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| Subject | COMMERCE |
| Paper No. and Title | Paper No.8: Financial Management |
| Module No. and Title | Module No. 34: Estimation of Working Capital Requirement |
| Module Tag | COM_P8_M34 |

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| COMMERCE | PAPER No. : 8 Financial Management |
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A Gateway to All Post Graduate Courses

1. Learning Outcomes

After studying this module, you shall be able to:

- Know the traditional methods of estimating working capital
- Analyze the operating cycle method of estimating working capital
- Understand the most appropriate method of determining working capital

COMMERCE

PAPER No. : 8 Financial Management

MODULE No. : 34 Estimation of Working Capital Requirement

2. Introduction

In this Module, we will discuss some methods of estimating working capital needs of the firm. The most appropriate method of estimating working capital needs of the firm is operating cycle which we have discussed in the last chapter. However, there are some other methods as well for estimating the working capital needs of the firm. First of all, we shall discuss other three methods of estimating working capital then we will discuss how operating cycle concept for estimating the working capital is being used by the firms.

3. Traditional Methods of Estimating Working Capital

There are three approaches for estimating the working capital needs of the firm which have been successfully applied in practice.

Current assets holding period:

- This method is based on the operating cycle concept of working capital. A firm uses this method to estimate working capital requirements on the basis of average holding period of current assets and relating them to costs based on the past experience of the company.

Ratio of sales:

- Based on the past experience, some average percentage of sales may be taken for determining the quantum of working capital on the assumption that current assets change with sales.

Ratio of fixed investment:

- Working capital may be determined as a percentage of fixed investment also.

For illustrating the above methods of estimating working capital, we shall take the example of two hypothetical firms in the following table.

Table 1: Data for two firms

| | <i>Firm A</i> | <i>Firm B</i> |
|--------------------------------------|---------------|---------------|
| Material cost: | | |
| Raw material consumed | 240000 | 240000 |
| Less: By product | 60000 | 60000 |
| Net material cost (A) | 180000 | 180000 |
| Manufacturing cost: | | |
| Labour | 168000 | |
| 168000 | | |
| Maintenance | 174000 | 174000 |
| Power & Fuel | 60000 | 60000 |
| Depreciation (Investment/Plant life) | 200000 | 400000 |
| Factory overheads | 210000 | 210000 |
| Total manufacturing cost (B) | 812000 | 1012000 |
| Total cost of production (A+B) | 992000 | 1192000 |
| Annual sales | 1592000 | 1592000 |
| EBIT | 600000 | 400000 |
| Investment | 2000000 | 4000000 |
| Plant life | 10 years | 10 years |
| EBDIT | 800000 | 800000 |
| ROI | 33.33% | 11.1% |

Assumptions:

Method 1: Inventory – one month's supply of each of raw material, work-in-progress (WIP) and finished goods. Debtors – one month's sales, Cash – one month's total cost.

Method 2: 20-30% of annual sales.

Method 3: 15-25% of fixed investment.

The following calculations show how the three methods work for firm A. You may calculate for firm B.

Method 1: Current Assets Holding Period

Firstly we compute inventory requirements.

Raw material: Rs 240000 ÷ 12 = Rs 20000

Work-in-progress: one month's supply of raw material plus one-half of normal conversion cost

Rs 20000 + ½ (Rs 168000 + Rs 174000 + Rs 60000) ÷ 12 = Rs 36750

Finished goods: Rs 992000 ÷ 12 = Rs 82667

The total inventory requirements are:
 Rs 20000 + Rs 36750 + Rs 82667 = Rs139417

After calculating the inventory requirements, the projection for debtors and cash should be made.

Debtors: Rs 1592000 ÷ 12 = Rs 132667

Cash: Rs 992000 ÷ 12 = Rs 82667

Thus, total working capital required is:
 Rs 139417 + Rs 132667 + Rs 82667 = Rs 354751

Method 2: Ratio of Sales

The average ratio is 25% i.e. average of 20% and 30%. Therefore, working capital required is:
 25% of Rs 1592000 = Rs 398000.

Method 3: Ratio of Fixed Investment

The average ratio is 20% i.e. average of 15% and 25%. Thus, 20% of fixed investment is required for working capital: 20% of Rs 2000000 = Rs 400000.

