

# **IMPACT OF WORKING CAPITAL MANAGEMENT ON LIQUIDITY, PROFITABILITY AND NON-INSURABLE RISK AND UNCERTAINTY BEARING: A CASE STUDY OF OIL AND NATURAL GAS COMMISSION (ONGC)**

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***Abstract.** This paper makes an attempt to provide an insight into the conceptual side of working capital and to assess the impact of working capital management on liquidity, profitability and non-insurable risk of ONGC, a leading public sector enterprise in India over a 9 year period (i.e. from 1998-99 to 2006-07). It also makes an endeavor to observe and test the liquidity and profitability position of the enterprise and to study the correlation between liquidity and profitability as well as between profitability and risk. In this study, an attempt has also been made to establish the linear relationship between liquidity and profitability with the help of a multiple regression model. The study is based on secondary data collected from published annual reports of ONGC. The available data have been analyzed by using some important managerial and statistical tools. Various statistical tests viz. t-test, F-test and Durbin and Watson test have been applied to test the significance of the results obtained.*

**Keywords:** Working Capital, Liquidity, Profitability, Non-insurable risk, ONGC

In a mixed economy, like India, efficient and effective implementation of socio-economic model of industrial policy leads to rapid economic growth and development. Public Sector Enterprises (PSEs) in India have been incurring losses due to their inefficient utilization of productive capacity. This has led to a slow and inadequate rate of economic growth in the country. Judicious blending of fixed capital and working capital and their effective utilization ensures better productive capacity, good profitability and sound liquidity of the enterprises, which are required on the part of the enterprises to earn sufficient surplus for their growth and to maintain their perpetual succession in the present competitive and changing environment. Public enterprises, so far, have given emphasis on growth and efficiency of fixed capital neglecting effective management of working capital, which is not desirable. Though performance of PSEs is progressively low, investment in those enterprises in India has been growing up significantly since 1950s. This indicates the positive attitude of the government towards generation of greater employment opportunity for the vast population of the country by establishing more and more PSEs along with higher blockage of fund following the traditional production function approach whereby fixed capital is considered as one of the explanatory variables to establish the relationship between output and profit ignoring the role of working capital. In the wave of globalization and economic liberalization, growth and survival stability of the enterprises largely depend on the effective management of working capital, which has a direct bearing on the economic well-being of the country as a whole. Thus, it is felt that there is a need to manage various components of working capital in such a way that an adequate amount of working capital is maintained for smooth running of the wheel of an enterprise for the fulfillment of twin objectives of liquidity and profitability as well as for reducing non-insurable risk and uncertainty bearing associated with the volatility of various components of working capital in the firm's operating environment.

Empirical studies show that ineffective management of working capital is one of the important factors causing industrial sickness (Yadav, 1986). A company should choose between liquidity and profitability and decide about its working capital requirement (Vijay Kumar and Venkatachalam, 1995). Modern financial management aims at reducing the level of current assets without ignoring the risk of stockouts (Bhattacharya, 1997). A firm should formulate certain policies to control the working capital so as to meet financial distress, which

may occur in future (Luther, 2007). Efficient management of working capital is, thus, an important indicator of sound health of an organization, which requires reduction of unnecessary blockage of capital in order to bring down the cost of financing. In the light of the above an attempt has been made in this study to assess the impact of working capital on profitability, non-insurable risk and uncertainty bearing, and liquidity of Oil and Natural Gas Commission (ONGC), a leading Public Sector Enterprise in India during nine years (i.e. from 1998-1999 to 2006-2007).

### **Purpose of the Study**

The main objective of the present work is to provide an insight into the conceptual side of working capital and to assess the efficiency of working capital management and its impact on liquidity, profitability and non-insurable risk and uncertainty bearing of ONGC on the basis of available data collected from published annual reports of the company over a period of 9 years (i.e. from 1998-1999 to 2006-2007). The specific objectives of this study are as follows:

1. To measure, test and evaluate the liquidity position of ONGC.
2. To determine the profitability position of ONGC and risk associated with it.
3. To find out the correlation between liquidity and profitability as well as between profitability and risk.
4. To point out the trade-off between liquidity, profitability and risk.
5. To establish the linear relationship between liquidity and profitability with the help of simple as well as multiple regression equations fitted on the basis of least-squares principles.

## METHODOLOGY

The study is based on secondary data collected from the audited Profit & Loss A/c and Balance Sheet associated with schedules and annexure available in the published annual reports of ONGC. For the purpose of the study, public enterprise survey reports, government publications etc. have been used. Journals, conference proceedings and other relevant documents have also been consulted to supplement the data. The study covers a period of 9 years (i.e. from 1998-99 to 2006-07). The available data have been analyzed by using various financial ratios as a managerial tool as well as some simple statistical tools like Arithmetic Mean, Standard Deviation, Co-efficient of Variation, Correlation and Regression etc. Various statistical tests viz. F-test, t-test and Durbin and Watson test have been applied for the purpose of testing in this study.

### Section 1- Working Capital: A Conceptual Framework

***Meaning and Definition of Working Capital:*** The term working capital refers to the quantum of fund required to maintain day-to-day expenditure on operational activities of a business enterprise. It is actually required to run the wheels of the business. It is regarded as the life blood of human body. The estimation of working capital of a firm is a difficult task for the management because of its varying characteristics in a dynamic operating environment. It actually varies across the companies in an industry as well as over the period under consideration for a particular firm. It also varies with the nature and size of the enterprise, level of production, operating cycle, credit policy of the firm, different macro-economic factors. (viz. inflation, fiscal policy, business cycle etc.), availability of raw materials and so on and so forth.

***Various Concepts of Working Capital:*** There are two possible approaches of working capital:

#### *A) Balance Sheet Approach:*

Under balance sheet approach, there are two interpretations of working capital: (i) Gross working capital and (ii) Net working capital.

Gross working capital refers to the firm's investment in current assets that circulates from one form to another in the ordinary course of business. Thus, it simply refers to the sum total of current assets, which include cash, and near cash items of short term resources e.g. cash and bank balance, receivables, inventories, prepaid expenses, loans and advances, marketable securities etc.

Net working capital on the other hand refers to the difference between current assets and current liabilities. The difference between current assets and

current liabilities may be of three types:

- (1) Positive (if  $CA > CL$ ),
- (2) Negative (if  $CA < CL$ ) and
- (3) Zero (if  $CA = CL$ ), where  $CA =$  Current Assets, and  $CL =$  Current Liabilities.

