assets (A)	45,161	66,560	72
Current Liabilities (B)	(23,279)	(152,919)	(1,670)
Net Current Assets/ (Liabilities) (A + B)	21,882	(86,359)	(1,598)

Which company will you think being in trouble ?

Illustration 2

Suggested answer:

- (1) 123 has been performing the general average by attaining a current ratio of 2:1
- (2) 728 has less current assets than its current liabilities, because Telecom industry requires heavy investment in non-current assets.
- (3) 627 has suffered from serious **Net Current Liabilities** , and has been **under liquidation** due to insolvency.

Illustration 3A

Identify any two consequences when a SME company increases its working capital.

Lower risk of not meeting the short-term liabilities, **but** the **opportunity cost** of not using the idle funds for long term investment will **increase** . Therefore, the return to the company may be lowered.

Illustration 3B

Identify two results if a SME company reduces its working capital ?

--if the company is **profitable**, the reduction of working capital will result in increase in long term investment, leading to higher return to company than before.

--if the company is **making loss**, it will result in general decrease of working capital, or yielding **net** current liabilities, leading to a risk of not matching short term liabilities !

Study 1

- You may access to the following link:
- www.thehackettgroup.com/casestudies/cytec/
- To have a study of the Cytec Industries Inc.---a chemicals trading and manufacturing group in USA ---how to successfully reduce its working capital by **40%** !

Study 2

- What kind of support has been providing by the Trade and Industry Department of the HKSAR to SME ?
- www.smefund.tid.gov.hk/eng/sgs.html
- → Working Capital Loans

Working Capital: Risk & Return

In Financial Management, it is well known that high risk may yield high return.

The benefits of maintaining effective working capital management to a company:

--attaining an **optimum balance**: liquidity Vs return. To enhance shareholders' return in the long run by releasing appropriate level of cash for investment.

--establishing **good creditworthiness** to its suppliers.

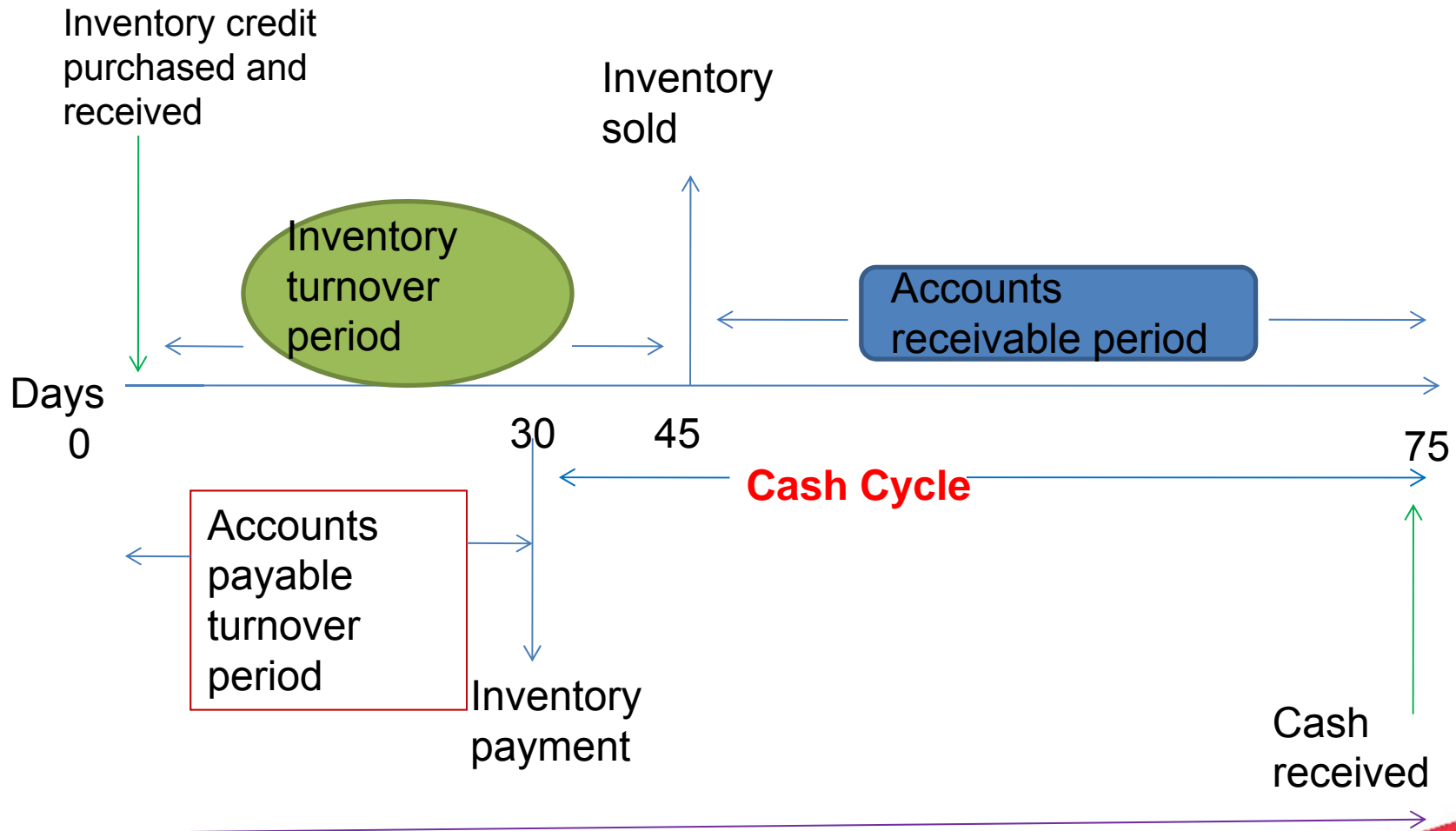
Cash management (現金管理)

- One of the **major** elements in Current Asset is **Bank and Cash**
- **Why** does a company have to hold money ?
- (1) Requires for **transactions** of
 - the purchases of fixed assets, investment, inventory, financing trade debtors, and prepayments.
- (2) **Sources of funding** from above transactions
 - credits received from suppliers in purchases

Definition of Cash Conversion Cycle(CCC)

- --This CCC (現金轉換循環) defines the time period **starting** from inventory **credit purchased** and received **until** the **collection of cash** from debtors after sale. The **time** from order placement to the receipt of inventory must be **excluded**.
- -- The cash cycle is the **difference** of time period between inventory payment and cash received from accounts receivable.

Cash conversion cycle (a trading company)



How to determine the **Cash Conversion Cycle (CCC)** ?

$$\begin{aligned} & \text{Inventory turnover period (存貨周轉率)} \\ & + \text{Accounts receivables collection} \\ & \text{period (應收帳款收款天數):} \\ = & - \text{Accounts payables turnover period} \\ & \text{(應付帳款付款天數)} \end{aligned}$$

CCC based on given data in previous page:

$$= (45 + 30 - 30) \text{ days} = 45 \text{ days}$$

Illustration 4: Calculation of Cash Conversion Cycle

- The accountant of Success Ltd has collected the following yearly data:

Credit sales	\$500,000
Credit purchases	\$250,000
Average inventory	\$ 50,000
Average accounts receivable	\$120,000
Average accounts payable	\$ 20,000

The selling price is normally based on cost of goods sold plus 25%. Determine the Cash Conversion Cycle for Success Ltd. (A year = 365 days)

Illustration 4:

- (1) The yearly cost of sales (note: Cost + 25%Cost = sales)
= $(\$500,000/1.25)=\$400,000$
- (2) Inventory turnover period (存貨周轉率):
= $(\$50,000/\$400,000) \times 365 = 45.6$ days
- (3) Accounts receivable collection period (應收帳款收款天數):
= $(\$120,000/\$500,000) \times 365 = 87.6$ days
- (4) Accounts payable turnover period(應付帳款付款天數):
= $(\$20,000/\$250,000) \times 365 = 29.2$ days
- (5) Cash Conversion Cycle = (2)+(3)-(4)
= $45.6 + 87.6 - 29.2 = 104$ days

How to **increase** your company's cash ?