3.1 Impact of Different Approaches on ROI

The first method gives details of current assets items of working capital. This method is not appropriate if markets are seasonal. As per this method, required working capital for firm A is Rs 354751. If this amount is used in calculating ROI, it is reduced from 33.3% to 27.84%. Rate of return is calculated as follows:

$$\text{Rate of return} = \frac{\text{EBIT}}{\text{Net Fixed Investment} + \text{Working capital}}.$$

The second method is not much reliable. Its accuracy depends upon the accuracy of sales. The rate of return is reduced to 27.3% under this method. The third method shows the relationship of working capital with investment and the accuracy of this method depends upon the investment. The rate of return is reduced to 27.27% under this method.

4. Operating Cycle Method of Estimating Working Capital

The working capital estimation as per this method, is the most systematic and logical approach. In this method, estimation of working capital is made on the basis of each and every component of working capital individually. As explained earlier, the working capital, required to sustain the level of planned operations is estimated by calculating each and every component of current assets and current liabilities. The calculation of Net Working Capital (NWC) may be shown as follows:

$$\text{Working Capital} = \text{Current Assets} - \text{Current Liabilities}$$

Current assets include stock of raw materials, stock of work-in-progress, stock of finished goods, debtors and cash balance. Current liabilities include creditors, outstanding wages and outstanding overheads.

Where,

Raw materials stock = Average cost of materials in stock

WIP stock = Cost of materials + wages + overhead of work-in-progress

Finished goods stock = Cost of materials + wages + overhead of work-in-progress

Creditors for material = Cost of average outstanding creditors

Creditors for wages = Average wages outstanding

Creditors for overhead = Average overheads outstanding

While determining the working capital requirement, following points should be given due consideration:

- Depreciation:* Depreciation on fixed assets is an important point that needs to be considered in the estimation of working capital requirement. The depreciation on the fixed assets, which are used in the production process or other activities, is not considered in estimation of working capital. The depreciation is a non-cash expense and there are no funds blocked in depreciation as such and therefore, it is ignored in the valuation of WIP or in the valuation of finished goods. If working capital is estimated by including the amount of depreciation, such estimate is known as total basis working capital. If working capital is estimated by ignoring depreciation, then such estimate is known as cash basis working capital.
- Safety margin:* Sometimes, a firm may also like to have a safety margin of working capital in order to meet any contingency. It may be expressed in terms of percentage of total current assets or total current liabilities or NWC. It is incorporated in the working capital estimates to calculate the NWC. There is no hard and fast rule for quantum of margin of safety and depends upon the nature and characteristics of firm as well as of its current assets and current liabilities.

5. Practical Problems in Estimation of Working Capital

Illustration 1

The cost sheet of ABC Ltd. provides the following data:

| | Cost per unit (Rs) |
|---|--------------------|
| Raw materials | 50 |
| Direct labor | 20 |
| Overheads (including depreciation of Rs 10) | 40 |
| Total cost | 110 |
| Profit | 20 |
| Selling price | <u>130</u> |

Average raw material in stock is for one month. Average materials in work-in-progress are for half month. Credit allowed by suppliers; one month; credit allowed to debtors; one month. Average time lag in payment of wages; 10 days; average time lag in payment of overheads; 30 days. 25% of the sales are on cash basis. Cash balance expected to be Rs 1,00,000. Finished goods lie in the warehouse for one month.

You are required to prepare a statement of the working capital needed to finance a level of the activity of 54,000 units of output. Production is carried on evenly throughout the year and wages and overheads accrue similarly. State your assumptions, if any, clearly.

Solution:

As the annual level of activity is given at 54,000 units, it means that the monthly turnover would be $54,000/12 = 4,500$ units. The working capital requirement for this monthly turnover can now be estimated as follows:

Estimation of Working Capital Requirement

| | Particulars | Amount (Rs) | Amount (Rs) |
|-----|---|----------------------|-----------------|
| I. | <i>Current Assets:</i> | | |
| | Minimum cash balance | 1,00,000 | |
| | Inventories: | | |
| | Raw materials ($4500 \times \text{Rs } 50$) | 2,25,000 | |
| | Work-in-progress: | | |
| | Materials [$(4500 \times \text{Rs } 50)/2$] | 1,12,500 | |
| | Wages [50% of $(4500 \times \text{Rs } 20)/2$] | 22,500 | |
| | Overheads [50% of $(4500 \times \text{Rs } 30)/2$] | 33,750 | |
| | Finished goods ($4500 \times \text{Rs } 100$) | 4,50,000 | |
| | Debtors ($4500 \times \text{Rs } 100 \times 75\%$) | <u>3,37,500</u> | |
| | Gross working capital | <u>12,81,250</u> | 12,81,250 |
| II. | <i>Current Liabilities:</i> | | |
| | Creditors for materials ($4500 \times \text{Rs } 50$) | 2,25,000 | |
| | Creditors for wages [$(4500 \times \text{Rs } 20)/3$] | 30,000 | |
| | Creditors for overheads ($4500 \times \text{Rs } 30$) | 1,35,000 | |
| | Total current liabilities | <u>3,90,000</u> | 3,90,000 |
| | Net working capital | | <u>8,91,250</u> |

Working Notes:

1. The overheads of Rs 40 per unit include a depreciation of Rs 10 per unit, which is a non-cash item. This depreciation cost has been ignored for valuation of WIP, finished goods and debtors. The overhead cost, therefore, has been taken only at Rs 30 per unit.
2. In the calculation of WIP, the raw materials have been taken at full requirements for 15 days; but the wages and overheads have been taken only at 50% on the assumption that on an average all units in WIP are 50% complete.
3. Since, the wages are paid with a time lag of 10 days, the working capital provided by wages has been taken by dividing the monthly wages by 3 (assuming a month to consist of 30 days).

Illustration 2

PQR Ltd. is presently operating at 60% capacity level, producing 36,000 units per annum. In view of favorable market conditions, it has been decided that from 1st January 2000, the company would operate at 90% capacity. The following information is available:

- i. Existing cost-price structure per unit is given below:

| | |
|----------------------|------|
| Raw materials | Rs 4 |
| Wages | Rs 2 |
| Overheads (Variable) | Rs 2 |
| Overheads (Fixed) | Rs 1 |
| Profit | Rs 1 |
- ii. It is expected that the cost of raw material, wages, other expenses and sales per unit will remain unchanged in the year 2000.
- iii. Raw materials remain in store for 2 months before these are issued to production. These units remain in production process for one month.
- iv. Finished goods remain in godown for 2 months.
- v. Credit allowed to debtors is 2 months. Credit allowed by creditors is 3 months.
- vi. Lag in wages and overhead payments is one month. It may be assumed that wages and overhead accrue evenly throughout the production cycle.

You are required to:

- (a) Prepare profit statement at 90% capacity level; and
 - (b) Calculate the working capital requirements on an estimated basis to sustain the increased production level.
- Assumption made if any, should be clearly indicated.

Solution:
Statement of Profitability at 90% Capacity

| | |
|---|-----------------|
| Units (at 90% capacity) | <u>54,000</u> |
| Sales ($54000 \times \text{Rs } 10$) (A) | <u>5,40,000</u> |
| Cost: | |
| Raw materials ($54000 \times \text{Rs } 4$) | 2,16,000 |
| Wages ($54000 \times \text{Rs } 2$) | 1,08,000 |
| Variable overhead ($54000 \times \text{Rs } 2$) | 1,08,000 |
| Fixed overhead ($36000 \times \text{Rs } 1$) | <u>36,000</u> |
| Total cost (B) | <u>4,68,000</u> |
| Net profit (A-B) | Rs 72,000 |

Statement of Working Capital Requirement

| Particulars | Amount (Rs) | Amount (Rs) |
|--|-----------------|-----------------|
| I. Current Assets: | | |
| Stock of raw materials ($4500 \times \text{Rs } 4 \times 2$ months) | 36,000 | |
| Work-in-progress: | | |
| Material ($4500 \times \text{Rs } 4 \times 1$ month) | 18,000 | |
| Wages [50% of ($4500 \times \text{Rs } 2 \times 1$ month)] | 4,500 | |
| Overheads | 6,000 | |
| Finished goods | 78,000 | |
| Debtors [$(468000/12) \times 2$ months] | <u>78,000</u> | |
| Gross working capital | <u>2,20,500</u> | 2,20,500 |
| II. Current Liabilities: | | |
| Sundry creditors ($4500 \times \text{Rs } 4 \times 3$ months) | 54,000 | |
| Outstanding wages ($4500 \times \text{Rs } 2 \times 1$ month) | 9,000 | |
| Outstanding overhead | <u>12,000</u> | |
| Total current liabilities | <u>75,000</u> | 75,000 |
| Net working capital | | <u>1,45,500</u> |