As a matter of fact, we have three aspects of net working capital – positive working capital, negative working capital and zero working capital. Positive working capital is the excess of current assets over current liabilities. It is actually, that part of current assets which is financed with the long term sources of funds. Negative working capital, on the other hand, may be defined as the excess of current liabilities over current assets. It is that part of current liabilities which is used for the purpose of investment in fixed assets. Both the definitions of positive and negative working capital are closely related to the analysis of trade-off between liquidity, profitability and risk. The usual practice of a firm is to maintain the positive working capital at a level, which ensures better liquidity, good profitability with a reasonable level of risk. The situation of negative working capital is very unusual and mainly linked with financing decision of the firm.

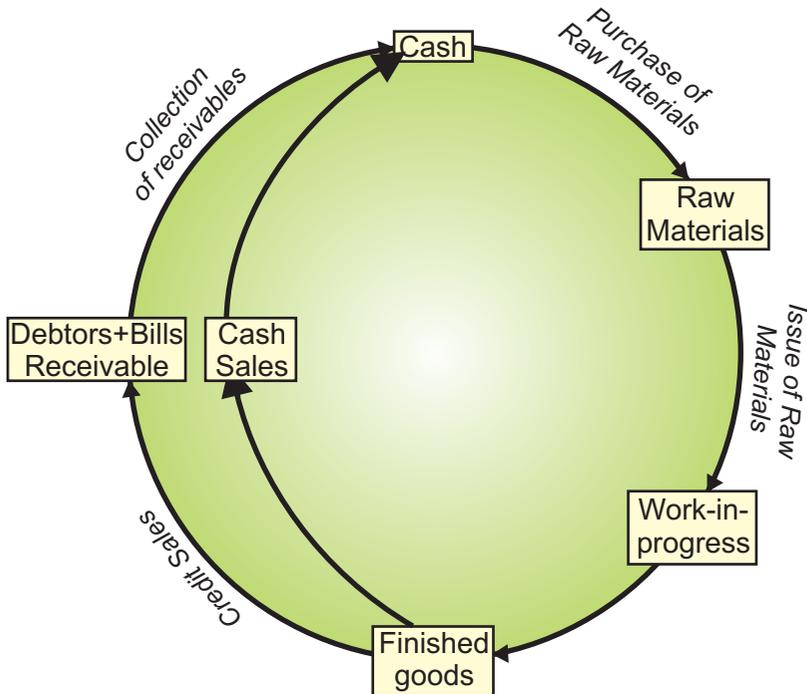
The concept of zero working capital is now gaining importance in working capital management. Zero working capital refers to the equality between current assets and current liabilities at all times. To avoid excess investment in current assets, firms try to meet their current liabilities out of the current assets fully if they follow this concept. Consequently, smooth and uninterrupted working capital cycle is ensured and it would create an environment in which financial managers always try to improve the quality of the current assets at all times for maintaining cent-percent realization of current assets. This zero working capital always brings a fine balance in financial management. The performance of the financial manager to this endeavor is always reflected.

#### *B) Operating Cycle Approach:*

This approach has been gaining more and more importance in the present business scenario. Under this concept, the requirements of working capital depend on the operating cycle of a firm and the cost of all operational activities. The *Operating Cycle (OC)* refers to the period during which investment of one unit of money will remain blocked in the normal course of operation till recovery out of revenue (Banerjee, 1973). It is the average time intervening between the acquisition of materials or services entering this process and the final cash realization (Fees, 1978). It may be broadly classified into the following four stages:

1. Raw Material Storage Stage
2. Work-in-Progress Stage
3. Finished Goods / Inventory Stage and
4. Receivables Collection Stage.

## Diagram-1: Operating Cycle of a Manufacturing Concern



The duration of the operating cycle is equivalent to the sum of the duration of these stages less the credit period allowed by the suppliers. Symbolically,

$$D = p_1 - q_c \dots\dots\dots (i)$$

Where,  $p_1$  = Period of holding in the stage of the operating cycle, ( $i = 1, 2, 3 \& 4$ )

$q_c$  = Credit payment period, and  $D$  = Duration of the operating cycle.

The total number of operating cycles to be completed in a year can be determined by dividing the number of working days in a year with the number of operating days in a cycle. Symbolically,

$$\phi = \frac{N}{D} \dots\dots\dots (ii)$$

Where,  $\phi$  = Total number of operating cycles in a year and  $N$  = Number of working days in a year.

The average quantum of working capital requirement in a period (i.e. year) can be worked out by simply dividing the total operating expenses for the period by the total number of operating cycles in that period. Symbolically,

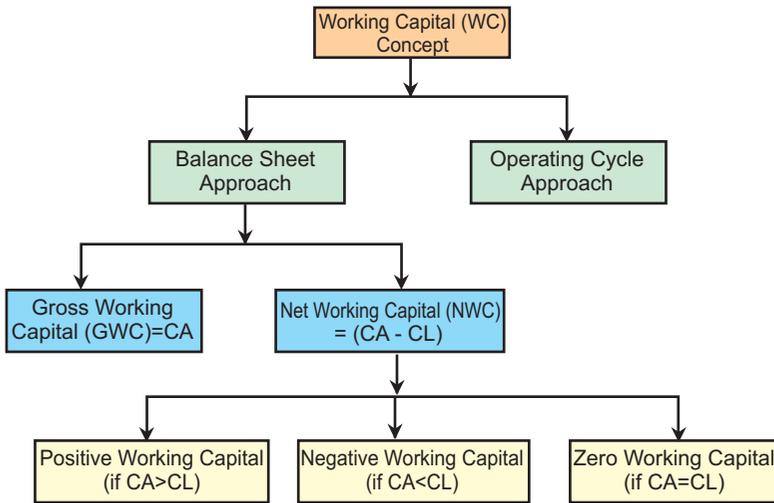
$$W = \frac{C_s}{\phi} \dots\dots\dots (iii)$$

Where,  $W$  = Working capital requirement,  $C_s$  = Total operating expenses

The necessary calculations under this approach for obtaining required working capital of a firm can easily be made on the basis of published annual financial statements of the firm. In our present study we are not dealing with the computation of required working capital under operating cycle approach. We simply follow the traditional concept of working capital dimension i.e. balance sheet approach, for our purpose of the study.