- To **speed up collection** from debtors or arrange factoring
- To **raise deposit** requirement from customers
- To **offer cash discount** to customers
- Loan** raised from banks
- Overdrafts drawing** from banks
- Lease** financing
- Fund raising** from existing **shareholders**

Payments required in a trading company

- To settle accounts payable, and sundries
- To pay for capital investment, or inventory purchases
- To settle labour cost and general overheads
- To pay off debts from bankers or lenders

Illustration 5

- Identify why a trading company shows profits in its Income Statement, but has no cash available for its daily operating.

It is because its cash inflows are slower than **cash outflows**. For example: Bought **excessive inventory** with long inventory conversion period. **Extensive receivables** term compared to **shorter payable** period.

Cash Budget(現金預算)

- A detailed plan of future cash receipts and payments. The time period will range from a quarter to a year.
- The major elements included in a Cash Budget
 - --Cash Receipts
 - --Cash Payments
 - --**Net Change in Cash** for a period
 - --**New financing** needed

Cash Budget= Management Tool ?

- **Yes:**
- A **feed forwards control** tool by projecting **cash** inflows, outflows, and closing cash balances and any loan arrangement required.
- A **comprehensive consideration** of all various items involved the cash budget within a specified time period which is based on weekly, or monthly depending on management purpose

How to prepare a Cash Budget ?(1)

- Step 1: **Find** the actual opening bank/ cash balances.
- Step 2: **Determine** the cash receipts from accounts receivable, and others.
- Step 3: **Determine** the cash payments due to accounts payable and others.
- Step 4: **Calculate** the closing period bank/ cash balances.

How to prepare a Cash Budget?(2)

- Step 5: **Identify** any cash surplus/ (deficit) during the period.
- Step 6: **Place** any surplus fund to short term investment. Any **deficit** in fund must be covered by some **external financing** (eg short term revolving loan, long term bank loan, shareholders' placement, etc.)

Data required for Cash Budget Preparation

1. **Sales** forecast.
2. Information on **collection policy** from debtors.
3. Forecast of **purchases** and their **payment terms**.
4. Forecast of other **cash payments**: wages, utility charges, taxes, capital expenditure, etc.
5. Company policy on **target cash balance**, if any.

Preparation of Cash Budget for Success Ltd in September and October (1)

1. Sales: August --\$320,000
September --\$400,000
October --\$600,000

--with 5% cash sales, and 5% bad debts losses (ie collections would total be 95% of monthly credit sales).

--Credit sales:30% of receivable collected in the month of sales; the balance of receivables collected in the following month.

Preparation of Cash Budget for Success Ltd in September and October (2)

2. Purchases: August	--\$240,000
September	--\$360,000
October	--\$420,000

--It is the company policy to **purchase stock one month before sales.**

--**40% of payables** paid in **the month** of purchase.

--the **balance** paid in **the following month.**

Preparation of Cash Budget for Success Ltd in September and October (3)

3. Utility charges: \$35,000 (quarterly payment in March, June, September, December);
Monthly cleaning expenses: \$8,000;
Monthly rent: \$30,000.
4. Office equipment depreciation per month:
--\$4,000.
5. August closing bank and cash balances
\$59,000.

Preparation of Cash Budget for Success Ltd (Workings 1)

Cash collections \$'000	September	October
Cash sales (1)	20	30
Credit sales Receipts (2)	311.6	418
Notes		
(1)	$400 \times 5\% = 20$	$600 \times 5\% = 30$
(2)	$304 \times 0.65 = 197.6$ $380 \times 0.3 = \underline{114.0}$ 311.6	$380 \times 0.65 = 247$ $570 \times 0.3 = \underline{171}$ 418

Preparation of Cash Budget for Success Ltd (Workings 2)

Cash payments \$'000	September	October
Purchases payment (1)	288	384
Other payments (2)	73	38
Notes : (1)	$240 \times 0.6 + 360 \times 0.4$	$360 \times 0.6 + 420 \times 0.4$
(2)	$35 + 8 + 30$ (depreciation excluded = non-cash item)	$8 + 30$

Completion of cash budget for Success Ltd

\$'000	September	October
Opening bank/ cash balances	59.0	29.6
Add: total cash receipts	331.6	448
	390.6	477.6
Less: total cash payments	(361)	(422)
Closing surplus bank/ cash balances	29.6	55.6

Minimum Cash Balance

Success Ltd has a policy to maintain minimum cash balance of \$100,000. What would be the further action proposed ? (Ignore interest payable)

It has been found that the closing cash balance of Success Ltd in September is \$29,600. It means that a short term loan of \$70,400 will be required.

Therefore, the revised closing balances of Success Ltd:

(1) In September: $\$(29,600 + \$70,400) = \$100,000$

(2) In October : $\$(100,000 + 448,000 - 422,000) = \$126,000$

Therefore: **partial repayment of short term loan:**

$\$(126,000 - 100,000) = \$26,000$ while its closing October cash balance will still be \$100,000 (after partial repayment).

Illustration 6

- Identify two advantages and two disadvantages of setting up a Cash Budgeting System within the Success Ltd.

	Advantages	Disadvantages
(1)	Within a SME, a proper way to arrange an advanced loan , if required	Forecast may be wrong, and wrong data leading to wrong forecast.
(2)	To allow proper allocations of surplus funds for short term investment	A lot of paperwork and time consuming in order to set up an accurate cash budget.

Illustration 7

- What are the reasons for Success Ltd to maintain a **minimum** cash balance of \$100,000?

- (1) If external **economic condition is worse off**, the actual cash collected from sales will be decreased (eg bad debt increased).
- (2) Being a **conservative approach**, the forecast may be wrong. Buffer cash can allow the smooth running of business.
- (3) Available for **immediate capital investment**.