Working Notes:

1. The WIP period is one month. So, the overheads included in WIP are on an average for half month because overheads have been taken only at 50% on the assumption that on an average all units in WIP are 50% complete.
 $\text{Overheads} = [50\% \text{ of } (4500 \times \text{Rs } 2 \times 1 \text{ month}) + 50\% \text{ of } (36000 \div 12)] = \text{Rs } 6000$
2. The valuation of finished goods can be arrived at as follows:
 $\text{Finished goods} = [(4500 \times \text{Rs } 8 \times 2 \text{ months}) + (36000 \div 12) \times 2 \text{ months}] = \text{Rs } 78000$
3. Since, the overheads are paid to creditors with a time lag of 1 month. So, valuation of outstanding overheads can be done in the following way:
 $\text{Outstanding overheads} = [(4500 \times \text{Rs } 2 \times 1 \text{ month}) + (36000 \div 12) \times 1 \text{ month}] = \text{Rs } 12000$

Illustration 3

XYZ Ltd. sells goods on a gross profit of 25%. Depreciation is considered as a part of cost of production. The following are the annual figures given to you:

| | |
|--|--------------|
| Sales (2 months credit) | Rs 18,00,000 |
| Materials consumed (1 month credit) | Rs 4,50,000 |
| Wages paid (1 month lag in payment) | Rs 3,60,000 |
| Cash manufacturing expenses (1 month lag in payment) | Rs 4,80,000 |
| Administrative expenses (1 month lag in payment) | Rs 1,20,000 |
| Sales promotion expenses (paid quarterly in advance) | Rs 60,000 |

The company keeps one month's stock each of raw materials and finished goods. It also keeps Rs 1,00,000 in cash. You are required to estimate the working capital requirements of the company on cash cost basis, assuming 15% safety margin.

Solution:

Statement of Working Capital Requirement

| Particulars | Amount (Rs) | Amount (Rs) |
|---|-----------------|-----------------|
| <i>I. Current Assets:</i> | | |
| Minimum cash balance | 1,00,000 | |
| Debtors (cost of sales i.e. $14,70,000 \times 2/12$) | 2,45,000 | |
| Prepaid sales promotion expenses | 15,000 | |
| Inventories: | | |
| Raw materials ($4,50,000/12$) | 37,500 | |
| Finished goods ($12,90,000/12$) | <u>1,07,500</u> | |
| Total current assets | <u>5,05,000</u> | 5,05,000 |
| <i>II. Current Liabilities:</i> | | |
| Sundry creditors ($4,50,000/12$) | 37,500 | |
| Outstanding manufacturing expenses ($4,80,000/12$) | 40,000 | |
| Outstanding administrative expenses ($1,20,000/12$) | 10,000 | |
| Outstanding wages ($3,60,000/12$) | <u>30,000</u> | |
| Total current liabilities | <u>1,17,500</u> | 1,17,500 |
| Excess of CA and CL | 3,87,500 | |
| Add: 15% for contingencies | | <u>58,125</u> |
| Net working capital | | <u>4,45,625</u> |

Working Notes:

| | | |
|-------|-----------------------------|------------------|
| 1. | <i>Cost structure</i> | |
| | Sales | 18,00,000 |
| Less: | Gross profit (25% on sales) | <u>4,50,000</u> |
| | Cost of production | 13,50,000 |
| Less: | Cost of materials | 4,50,000 |
| Less: | Wages | 3,60,000 |
| Less: | Cash manufacturing expenses | <u>4,80,000</u> |
| | Depreciation | <u>60,000</u> |
| 2. | <i>Total cash cost</i> | |
| | Cost of production | 13,50,000 |
| Less: | Depreciation | <u>60,000</u> |
| Add: | Administrative expenses | 1,20,000 |
| Add: | Sales promotion expenses | <u>60,000</u> |
| | Total cash cost | <u>14,70,000</u> |

Illustration 4

Gulfam Ltd. is presently operating on single shift basis and has the following cost structure (per unit):

| | |
|--------------------------------|-------|
| Selling price Rs 36 | |
| Raw materials Rs 12 | |
| Wages (60% variable) Rs 10 | |
| Overheads (20% variable) Rs 10 | |
| | Rs 32 |