The concept of working capital discussed above is exhibited in the following diagram:

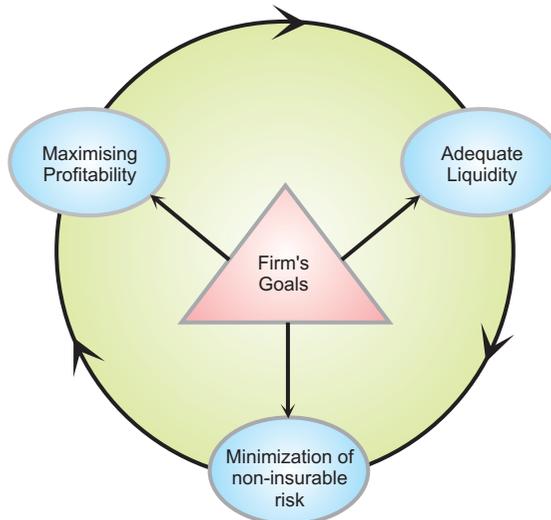
**Diagram-2: Various Concept of Working Capital**



**Working Capital Management:**

Working Capital Management refers to the management of all types of current assets of the business enterprise in which adequacy of current assets as well as the level of non-insurable risk posed by current liabilities are optimally identified. It is concerned with the problems relating to the administration of all aspects of current assets, current liabilities and the inter-relationships that exist between them. It aims at reducing the locking up of funds in working capital so as to improve the return on capital employed (i.e. profitability in the business). It seeks to formulate proper policies for managing current assets and liabilities as well as the techniques for maximizing the benefits derived from it. The policies for managing the working capital of a firm should be such that the firm can accomplish its three important goals simultaneously--(a) Adequate liquidity (b) Maximizing profitability and (c) Minimization of non-insurable risk and uncertainty. This can be shown in the following diagram:

**Diagram-3: Three-important Goals of a firm**



## Adequate Liquidity

The term 'liquidity' refers to the capability of a firm to meet short term financial obligations [i.e. Current Liabilities (CL)] by converting the short term assets [i.e. Current Assets (CA)] into cash without suffering any loss. Here current assets refer to those which are readily convertible into cash within one accounting period. Current liabilities, on the other hand, are those, which are to be met within one accounting period. The liquidity of a firm actually depends on the effective management of the composition of CA vis-à-vis CL. In fact, the components of CA other than cash have varying degree of liquidity depending on the time taken for conversion of assets into cash. The components of CL also have varying degree of the span of time made available to the firm by the short term creditors. A business enterprise making no profit may be considered as sick but one having no liquidity will die soon. As a matter of fact, liquidity is a necessary condition (or a pre-requisite) for the very survival of the firm. The liquidity position of a firm is generally analyzed with the help of some important ratios computed on the basis of different constituents of working capital either in isolation or in aggregate or both. The important ratios reflecting the liquidity position of a firm are as follows:

1. *Current Ratios*: It is the ratio of current assets to current liabilities for establishing the relationship between them. It is determined by using the following formula:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

This ratio measures the short term solvency (i.e. liquidity) position of a firm indicating the amount of current assets available per unit of current liabilities. Higher the ratio the more will be the firm's ability to meet short term obligations and the greater will be the safety of funds of short term creditors. It is worthwhile to note that a very high current ratio may not be indicative of good liquidity position. A high current ratio may be the signal of excessive inventories over the current requirements, inefficiency in collection of debtors and high cash and bank balances without proper investment etc. Conventionally, a current ratio of 2:1 is taken as satisfactory. However, this satisfactory norm may differ depending on the country's economic conditions, nature of industry, management pattern and other factors of a particular firm under an industry etc. Therefore, satisfactory current ratio should be developed by a firm on the basis of its past experiences and be considered as standard. Current ratio should be considered in conjunction with quick ratio to ascertain the true liquidity position of an organization.

2. *Quick Ratio / Acid Test Ratio*: It is the ratio of quick assets to quick liabilities for establishing the relationship between them. It is computed as follows:

$$\text{Quick Ratio} = \frac{\text{Quick Assets}}{\text{Quick Liabilities}} = \frac{\text{Current Assets} - \text{Inventories} - \text{Prepaid Exp.}}{\text{Current Liabilities} - \text{Bank Overdraft}}$$

Quick assets refer to those current assets which can be converted into cash/bank immediately or at a short notice without suffering any loss. It actually means the current assets excluding inventories and prepaid expenses. The logic behind the exclusion of inventory and prepaid expenses is that these two assets are not easily and readily convertible into cash. Quick liabilities, on the other hand, refer to those current liabilities which are to be met within very short period. It actually means current liabilities excluding bank overdraft. The justification for exclusion of bank overdraft from current liabilities is that bank overdraft is normally considered as a particular method of financing a firm, and not likely to be called in on demand. This ratio measures the quick short-term solvency position of a firm. A high quick ratio indicates that the quick short term solvency position of a firm is good. Generally, a quick ratio of 1:1 is considered satisfactory for a firm though it depends on many factors. Quick ratio is a more rigorous and penetrating test of the liquidity position of an organization as compared to the current ratio of the firm.

3. *Current Asset to Total Asset*: It is calculated by using the following formula.

$$\text{Current Asset to total Asset Ratio} = \frac{\text{Current Asset}}{\text{Total Asset}}$$

It explains the relationship between current assets and total investment in assets. Higher the investment in current assets, the more will be the liquidity of a firm but as the same time it decreases profitability. Thus, this ratio prescribes the optimum level of current assets that should be maintained in the firm by considering the concept of both liquidity and profitability.

4. *Working Capital to Turnover Ratio*: This ratio shows the number of times the net working capital of a firm is turned over within a specified period. It is calculated as follows:

$$\text{Working Capital Turnover Ratio} = \frac{\text{Net Sales}}{\text{Net Working Capital}}$$

It helps to assess the degree of efficiency in the use of short term fund for operating sales. Higher the ratio, the lower will be the investment in working capital and the greater will be the profitability of a firm. However, a very high working capital turnover ratio is a symptom of overtrading which may put the organization into financial crisis. On the other hand very low working capital turnover ratio indicates the inefficient utilization of fund invested in net working capital.

5. *Inventory Turnover Ratio*: This ratio is calculated as follows:

$$\text{Inventory turnover Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

It establishes the relationship between cost of goods sold during a particular period and the average inventory level maintained by a firm during that period. It shows how rapidly the inventory is turned into account receivables through sales. It indicates whether investment in inventory is efficiently used or not and thus it is linked with the inventory control policy adopted by the management of a firm. A high inventory turnover ratio implies good inventory management. However, a very high ratio is a symptom of under-investment in inventory which adversely affects the ability of a firm to meet the customers' demand. This situation creates the problem of stock-out associated with high stock out cost. A very low inventory turnover ratio signifies over-investment in inventory carrying excessive inventory cost that may lead to low profitably. Thus, a firm should have neither too high nor too low inventory turnover ratio.