Illustration 8

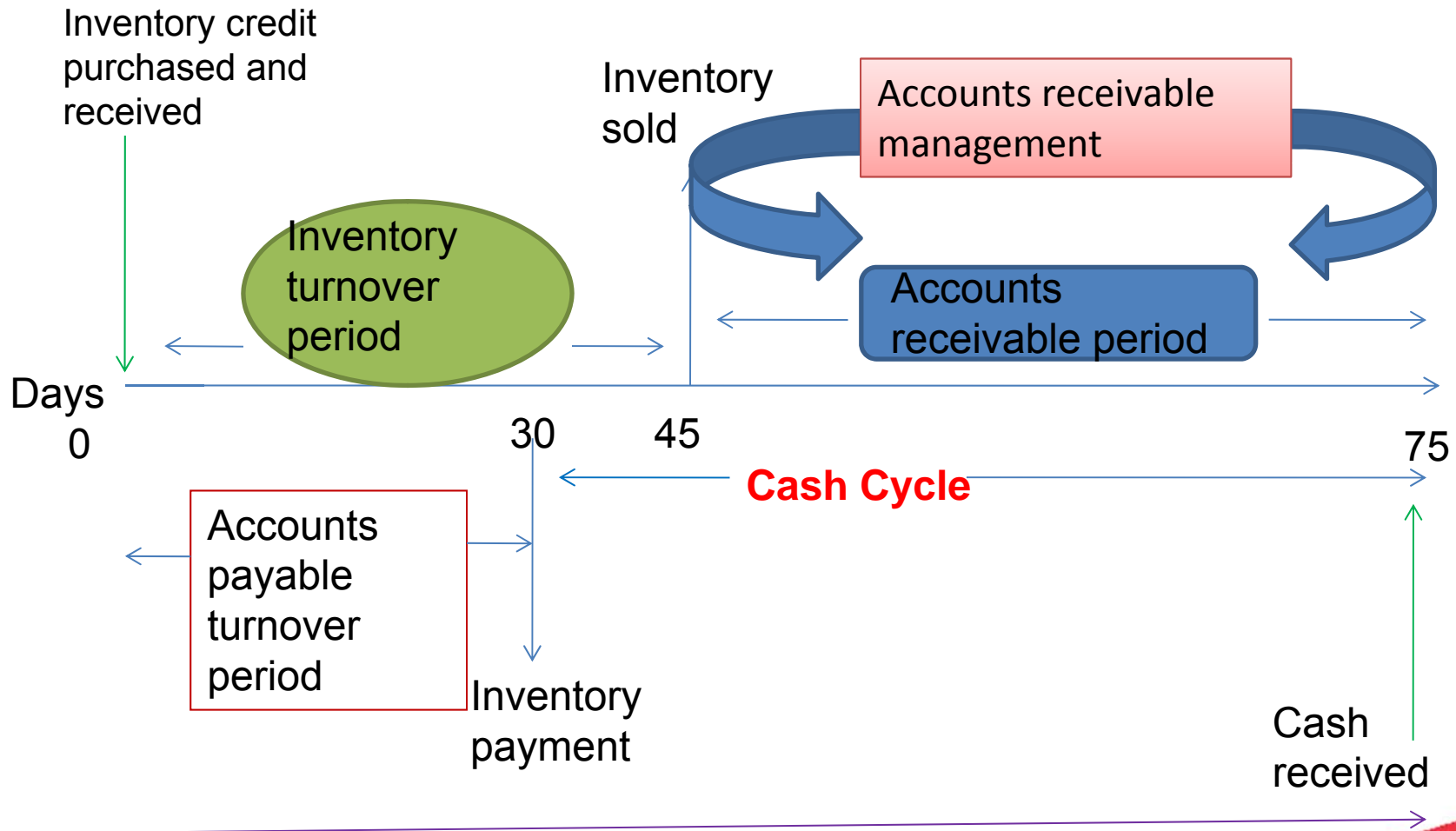
- How can a convenient store collect sufficient cash inflows to meet its monthly payments ?

- (1) Conducting regular promotions to increase sales, especially special discounted items for cash sales.
- (2) Introduction of bonus points system to allow customers to participate in gift redemption promotion process. Cash conversion cycle can be maintained at low level.
- (3) To ask its holding company, if any, for short term borrowing.

Contemporary application of Cash Budget Control

- All forecasted cash receipts and payments will be laid down for the consideration. Cash budget is a plan with the emphasis of **feed forward control**.
- Allowance for **various aspects** which are critical to the survival of the company.
- The cash budget can be **continually amended** to reflect variances due to ever changing economic circumstances.

Accounts Receivable Management



What is accounts receivable management ?

- A company allows its customers to purchase **on credit** (ie without paying the goods at once).
- After some days (credit period) lapse, the customers will settle the accounts according to **the sales agreement previously fixed**.
- If the customers default on the payments, the company would suffer from bad debts loss. This must be controlled by a **strong and flexible 'Credit Policy'**.

How to establish a Receivable Credit Policy ? (1)

(It is also termed as accounts receivable policy.)

- (1) Establishment of 'Credit Standards' by determining the basic level of credit score for a potential customer to possess. Poor credit rating score by a customer would mean a high level risk of bad debts—no credit granted, but only **Cash-on-delivery**. A certain level of rating scored or above would result in a **credit limit** granted (eg less than \$1 M).
- (2) Determination of '**Credit Period**' granted to a customer relating to credit sale.

How to establish a Receivable Credit Policy ? (2)

(2) ‘**Credit Period**’ granted to a customer during the credit sale (ie how long the customers have to finally settle the invoice), the longer period would mean a higher level of bad debt risk to the company. Therefore, on average, a credit period of 1 month is better to the selling company, but may not be welcome by potential customers.

How to establish a Receivable Credit Policy ? (3)

(3) Establishing any '**Cash Discount**' term to customers. It means giving an extra amount of discount to the customers if they can settle the invoices at an earlier date stated in the cash discount.

For instance, a cash discount term of '**2/15, net 30**' means an extra cash discount of 2% given to customers settled within 15 days after sales. Or, the customers normally have to settle invoices in full in 30 days.

How to establish a Receivable Credit Policy ? (4)

(4) **Formulating the procedures** by following up any overdue invoices.

The aging report of accounts receivable would disclose any overdue invoices. Some appropriate actions must be followed:

--overdue statements issued with reminder/warning, and customers' office visits;

--issue of legal letters; use of collection agency.

Illustration 9

- Evaluate whether to offer a cash discount term of: 1/5 net 30 for an invoice of \$150,000 to C Ltd, assuming Success Ltd will use the cash collected to repay the outstanding loan at 15% per annum. Take 365 days= One year.

Benefit (Interest Saved) (A)	Cost (B)	Net (A-B)
$\$150,000 \times (25/365) \times 15\%$ = \$1,541	$\$150,000 \times 1\%$ = (\$1,500)	+\$41 valid to offer the cash discount.

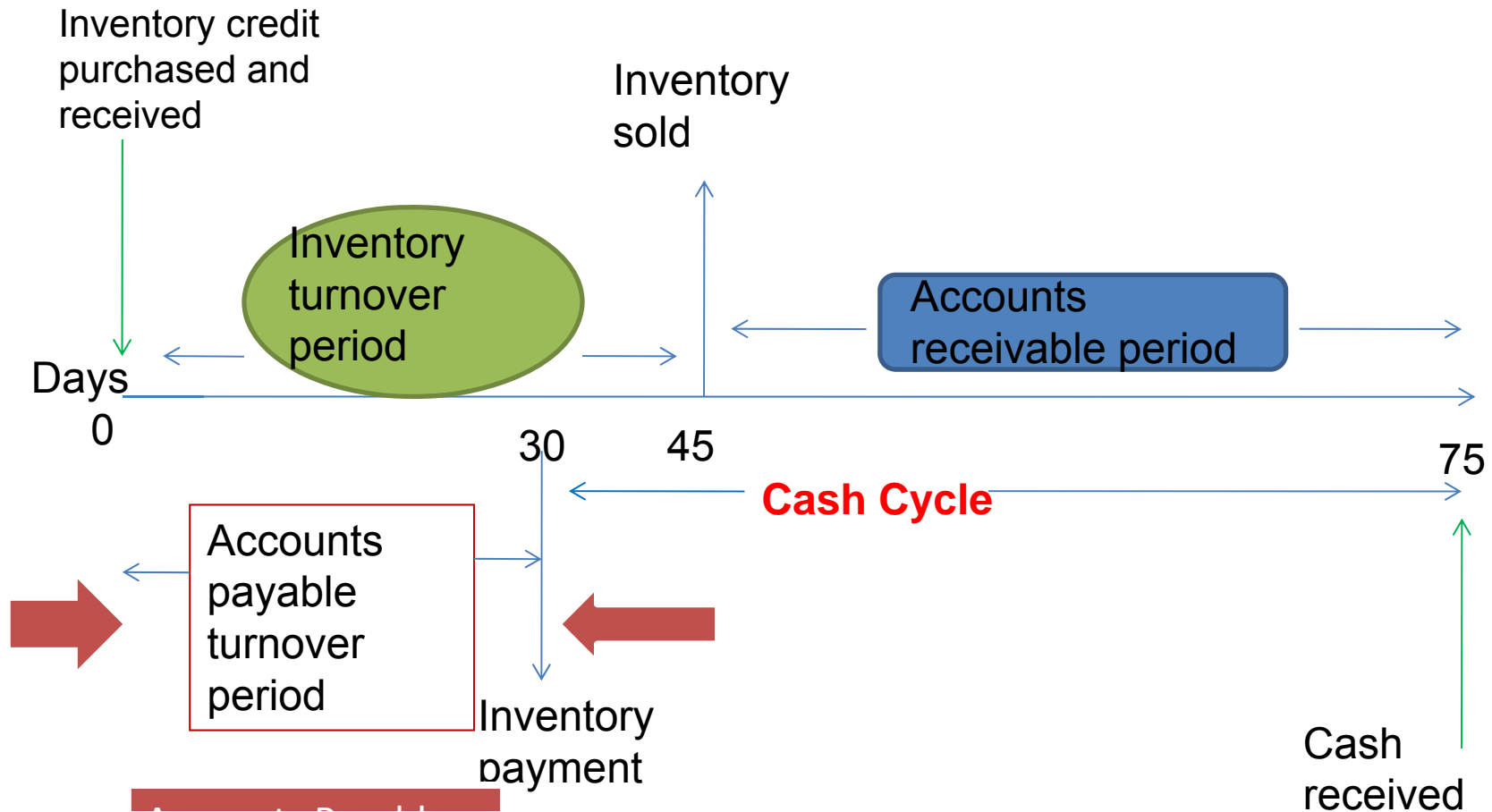
Major effects on Company when considering credit granted to customers