For the year ending March 31, 2000; the sales amounted to Rs 8,64,000 and the current asset position on that day was follows:

| | |
|-------------------------------|-------------|
| Raw material | Rs 72,000 |
| Finished goods | Rs 1,44,000 |
| Work-in-progress (prime cost) | Rs 44,000 |
| Debtors | Rs 2,16,000 |

At present the company receives a credit of 2 months from the supplier of raw materials and wages & expenses are payable with a time lag of half a month. In order to meet the excess demand, the company is preparing to work in double shift. The increase production will enable the firm to get a 10% discount from the supplier of raw materials. There will not be of any change in fixed cost, credit policy, etc.

Ascertain the effect on requirement for working capital if the proposal of double shift materializes.

Solution:

In order to calculate the working capital requirement for double shift operations, the existing parameters should be ascertained as follows:

Present position

Sales = $(8,64,000 \div 36) = 24,000$ units per annum i.e. 2,000 units per month

Debtors = $(2,16,000 \div 8,64,000) \times 12 = 3$ months outstanding

Raw material = $(72,000 \div 12) = 6,000$ units or 3 months consumption

Work in progress = $(44,000 \div 22) = 2,000$ units or 1 month requirement

Finished goods = $(1,44,000 \div 32) = 4,500$ units or 2.25 months requirement

New cost of raw material = Rs 12 – 10% of 12 = Rs 10.80

Statement of Working Capital Requirement (Present Situation)

| Particulars | Amount (Rs) | Amount (Rs) |
|--|-----------------|---------------|
| <i>I. Current Assets:</i> | | |
| Raw materials (given) | 72,000 | |
| Work-in-progress (given) | 44,000 | |
| Finished goods (given) | 1,44,000 | |
| Debtors ($2,000 \times \text{Rs } 32 \times 3$ months) | <u>1,92,000</u> | |
| Total current assets | <u>4,52,000</u> | 4,52,000 |
| <i>II. Current Liabilities:</i> | | |
| Creditors ($2,000 \times \text{Rs } 12 \times 2$ months) | 48,000 | |
| Wages & overheads ($2,000 \times \text{Rs } 20 \times 1/2$ month) | 20,000 | |
| Total current liabilities | <u>68,000</u> | <u>68,000</u> |
| Net working capital | <u>3,84,000</u> | |

Statement of Working Capital Requirement (Proposed Situation)

| Particulars | Amount (Rs) | Amount (Rs) |
|--|-----------------|-----------------|
| <i>I. Current Assets:</i> | | |
| Raw materials ($4,000 \times \text{Rs } 10.80 \times 3$ months) | 1,29,600 | |
| Work-in-progress ($4,000 \times \text{Rs } 20.80 \times 1$ month) | 83,200 | |
| Finished goods ($4,000 \times \text{Rs } 30.80 \times 2.25$ months) | 2,77,200 | |
| Debtors ($4,000 \times \text{Rs } 30.80 \times 3$ months) | <u>3,69,600</u> | |
| Total current assets | <u>8,59,600</u> | 8,59,600 |
| <i>II. Current Liabilities:</i> | | |
| Creditors ($4,000 \times \text{Rs } 10.80 \times 2$ months) | 86,400 | |
| Wages & overheads ($4,000 \times \text{Rs } 20 \times 1/2$ month) | <u>40,000</u> | |
| Total current liabilities | <u>1,26,400</u> | <u>1,26,400</u> |
| Net working capital | | <u>7,33,200</u> |

Therefore, working capital requirement will increase by $(\text{Rs } 7,33,200 - \text{Rs } 3,84,000)$ Rs 3,49,200 due to change from single shift to double shift operations.

6. Summary

- The most appropriate method of determining working capital needs of the firm is operating cycle. However, there are some other methods as well for estimating the working capital needs of the firm.
- Apart from operating cycle method, there are other three methods namely current assets holding period, ratio of sales and ratio of fixed investment.
- In the operating cycle method, working capital is calculated as the difference between current assets and current liabilities.
- If depreciation is included in the cost, then such estimate is known as total basis working capital.
- If depreciation is excluded from cost, then such estimate is known as cash basis working capital.