6. *Debtors Turnover Ratio*: It is calculated by using the following formula:

$$\text{Debtors Turnover Ratio (DTR)} = \frac{\text{Net Credit Sales}}{\text{Average Debtors}}$$

By the analysis of DTR we supplement the information regarding the liquidity of one item of current assets of the firm. This ratio reflects the efficiency of credit and collection policy pursued by the concern. It is an important tool of analyzing the efficiency of liquidity management of a company. The liquidity position depends on the quantity of debtors of a company to a great extent. It measures the rapidity or slowness of their collectability. The higher the ratio, the shorter will be the time lag between credit sales and cash collection. A low ratio, on the other hand, indicates that the debts are not being collected rapidly.

## Maximizing Profitability

The term 'Profitability' means the ability to earn profits by an enterprise on its static resources (i.e. invested capital). It, thus, expresses the relationship between profits and capital. The firm is said to be successful if its profitability exceeds the weighted average cost of capital to the firm. The profitability acts as a yardstick to measure the operating efficiency of the enterprise. The greater the profitability the more will be the efficiency and vice-versa. It also indicates public acceptance of the goods produced or service rendered by the enterprise and shows the combined effect of liquidity, assets management and debt management on operating results. It reflects the ultimate impact of various policy decisions adopted by the enterprises on its business operations. The profitable investment of excess cash, minimization of inventories, speedy collection of receivables and avoidance of unnecessary and costly short-term financing all contribute to the maximization of profitability. Thus profitability is the basic measure of overall success of the firm. It is the necessary condition for the growth and survival stability of the enterprise. The profitability of the enterprise is popularly measured with the help of financial ratios conveying quantitative relationship between two variables considered for the purpose. Some important ratios relating to profitability of a firm are briefly discussed below:

1. *Gross Profit Ratio*: This ratio establishes the relationship between gross profit and sales. It is calculated by using the following formula:

$$\text{Gross Profit Ratio} = \frac{\text{Gross Profit}}{\text{Sales}} \times 100$$

It is also known as gross profit margin. It measures the percentage of each sales rupee remaining after meeting firm's expenses on its goods. The gross profit margin indicates the limit beyond which sales are not tolerated to fall. A high ratio of gross profit to sales is a symbol of good management whereas a relatively low gross profit margin is clearly a danger signal for the firm. However, a very high and rising gross profit ratio may also be the result of the unwarranted valuation of opening and closing stock/inventories. A firm should have a reasonable gross profit ratio to ensure adequate coverage for operating expenses of the enterprise and sufficient return to the owners.

2. *Net Profit Ratio*: This ratio measures the relationship between net operating profit and sales of a firm. It is computed by using the following formula:

$$\text{Net Profit Ratio} = \frac{\text{Net Operating Profit}}{\text{Sales}} \times 100$$

It is also known as net profit margin. It indicates the efficiency of management to operate the firm successfully in relation to earned revenues and all types of costs associated with it at a reasonable level of risk and uncertainty. The high net profit ratio ensures good return to the owners and enables a company to maintain its survival stability in adverse economic condition like declining selling price, rising cost of production, falling demand etc. A relatively low net profit ratio gives the opposite picture. However, a company with a low net profit margin may earn a high rate of return on its investment if it has a high inventory turnover.

3. *Earnings Per Share (EPS)*: The overall profitability of a company can also be measured by computing earnings per share with the help of the following formula:

$$\text{Earnings Per Share (EPS)} = \frac{\text{Net Profit after taxes and pref. dividend}}{\text{No. of Equity Shares}}$$

$$= \frac{(EBIT - I)(1 - t) - P_d}{N}, \text{ where EBIT} = \text{Earnings before Interests \& Taxes; I} = \text{Interest;}$$

t = Tax Rate; P<sub>d</sub> = Preference Dividend and N = No. of Ordinary Shares held.

This is a well-known and widely used indicator of the economic performance of a corporate entity. It measures the profit available to equity shareholders on per share basis. The higher the ratio, the better will be the performance of the entity and vice-versa. It can be used to draw inference about the performance of a firm on the basis of its trend over a period of time, comparison with the EPS of nearest competitive firms and comparison with the industry average. It plays a vital role in determining the dividend and retention policy and in fixing the market prices of the equity shares of the company. Despite its wide use in practice the EPS figure is often an ambiguous measure of performance because of earning retention phenomena. Specifically, since most of the firms periodically retain a portion of their earnings, the amount of equity per share of these firms tends to increase over time. Consequently, EPS will increase even though the firm's profitability of operations has not changed. In this case an adjustment is required to remove the retention effect. The adjustment is made by dividing the EPS figure by common equity per share.

4. *Return on Net Worth (RONW)*: It is the ratio of net profit after taxes to the amount of fund invested by the owners. It is calculated as under:

$$\text{Return on Net Worth} = \frac{\text{Net profit after taxes}}{\text{Net Worth (or Ordinary shareholders' equity)}}$$

It indicates how profitably the shareholders' fund or net worth has been utilized by the enterprise. It is an important yardstick to judge the performance of a firm for the equity shareholders. The higher the ratio, the better will be the performance of the firm in relation to the utilization of owner's fund and vice-versa.

5. *Return on Assets (ROA)*: This ratio measures the average profitability of a firm in terms of the relationship between Net Profits and Assets. It is also known as profit to asset ratio. It is generally computed as follows:

$$\text{Return on Assets (ROA)} = \frac{\text{Net profit after taxes}}{\text{Average Total Assets}} \times 100$$

Though widely used, ROA is an old measure because its numerator measures the return available to both equity and preference shareholders whereas its denominator represents the contribution of shareholders and lenders.

6. *Return on Capital Employed (ROCE)*: The strategic aim of a business enterprise is to earn a return on capital. Measuring the historical performance of an investment entity calls for a comparison of the profit that has been earned with capital employed. The rate of return on capital employed is determined by dividing the earnings before interest and taxes (EBIT) by the capital employed or investment made to achieve that profit. Thus, it is computed as follows:

The terms capital employed refers to long term funds supplied by the creditors and owners of the firm. For inter-firm and intra-firm analysis this ratio throws sufficient light into how efficiently long term funds of owners and lenders are being used. Higher the ratio more efficient the use of capital employed and vice-versa.