Effects to company	Description of effects
Sales level ↑	due to offering longer credit term , or higher credit limit to customers.
Profit level ↓	longer credit term given to customers may result in increasing the interest cost (or opportunity cost) of accounts receivable amount financed . Longer collection period would also result in higher bad debt risk .
Liquidity level	<u>Inversely</u> proportional to credit amount / term. Insolvency may have fatal effect to the company. It must be considered in detail before offering the longer credit term to customers.

How to arrive at an optimum credit policy ?

- (1) Consideration of all factors discussed previously, and summarized into the elements of 'Benefits' and 'Costs';
- (2) In financial term, 'Benefits' > 'Costs' means overall net benefits enjoyed by the company , and vice versa.
- (3) Liquidity is also a major element in determination of credit policy.

Accounts Payable Management



Accounts Payable (AP) Management

What is Accounts Payable(AP) Management?

- Due to the **credit** purchase by a company from its suppliers, the goods will be settled with payments **after** some days.
- It is treated as a kind of **interest free source of finance** enjoyed by the buying company.

Factors considered in setting an AP Policy

- (1) Negotiation of a better credit period.
- (2) Consideration of accepting the cash discount given by suppliers.
- (3) Implementing Just-in-time control system, which is useful in reducing inventory level, and hence the payable amount.

Negotiation for a better 'Credit Period'

The longer the payable credit period, the higher benefit resulted to the 'payable company'. However, excessively long payable credit period would result in suppliers' **withholding** of supplies, and **overdue interests charged** on overdue amount. Reference by comparison to industry average can reveal a status for proper positioning.

Success Ltd -consideration of accepting the cash discount offered by suppliers.

Success Ltd can evaluate the cash discount policy by:

- (a) comparing the benefits and costs.
- (b) calculating the annualized interest cost for comparison with Success Ltd's average interest cost of borrowing.

Illustration 10: Cash discount (Accounts Payable)

- Success Ltd has an overdraft facility line to finance its working capital, with an interest rate of **15%** per annum.
- A Ltd has offered a cash discount with the following term: **1.5%/10 net 45**.
- Success Ltd has a balance due and payable to A Ltd at \$140,000. Take a year =365 days.
Determine whether the cash discount is acceptable to Success Ltd.

Illustration 10: Workings (1)

(1) The benefits and costs of cash discount to Success Ltd:

--Benefits (cost savings)

$$= \$140,000 \times 1.5\% = \$2,100$$

--Interest costs

$$= \$140,000 \times [(45-10)/365] \times 15\%$$

$$= \$2,013.7$$

--Net benefits (savings) = +\$86.3 (acceptable)

Illustration 10: Workings (2)

--Alternative answer:

The annualised interest costs of cash discount:

$$\begin{aligned} &= \left[\frac{(\text{Cash discount in \%}) (365) (100\%)}{(100\% - \text{Cash discount in \%}) \times (\text{Normal credit days} - \text{Cash discount days})} \right] \\ &= [(1.5\%)(365) / (100\% - 1.5\%) (45 - 10)] \times 100\% \\ &= 15.9\% \end{aligned}$$

--Explanation: Success Ltd can borrow overdraft at the cost of **15%** per annum, while its supplier has offered to Success Ltd the equivalent annualised cash discount **benefit of 15.9%**. The AP cash discount is acceptable because of **benefit** > cost (ie **15%**).

Implementing **Just-in-time (JIT)** inventory control system

- The implementation of JIT system would result in **no excessive inventory**, and the **reduction** of **Accounts Payable** and **Accounts Receivable** to a reasonable level.
- However, the smaller quantity of purchase may result in the loss of quantity discount.
- An **Economic Order Quantity (EOQ)** may help to lower overall inventory costs. It will be discussed in next section.

Illustration 11

A supplier has offered a cash discount to Success Ltd on the following term: a cash discount of 2% if the amount is settled within 5 days. The normal credit term is 30 days. The annual rate of borrowing by Success Ltd is 20%. Take a year = 365 days.

The annual rate of cash discount will be (1); and the cash discount will be (2).

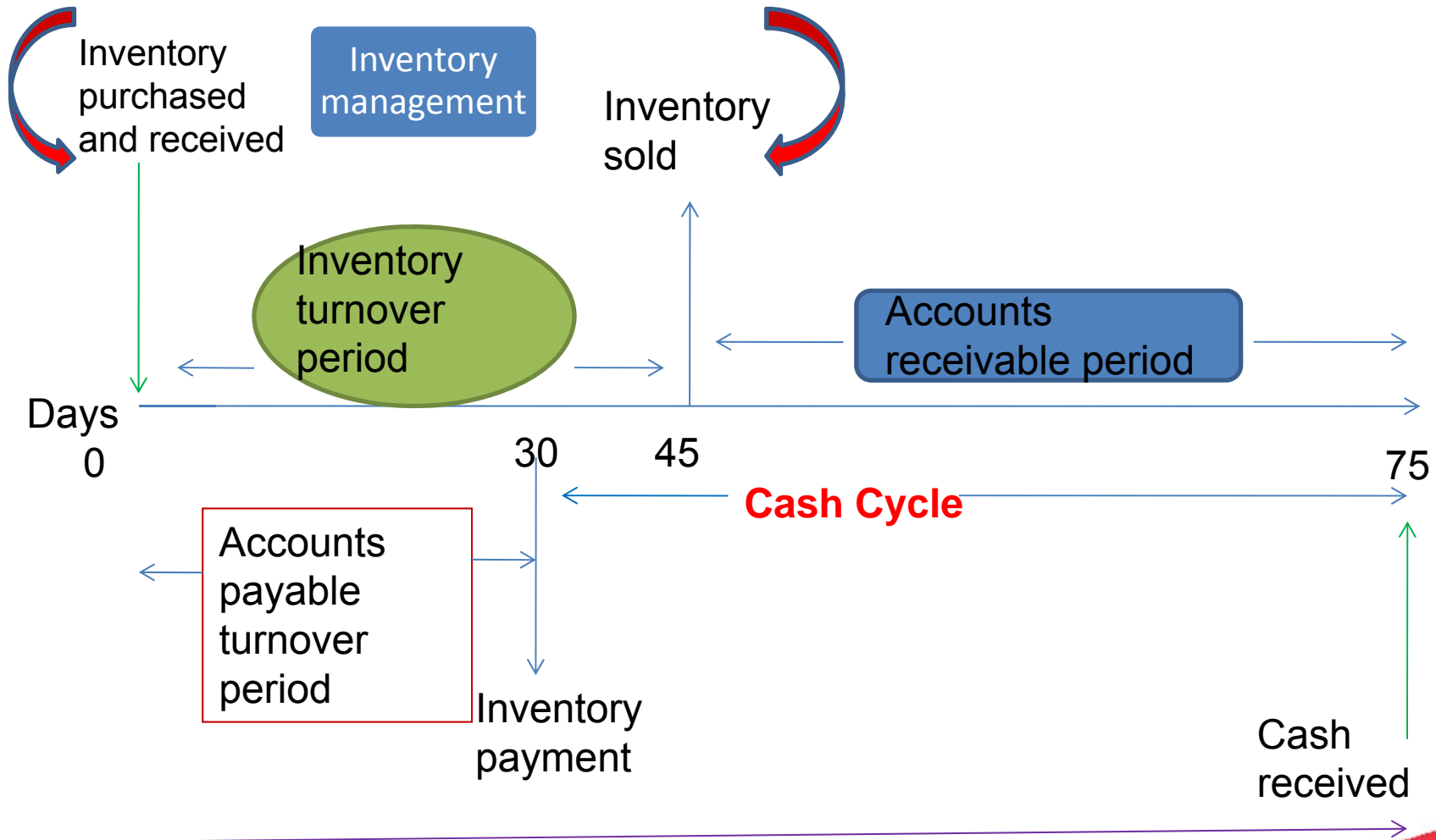
- | | <u>(1)</u> | <u>(2)</u> |
|----|------------|------------|
| a) | 29.8% | rejected |
| b) | 29.8% | acceptable |
| c) | 28.8% | rejected |
| d) | 28.8% | acceptable |