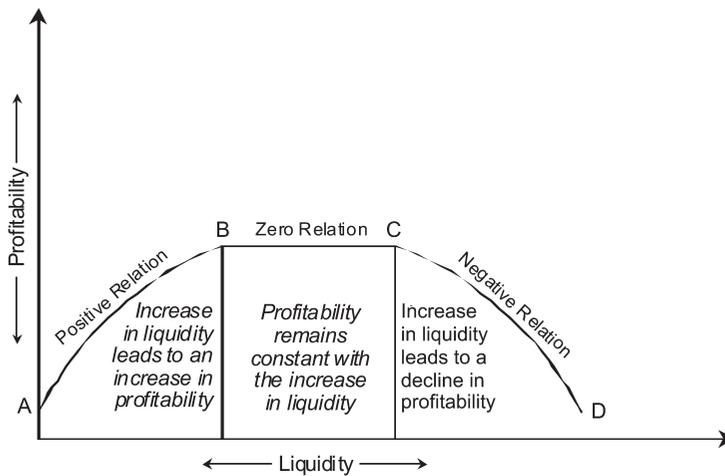
Liquidity-Profitability tangle: The relationship between liquidity and profitability can be explained with the help of return on capital employed ratio expressing it in the following form:

$$P = \frac{\text{EBIT}}{(\text{FA} + \text{NWC})} \text{ where,}$$

P = Profitability, EBIT = Earnings before interest and taxes,  
and NWC = Net working capital.

This ratio indicates that other things remaining unchanged, continuous reduction in NWC (i.e. liquidity) improves the profitability (P) of a firm with the simple passage of time. This suggests that there always exists a negative relation between liquidity and profitability. But in reality it is seen that unless there is a minimum level of investment in CA, which could provide a promising vehicle for increasing profitability, the required amount of output and sales cannot be maintained. Therefore, upto a certain level liquidity and profitability are complementary to each other. In this connection James E. Gentry hypothesized that upto a certain level, increase in liquidity will lead to a corresponding increase in profitability. Beyond that, profitability remains constant with an increase in liquidity within a specified domain. Therefore, any further investment in CA will lead to decline in profitability. Thus, the shape of the curve showing the relationship between liquidity and profitability seem to be an inverted teacup. This is shown in the following exhibit:

**Diagram-4: Relationship between Liquidity and Profitability (Gentry's Curve)**



**Minimizing Non-insurable Risk & Uncertainty**

A business enterprise should maintain adequate level of working capital to meet the current financial obligations as well as for maintaining undisrupted business operation. The firm should ensure that it does not suffer from the deficiency of liquidity. The lack of sufficient liquidity to meet its short term financial obligations may result in bad credit ratings, loss of creditors' confidence, high-cost emergency borrowing, unnecessary legal hazards or even closure of the company. At the same time, if the level of working capital is more than the adequate level, holding cost of current assets would be more in which profitability, i.e. the outcome of non-insurable risk and uncertainty bearing will be affected very badly. Thus, too high or too low level of working capital is dangerous to the firm. A well-managed optimum amount of working capital at a reasonable level of non-insurable risk is always expected for better profitability. This risk is generally measured with the help of financial ratios. It is to be noted that there are no prescribed accounting ratios for risk evaluation. However, some important financial ratios such as current ratio, acid test ratio, current assets to total assets ratio, current liabilities to total assets ratio etc. are popularly used for measuring the risk associated with the liquidity of the firm. Some specific index value methods are also followed to determine the risk.

In this study we use the following formula for measuring non-insurable risk of ONGC:

$$R_t = \frac{(E_t + D_t) - A_t}{C_t} \text{ where,}$$

$R_t$  = Risk factor at the period t

$E_t$  = Shareholders' equity at the period t

$D_t$  = Long term debt capital at the period t

$C_t$  = Current assets at the period t

$A_t$  = Fixed assets at the period t

### **Strategies in Working Capital Management:**

At the time of adopting working capital strategy of a firm, the financial manager should emphasis on the following two important dimensions of working capital management:

Relative Asset Liquidity (or level of CA) - It is measured by Current Assets to Total Assets ratio. The greater the ratio the less risky as well as less profitable will be the firm and vice-versa; and

Relative Financing Liquidity [or level of short term financing (STF)] - It is measured by the short term financing to total financing ratio. The lower this ratio the less risky as well as less profitable will be the firm and vice-versa.

In connection with the tradeoff between liquidity, risk and profitability a company may adopt three types of working capital strategies viz.: (a) conservative strategy, (b) aggressive strategy and (c) moderate strategy.

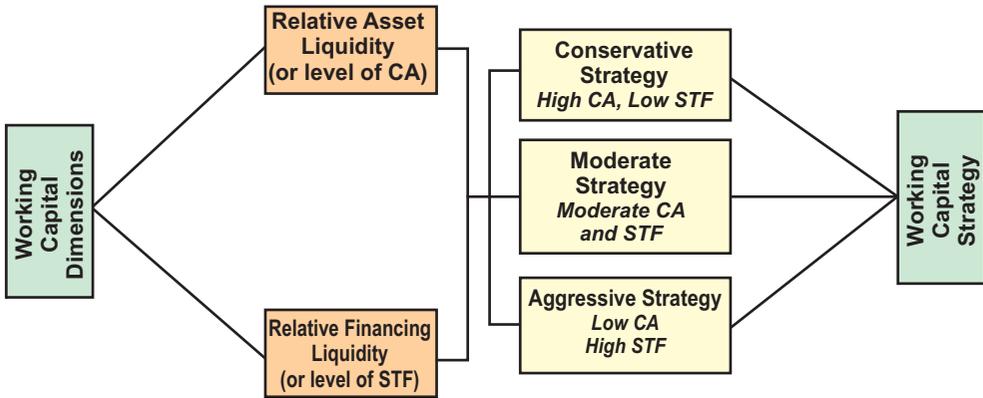
The firm following conservative working capital strategy combines a high level of current assets in relation to sales with a low level of short term financing. Excess amount of current assets enable the firm to absorb sudden fluctuations in sales, production plans and procurement time without disturbing the continuity in production. The higher level of current assets reduces the risk of insolvency. But at the same time lower risk translates into lower profit.

The firm following aggressive working capital strategies, on the other hand, would combine low level of current assets with a high level of short term financing. This firm will have high profitability and greater risk of insolvency.

The moderate firm would like to combine moderate level of current assets in relation to sales with moderate level of short term financing to maintain a fine balance between the risk of insolvency and profitability.