Illustration 11--Answer

The annual rate of cash discount will be (1) ; and the cash discount will be (2) .

- (1) (2)
- a) 29.8% ; rejected
 - b) 29.8% ; acceptable
 - c) 28.8% ; rejected
 - d) 28.8% ; acceptable

Inventory Management



What is Inventory Management ?

It is the planning, coordinating, and controlling activities (including period and cost):

--(in a trading company) purchasing of inventory → warehousing → delivery to customers.

--(in a manufacturing company)

purchasing of raw materials → producing work-in-progress → finished goods completion → warehousing → delivery to customers.

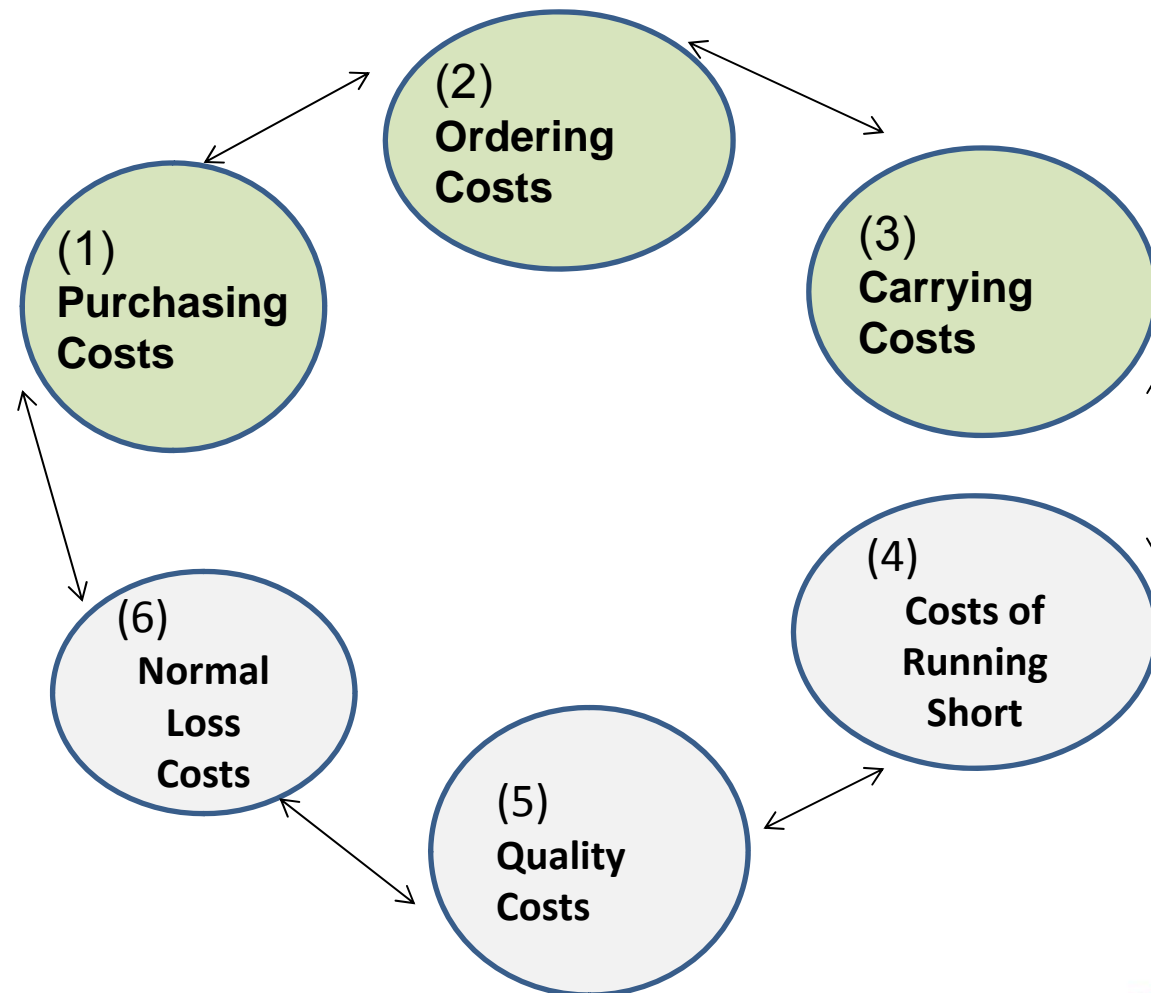
Why do we have to implement inventory management ?

- With effective planning and controlling of the activities in purchasing and management of inventory or goods for sale, **less cash is tied up** in inventory. **Other investment opportunities** can be engaged.
- The risk of stock loss and obsolescence can be minimised. The company's **profitability** can be favorably **increased**.

Inventory Management involves :

- 1) Identification of **Six** types of costs in relation to inventory for sale.
- 2) Understanding and application of Economic Order Quantity (EOQ) decision model.
- 3) Inventory Control: Just-in-time (JIT) system.
- 4) Inventory Control: Re-order level methods under different demand conditions.

Costs Associated with Inventory for Sale



Costs Associated with Inventory for Sale

- (1) **Purchasing costs** = Costs of inventory purchased from suppliers, **together** with carriage inwards cost, and insurance cost, **but** net of goods return. Unit = \$ per Kg or litre
- (2) **Ordering costs** = Costs of issuing purchase orders, receiving and checking the quantity in the orders, and matching invoices received against purchase order and goods received note to make payments. Unit= \$ per order.

Costs Associated with Inventory for Sale

- (3) **Carrying costs** = all costs of holding an inventory until sale, **inclusive** of any opportunity cost (eg interest cost) tied up in inventory and costs of storage (eg rent, insurance, obsolescence costs).
- (4) **Costs of running short** = all costs resulted due to a confirmed customer orders unfulfilled (eg short of stocks leading to lost sales from customers and goodwill).

Costs Associated with Inventory for Sale

- (5) **Quality costs** = Totally 4 categories of costs including prevention, appraisal, internal failure, and external failure due to not in conformance with customer expectations.
- (6) **Normal loss costs** = Any kinds of loss in physical quantity and amount of the inventory (eg misclassification, theft, evaporation or breakage, etc).

Illustration 12

Success Ltd is a SME which specializes in manufacturing a certain range of USB storage devices. Since it has limited share capital, the inventory will be financed by borrowing money from bank.

Which cost category of inventory management does interest cost belong to ?

Illustration 12

- A) ordering costs
- B) normal loss costs
- C) purchasing costs
- D) carrying costs

Illustration 12

Answer:

- A) ordering costs
- B) normal loss costs
- C) purchasing costs
- D) carrying costs

Effect of Inventory Size on Costs

- By **reducing** the average quantity of inventory held generally:

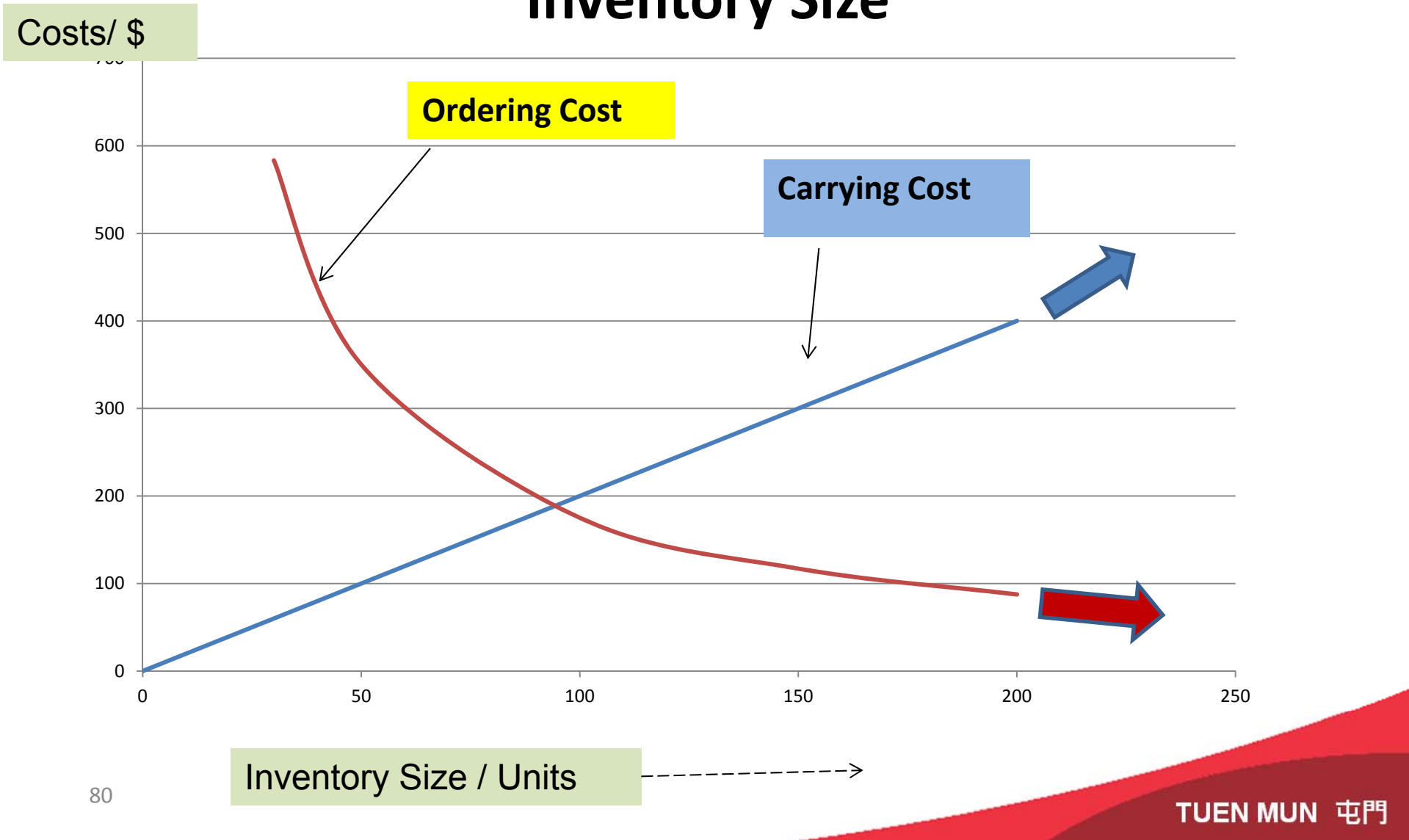
--**increases** ordering cost

--**reduces** carrying cost

Disadvantage:

--increasing the chance of running short of inventory.

Behaviour of Ordering and Carrying Costs on Inventory Size



Inventory Management from Various Departments' Perspective: (1)

Sales
department

In order to meet customers' orders, they will favour a large size of inventory level. Their decision will affect carrying cost and cost of running short.

Production
department

In order to attain mass production by lowering down production costs, they will favour to buy in sufficient raw materials in stores to prevent from production stoppages. Their decision will affect ordering cost, carrying cost, cost of running short and quality cost.

Inventory Management from Various Departments' Perspective: (2)

Purchasing department

In order to secure quantity discounts from suppliers, a **large quantity of raw materials** will be sought. Their decision will lead to decrease in purchasing cost, ordering cost and costs of running short, **but increase in carrying cost and normal loss cost.**

Costing department

They have to monitor with the total inventory costs, with the aim to maintain an overall low inventory level in order **to avoid capital held up in excessive inventory.**

Economic Order Quantity (EOQ) Decision Model

- How many quantities of inventory should be ordered each time ?
 - By balancing not to order too many and not too little, the **optimum costs** associated with goods for sale can be attained by adopting the EOQ decision model, which can help to minimise the costs of ordering and carrying.
 - Application of EOQ has some basic assumptions to follow with.

Basic **Assumptions** underlying for EOQ

- (1) **Same quantity** ordered at each reorder placed.
- (2) **Constant demand**, ordering costs and carrying costs are known without uncertainty. The time between placing a purchase order and its delivery is also known. Thus, no cost of running short will happen.
- (3) Purchase **price** of inventory remains **constant** and unaffected by various ordered quantity.

Benefit from applying EOQ

Based on above assumptions, EOQ is a useful decision model for a company to find an **optimum order quantity** in which the total inventory costs are **minimised**. It is beneficial to the company because **efficiency** can be enhanced. Therefore, profitability and liquidity can be improved by the company.

Formula of EOQ

$$EOQ = \sqrt{\frac{(2) (D) (O)}{C}}$$

Where: 2 = a constant

D = Consumption in units for **a time period defined**

O = Total ordering costs per order placed each time

C = Total carrying costs per unit for **a time period defined**

Illustration 13

Success Ltd has an inventory X with annual consumption of 8,000 units. The Costing Department has estimated that the ordering and carrying costs for X are \$80 per order, and \$2 per unit per annum. Determine the company's Economic Order Quantity. (Assumed no changes in other costs.)

$$EOQ = \sqrt{(2) (8,000) (80) / 2} = 800 \text{ units}$$

(It means Success Ltd has to place 800 units per order so as to achieve a minimum total inventory cost for x per annum.)

Illustration 14

Success Ltd has to purchase another inventory Z:

- (1) Annual demand: 1,000 units
- (2) Purchase Price = \$10/unit
- (3) Estimated total cost per order = \$405
(including receiving and inspecting costs)
- (4) Estimated carrying cost per unit per year
= 10% of purchase price

Determine the EOQ of Z.