Thus, the considerations of assets and financial mixes are very much crucial to the working capital management of a firm. The working capital strategy as stated above can be shown in the following diagram:

**Diagram-5: Strategies of Working Capital**



**Liquidity and Profitability-Risk Trade-off:**

Liquidity and profitability-risk trade-off may be discussed in the light of firm's net working capital position. The level of net working capital of a firm has a bearing on its liquidity, profitability as well as non-insurable risk and uncertainty. Liquidity is a two-dimensional concept – time and risk. Time dimension of liquidity is concerned with the speed of convertibility of different current assets (other than cash) into cash. Risk dimension of liquidity indicates the degree of certainty about the conversion of current assets into cash without suffering any loss or with as little sacrifice in price as possible. The term 'Profitability' used in this context is measured by profit after expenses. It is expressed as the ratio of profit after expenses to the invested capital (i.e. Fixed Asset + Net Working Capital). In the light of profitability of a firm the risk may be understood as the probability of technical insolvency. Technical insolvency occurs whenever a firm is unable to meet its cash obligations when they become due for payment. This risk of becoming technically insolvent is measured by detailed analysis of any change in the level of current assets and current liabilities (i.e. the change in the Net Working Capital). Any change in Net Working Capital brings about a considerable change in the quantum of profit after expenses of the firm. The evaluation of profitability-risk trade off in relation to NWC is based on the following three assumptions:

1. the firm under consideration is a manufacturing firm;
2. current assets of the firm are less profitable than non-current assets; and
3. short term financing is less costly than the long term financing.

Under these assumptions, the tradeoff can be identified by using the ratio of current assets to total assets (CATA) which indicates the percentage of current assets in total assets. The higher the ratio of CATA the lower will be the profitability and risk and vice-versa. This trade off can also be demonstrated by using the ratio of current liabilities to total assets (CLTA). This ratio reflects the percentage of total assets financed by current liabilities. The higher the ratio of CLTA, the higher will be the profitability and risk and vice-versa. The combined effect of these two ratios reflects the true profitability-risk trade off of a firm.

## A CASE STUDY OF ONGC OVER 9 YEARS (1998-99 TO 2006-07)

### Company Profile

The Oil and Natural Gas Corporation limited is the biggest exploration and production company in Asia. ONGC, a Fortune-Global 500 Company, is recognized as one of the top E&P Company in the world and ranks 25th among leading global energy majors as per 'Platts Top 250' Global Energy Company Ranking 2008. It is ranked 335th in Fortune-500 by Turnover. PFC Energy 50 ranked ONGC at 23rd amongst Global Oil & Gas Companies by Market Capitalization and ranked 4th as Global E&P Company. ONGC is placed 2nd amongst all Indian Corporations listed in Forbes Global 2000 (rank 198th). It has discovered 6 of the 7 commercially-producing Indian Basins, in the last 50 years, adding over 6.5 billion tonnes of In-place Oil & Gas Reserves. It is the owner of the largest pipeline (11000 kilometers) in India. It alone contributes over 84 per cent of Indian's oil and gas production. ONGC has the distinction of having paid the highest-ever dividend in the Indian corporate history. It has 5 regional offices across India and two plants. ONGC's wholly-owned subsidiary ONGC Videsh Ltd. (OVL) is the biggest Indian multinational, with 44 Oil & Gas projects (7 of them producing) in 18 countries. It has also ventured into Refining, LNG, Petrochemicals, Power, SEZ, etc. to further strengthen its core business activities. It has been aggressively pursuing its three long-term (2001-2020) strategic goals which were formulated in 2001; first, to double in-place hydrocarbon accretion to 12 billion tonnes; second, to enhance global Recovery Factor from its domes fields from 28% to 40%; and the third, to access 20 million tonnes per annum equity oil from abroad. It has been playing a very important role in strengthening the fabrics of the society. It has a well articulated policy on CSR under which it focuses on promoting education, healthcare and entrepreneurship in the community. It accords high importance to environment management in its various operational activities. ONGC is spearheading the United Nations Global Compact – World's biggest corporate citizenship initiative to bring Industry, UN bodies, NGOs, Civil societies and corporate on the same platform. Awarded Asia's Best Oil and Gas Company, Oil and Natural Gas Corporation Limited is seen as the flagship for oil and gas companies (public sector) in India. Its competitive strength lies in strong intellectual property base, information, knowledge, and skilled and experienced human resource base.

The liquidity position of ONGC over the period of 9 years as captured by different liquidity ratios calculated on the basis of available data in its annual reports is presented in Table-1 below:

**Table-1 Liquidity Ratios of ONGC over the period under study**

| Year                          | Current Ratio | Quick Ratio | CATA | WCTR  | ITR   | DTR   | CBTR  |
|-------------------------------|---------------|-------------|------|-------|-------|-------|-------|
| 1998-1999                     | 1.82          | 1.52        | 0.35 | 3.50  | 9.61  | 13.5  | 0.13  |
| 1999-2000                     | 2.36          | 2.05        | 0.30 | 2.97  | 12.99 | 11.8  | 0.17  |
| 2000-2001                     | 2.89          | 2.57        | 0.35 | 2.66  | 15.74 | 14.0  | 0.08  |
| 2001-2002                     | 2.62          | 2.41        | 0.40 | 2.18  | 16.42 | 10.7  | 0.21  |
| 2002-2003                     | 2.45          | 2.26        | 0.43 | 2.78  | 22.53 | 8.9   | 0.10  |
| 2003-2004                     | 3.15          | 2.88        | 0.45 | 1.72  | 13.69 | 14.0  | 0.17  |
| 2004-2005                     | 2.96          | 2.72        | 0.45 | 2.22  | 18.39 | 12.6  | 0.12  |
| 2005-2006                     | 3.51          | 3.22        | 0.45 | 1.86  | 16.27 | 13.5  | 0.09  |
| 2006-2007                     | 3.17          | 2.96        | 0.46 | 1.94  | 19.47 | 21.4  | 0.23  |
| Compound growth rate (%)      | 6.27          | 7.45        | 5    | -7.54 | 6.25  | 3.92  | 1.62  |
| Average                       | 2.77          | 2.51        | 0.40 | 2.43  | 16.13 | 13.38 | 0.14  |
| Standard deviation            | 0.55          | 0.48        | 0.08 | 0.54  | 3.56  | 3.24  | 0.06  |
| Co-efficient of variation (%) | 19.8          | 25.1        | 20   | 22.22 | 22.07 | 24.22 | 42.86 |

Source: Annual Reports of ONGC (calculated values).

From Table-1 it is seen that the current ratio of the company grows at a compounded rate of 6.27%. This ratio is also above the standard norm of 2:1 over the period under study except in the year 1998-1999. The average current ratio is 2.77 which is found to be above the standard norm 2:1. Thus, the ability of the company to meet short term obligations is good and it is also a good indication about the safety of funds for the short term creditors.