Illustration 14--Answer

$$\begin{aligned} \text{EOQ} &= \sqrt{(2)(1,000)(405) / (10)(0.1)} \\ &= 900 \text{ unit per order} \end{aligned}$$

What will be the relevant total costs per year?

=total no. of orders per year x each ordering cost
+ average carrying cost of Z per unit per year

$$=(1000/900)(405) + (900/2)(1)$$

=\$900 per year

Illustration 15

Using the same data in Illustration 14 above, with the order quantity is : (a) 750 units or (b) 1100 units, what will be the **relevant total costs** per year ?

Illustration 15--Answer

(a) If order quantity is 750 units, the total relevant costs :

$$= (1000/750) 405 + (750/2) (1) = \$915 \text{ per year}$$

(b) If order quantity is 1,100 units, the total relevant costs:

$$= (1000/ 1100) 405 + (1100/2)(1) = \$918 \text{ per year}$$

It is proved that EOQ will give **the lowest total relevant costs (ie \$900)** by comparing to above various order quantities !

EOQ by graphical method

Illustration: Annual Demand=350units; Cost/order = \$50/order;
Carrying cost = \$4/unit (Note **Please prove it by calculation !**)

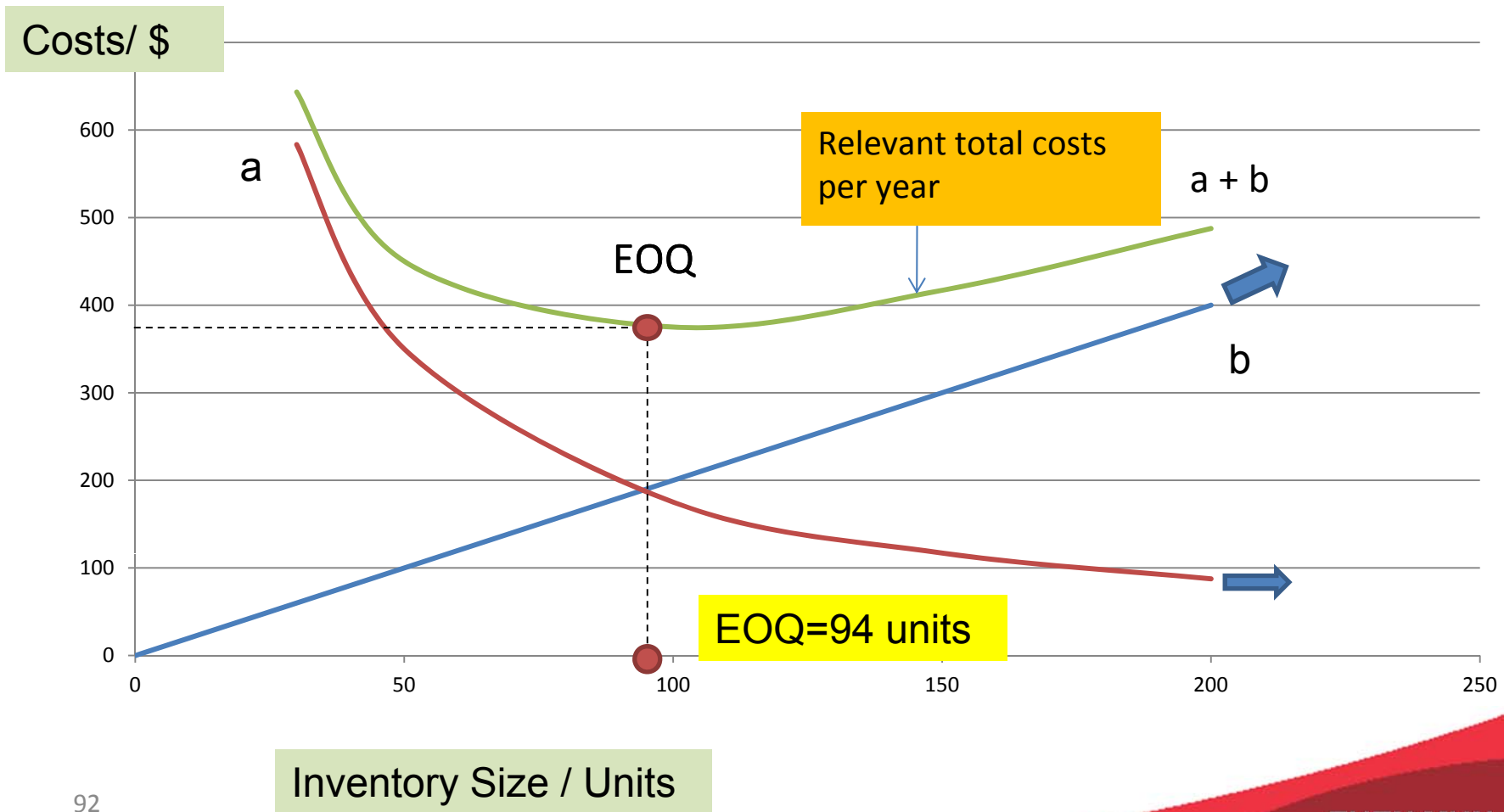


Illustration 16

By successfully reducing the total inventory level of Success Ltd, will there be any benefit to the company's liquidity position?

Answer:

Success Ltd can attain immediate improvement in cash/liquidity position. In the long run, more cash can be applied to other more profitable investments.

Inventory Control: Just-in-time(JIT) System (1)

- (1) The implementation of JIT system can help a company to attain several goals. One of them is zero closing inventory. The concept would include the adopting of JIT purchasing technique—the delivery of materials by **approved suppliers** immediately preceding their requirement by the company.
- (2) By contracting with the suppliers having more frequent deliveries, and agreed delivery time (ie lead time fixed).

Inventory Control: Just-in-time(JIT) System (2)

- (3) A longer-term purchasing orders will be placed to approved suppliers. **Quality of inventory and quantity discount** can be ensured from the suppliers.
- (4) After the implementation of JIT system, the company can benefit from reduced inventory level, leading to the **savings** of factory space, time in placing order, and good quality maintained in inventory.