The quick ratio of the company grows at a compounded rate of 7.45%. It is seen that the quick ratio throughout the period under study is tuned on an average at 2.51 which is far above the standard norm of 1:1. Thus, the quick short term solvency position of the company is very good. From Table-1 it is also seen that the inventory turnover ratio of the company over the period under study is considerably high. The compounded growth rate of this ratio is 6.25% and the average ITR is 16.13%. The high inventory turnover of ONGC indicates good inventory management assuming that there is no problem of stock-out situation. Considering the current ratio in conjunction with the quick ratio and inventory turnover ratio of the company it may be pointed out that the company has a sound liquidity position. It is seen that average CATA ratio is 0.40 which means that ONGC has maintained current assets on an average at 40% level out of the fund invested in total assets. It grows at the compounded rate of 5% over the period under consideration. It reveals that ONGC has given a considerable emphasis on working capital investment which has a bearing on liquidity as well as profitability of the firm.

Average DTR of ONGC (14.69) is found to be satisfactory with a compounded growth rate of 3.92%. The coefficient of variation of this ratio is 24.22%. Therefore, the credit management of ONGC is efficient enough. Moreover less instability is found in this ratio over time, which indicates that credit collection policy pursued by the firm is more or less stable.

CBTR ratio of the company is tuned on an average 0.14 with a compounded growth rate of 1.62% and coefficient of variation of 42.86%. The result shows that the company maintains cash and bank balances at a higher level as compared to other current assets. This indicates that the ability of the company to pay its short-term contractual and non-contractual obligations is good.

Thus, in totality, it may be said that the short term solvency position of ONGC over the period under study is found to be strong enough simply on the basis of analyzing the ratios and other statistical measures relating to those ratios.

### **Motaal's Comprehensive Test of Liquidity**

Motaal prescribes a comprehensive test for determining the soundness of a firm as regards liquidity position. According to him, a process of ranking is used to arrive at a more comprehensive measure of liquidity in which the following three ratios are combined in a point score:

i) Working Capital (WC) to Current Asset Ratio =

$$\frac{\text{Current Assets} - \text{Current Liabilities}}{\text{Current Liabilities}} \times 100$$

ii) Stock to Current Asset Ratio =  $\frac{\text{Stock}}{\text{Current Asset}} \times 100$

iii) Liquid Resources (LR) to Current Asset Ratio =  $\frac{\text{Current Asset} - \text{Stock}}{\text{Current Asset}} \times 100$

The higher the value of both working capital to current asset ratio and liquid resources to current asset ratio, relatively the more favorable will be the liquidity position of a firm and vice-versa. On the other hand, lower the value of stock to current assets ratio, relatively the more favorable will be the liquidity position of the firm. The ranking of the above three ratios of a firm over a period of time is done in their order of preferences. Finally, the ultimate ranking is done on the basis of the principle that the lower the points score, the more favorable will be the liquidity position and vice-versa.

**Table-2 Motaal's Comprehensive Test of Liquidity of ONGC (over the period 1998-99 to 2006-07)**

| Year      | WC to CA Ratio (%) | Rank | Stock to CA Ratio (%) | Rank | LR to CA Ratio (%) | Rank | Total Rank | Ultimate Rank |
|-----------|--------------------|------|-----------------------|------|--------------------|------|------------|---------------|
| 1998-1999 | 44.90              | 9    | 16.34                 | 9    | 83.66              | 9    | 27         | 9             |
| 1999-2000 | 57.59              | 8    | 13.16                 | 8    | 86.84              | 8    | 24         | 8             |
| 2000-2001 | 65.41              | 5    | 11.00                 | 7    | 89.00              | 7    | 19         | 7             |
| 2001-2002 | 61.84              | 6    | 8.22                  | 5    | 91.78              | 5    | 16         | 6             |
| 2002-2003 | 59.14              | 7    | 7.31                  | 1    | 92.69              | 2    | 11         | 4             |
| 2003-2004 | 68.26              | 3    | 8.57                  | 6    | 91.43              | 6    | 15         | 5             |
| 2004-2005 | 66.19              | 4    | 8.00                  | 3    | 92.00              | 3    | 10         | 3             |
| 2005-2006 | 71.49              | 1    | 8.18                  | 4    | 91.82              | 4    | 9          | 2             |
| 2006-2007 | 68.48              | 2    | 6.83                  | 1    | 93.17              | 1    | 4          | 1             |

This test has been applied for determining the liquidity position of ONGC over the period under consideration. On the basis of ultimate ranking as suggested by Motaal it may be concluded that liquidity position of ONGC in the year 2006-07 was best followed by the years 2005-2006, 2004-2005, 2002-2003, 2003-2004, 2001-2002, 2000-2001, 1999-2000, 1998-1999 respectively in that order. It indicates that liquidity position of the enterprise is more or less improving over the period under study. The result of the Motaal test as revealed in the study corroborates with the result about the liquidity position of ONGC by other important set of ratios presented in Table-1.

***Profitability Position of ONGC through Profitability Ratios:*** In the following table we analyze the data relating to profitability of ONGC in terms of important ratios.

**Table-3 Profitability Ratios of ONGC over 9 years (i.e. 1998-1999 to 2006-2007)**

| Year                          | Net Profit Ratio (%) | Return on Assets (%) | Return on Capital Employed (%) | Return on Net worth (%) | Earnings per share (%) |
|-------------------------------|----------------------|----------------------|--------------------------------|-------------------------|------------------------|
| 1998-1999                     | 18.2                 | 10.0                 | 25.3                           | 11.4                    | 19.3                   |
| 1999-2000                     | 17.9                 | 9.3                  | 34.1                           | 13.6                    | 25.5                   |
| 2000-2001                     | 21.5                 | 13.1                 | 42.4                           | 17.3                    | 36.7                   |
| 2001-2002                     | 26.0                 | 13.9                 | 39.2                           | 21.0                    | 43.5                   |
| 2002-2003                     | 29.8                 | 21.1                 | 54.0                           | 29.6                    | 73.8                   |
| 2003-2004                     | 26.3                 | 13.8                 | 45.8                           | 21.7                    | 60.8                   |
| 2004-2005                     | 27.5                 | 18.3                 | 58.8                           | 28.0                    | 91.05                  |
| 2005-2006                     | 29.2                 | 17.3                 | 57.5                           | 26.9                    | 101.20                 |
| 2006-2007                     | 26.5                 | 16.1                 | 56.7                           | 25.5                    | 73.14                  |
| Compound growth rate (%)      | 5.9                  | 7.66                 | 9.79                           | 11.0                    | 21.34                  |
| Average (%)                   | 24.77                | 14.77                | 45.98                          | 21.67                   | 58.33                  |
| Standard deviation (%)        | 4.21                 | 3.61                 | 11.07                          | 6.09                    | 27.23                  |
| Co-efficient of variation (%) | 16.99                | 24.44                | 24.07                          | 28.10                   | 46.68                  |

Source: Annual Reports of ONGC (calculated values).