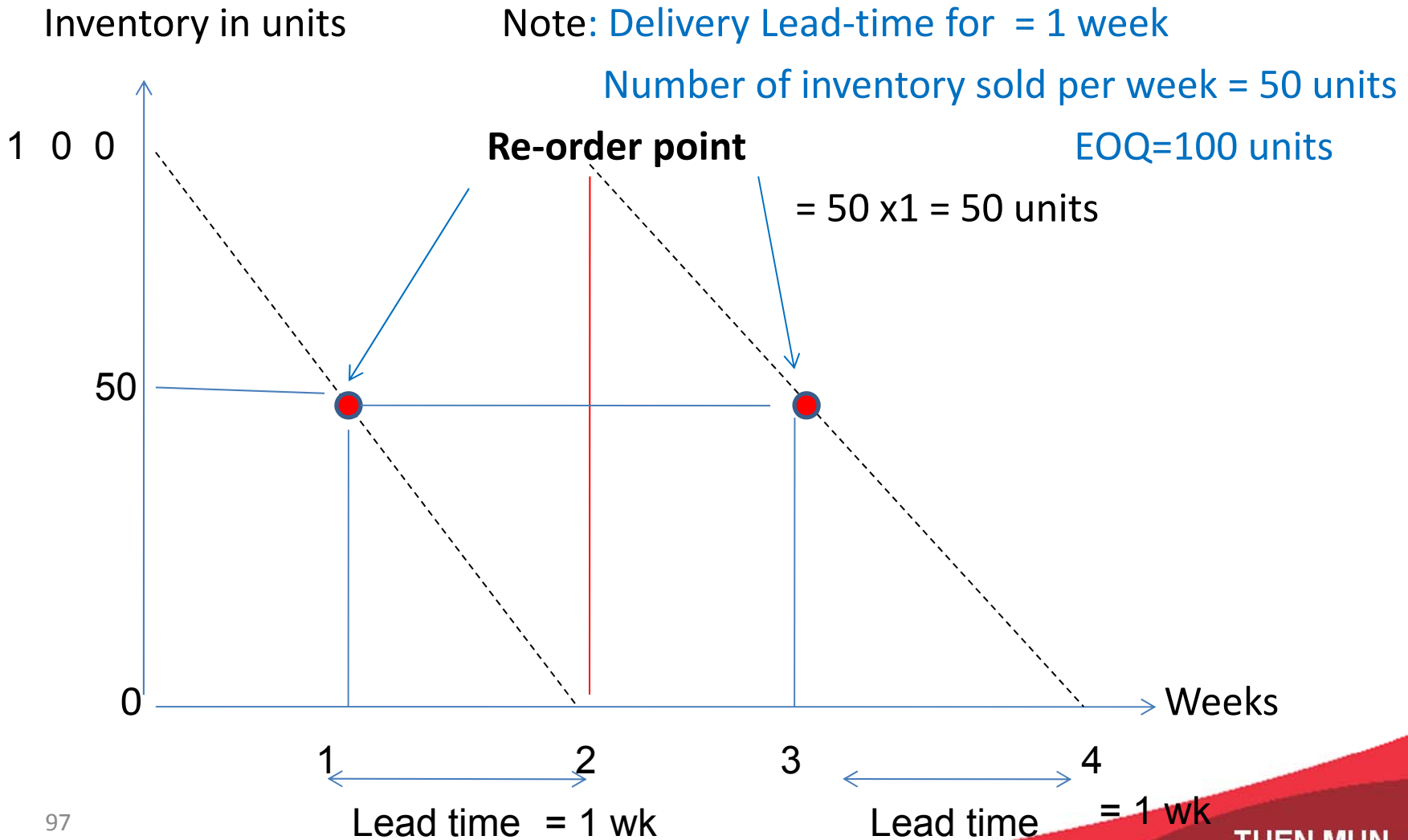
Inventory Control-Reorder Level Method

(A) How to apply Reorder point under **constant demand**:

= Average requirement rate per day X Lead time in days

(Lead time = the days measured from placing the purchase order to the arrival of new inventory in which the existing inventory level reaches zero. The **reasons** causing lead time during delivery from suppliers : shipping delays; strikes, bad weather conditions)

Illustration 17: Re-order point – certain demand and constant lead time (by graph)



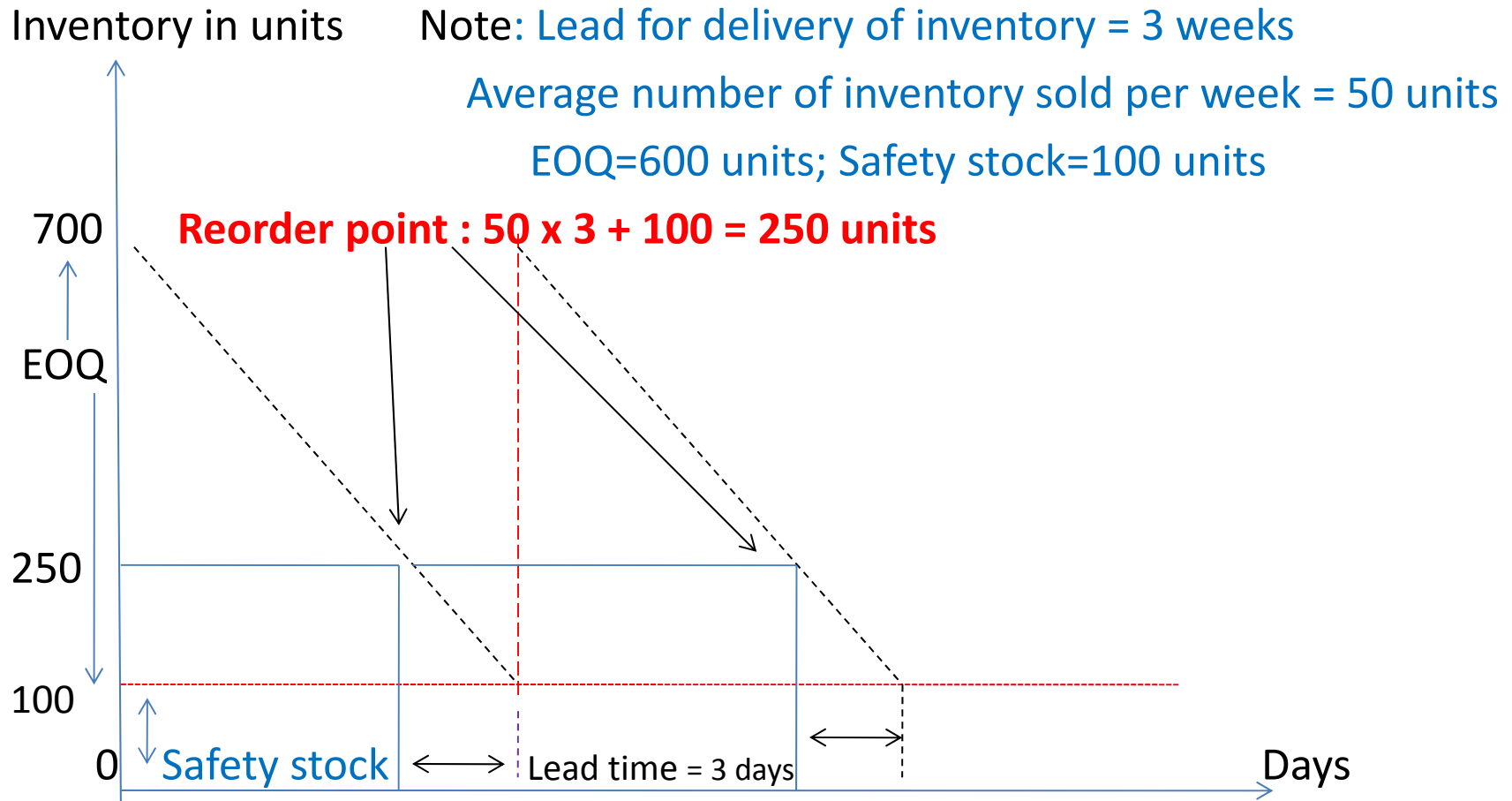
Inventory Control-Reorder Level Method

(B) Reorder point under **uncertain demand**:

= Average inventory requirement rate during lead time
+ **Safety Stock**

[Where **Safety Stock**= (The difference between
Maximum Demand and Average Demand) x Purchase
Lead Time]

Illustration 18: Re-order point – uncertain demand and constant lead time (by graph)



Factors contributing to **unstable** demand

- (1) A sudden increase or decrease in sales demand.
- (2) A sudden delay in inventory delivery.
- (3) A severe quality problem leading to the drop of customers' demand of inventory.
- (4) A change in disposal income of consumers due to change in government policy.

Further Readings

Drury, C. (2008). *Management and Cost Accounting*, 7th edition
UK: South-Western Cengage Learning. Chapters 15, 21 and 24.

Brigham, Houston (2009). *Fundamental of Financial
Management*, 11th edition. Harcourt College Publishers.
Chapters 16 and 17.

Ross, Westerfield & Jordan (2010), *Fundamentals of Corporate
Finance*, ninth edition, McGraw Hill. Chapters 19, 20 and 21

End of Presentation

*Please complete the evaluation form, and a
CPD certificate will be issued.*

Thank You Very Much!