From Table-3 it is seen that net profit on sales ratio of ONGC is slightly fluctuating over time. The average net profit ratio of the firm is 24.77%. The compounded growth rate of this ratio is 5.9% which indicates that the ratio is improving to a favorable extent over the period under study. Therefore it may be said that the profitability on sales of the company is satisfactory. It also indicates that the management operates the firm successfully in relation to earned revenues and the costs associated with it. The same trend is observed in case of ROA, RONW & ROCE. The average growth rate of these three ratios is 7.66%, 9.79% and 11% respectively. Moreover the average values of ROA, RONW & ROCE are found to be 14.77%, 21.67% and 45.98% respectively. The profitability ratios discussed above are found to be, more or less, in a stable position over time on the scrutiny of their coefficient of variations shown in Table-3. The Earning Per Share ratio fluctuates considerably over the period of 9 years. The instability of EPS is clearly shown by its coefficient of variation, which is found to be 46.68%. The average EPS figure is 21.34% with standard deviation 58.33%. From the analysis of EPS it is clear that the company is in a favorable position towards the earnings available to equity shareholders on per share basis though it fluctuates over time. Thus, in totality, it can be said that the overall profitability position of ONGC is satisfactory enough for the period under study and the company is in a favorable position to create sufficient surplus for its growth and survival stability in the present competitive business environment.

**Liquidity and Profitability Analysis by using simple rank correlation:** In the following table the relationship between liquidity and profitability is analyzed with the help of rank correlation:

**Table-4. Liquidity and Profitability: The relationship (using rank correlation)**

| Year      | Current Assets (CA) | Total Assets (TA) | Capital Employed (CE) | Earnings Before Interest dep. & Tax (EBIDT) | CATA (%) | Rank On CATA ( $x_1$ ) | Return on Capital Employed (ROCE) (%) | Rank On ROCE ( $x_2$ ) | $d=(x_1-x_2)$ | $d^2 = (x_1-x_2)^2$ |
|-----------|---------------------|-------------------|-----------------------|---|----------|------------------------|---------------------------------------|------------------------|---------------|---------------------|
| 1998-1999 | 16186               | 170300            | 267256                | 67495                                       | 56.48    | 9                      | 25.3                                  | 9                      | 0             | 0                   |
| 1999-2000 | 118919              | 182920            | 293185                | 100077                                      | 65.01    | 8                      | 34.1                                  | 8                      | 0             | 0                   |
| 2000-2001 | 139715              | 198608            | 310331                | 134326                                      | 70.35    | 7                      | 42.4                                  | 6                      | 1             | 1                   |
| 2001-2002 | 176659              | 232667            | 329061                | 129279                                      | 75.93    | 6                      | 39.2                                  | 7                      | -1            | 1                   |
| 2002-2003 | 214970              | 268898            | 352710                | 190492                                      | 81.00    | 5                      | 54.0                                  | 4                      | 1             | 1                   |
| 2003-2004 | 280615              | 337301            | 395299                | 181230                                      | 83.19    | 3                      | 45.8                                  | 5                      | -2            | 4                   |
| 2004-2005 | 321658              | 380023            | 419926                | 246784                                      | 84.64    | 1                      | 58.8                                  | 1                      | 0             | 0                   |
| 2005-2006 | 371615              | 450037            | 493763                | 283731                                      | 82.57    | 4                      | 57.5                                  | 2                      | 2             | 4                   |
| 2006-2007 | 443953              | 532344            | 540744                | 306465                                      | 83.40    | 2                      | 56.7                                  | 3                      | -1            | 1                   |
|           |                     |                   |                       |   |          |                        |                                       |                        |               | $\Sigma d^2 = 12$   |

Source: Annual Reports of ONGC (calculated values). Amounts in Million Rupees.

The relationship between liquidity (measured by CATA) and profitability (measured ROCE) of ONGC over the period of 9 years is presented in Table-4. This relationship is established by using Spearman's Rank Correlation Coefficient. The rank correlation between CATA and ROCE is computed by applying the formula

$$r_{Rank} = 1 - \frac{6 \sum di^2}{n(n^2 - 1)}$$

since there is no tie for giving the rank to the value of CATA and ROCE; here d =

difference in rank and n = number of pairs of observations. Putting the respective values of d and n in rank correlation formula above we obtain  $r_{Rank} = 0.90$  which indicates that there is a high positive correlation between liquidity and profitability of the company. To find out the significance of the above result we test the hypothesis as under:

Null Hypothesis  $H_0$ :  $\rho = 0$  against

The Alternative Hypothesis  $H_1$ :  $\rho \neq 0$ .

If  $H_0$  is true, then the value of test statistic  $t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \sim t_{p, n-2}$

Putting the values of n and r, we get  $t = \frac{0.90\sqrt{9-2}}{\sqrt{1-(0.90)^2}} = 5.4628$  where

$t_{0.05, 7} = 2.365$ ; and  $t_{0.01, 7} = 3.499$  (Table value of t)

Since computed value of t (5.4628) is greater than the table value of t (i.e. 2.365 at 5% level and 3.499 at 1% level of significance), the null hypothesis,  $H_0$ :  $\rho = 0$  is rejected both at 5% and 1% level of significance and thus, the alternative hypothesis,  $H_1$ :  $\rho \neq 0$  is accepted both at 95% and 99% level of confidence. Therefore, we may conclude that there is a direct relationship between liquidity and profitability of the firm under study. This relationship is statistically significant both at 5% and 1% level.

**Liquidity and Profitability Analysis by Using Linear Multiple Regression:** In order to find out the influence of liquidity ratios under consideration on profitability of the firm the following linear multiple regression model is used:

$$y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 \dots\dots\dots \text{(Equation-1),}$$

where y = Return on Capital Employed (ROCE),  $x_1$  = Current Ratio (CR),  $x_2$  = Quick Ratio (QR),  $x_3$  = Current Assets to Total Assets (CATA),  $x_4$  = Working Capital Turnover Ratio (WCTR),  $x_5$  = Inventory Turnover Ratio (ITR) and  $x_6$  = Debtors Turnover Ratio (DTR). In this study CR, QR, CATA, WCTR, ITR and DTR have been taken as the explanatory variables and ROCE has been used as the dependent variable. For selecting the explanatory variables the correlation matrix is constructed (Table-5a) giving the correlation coefficients between the explanatory variables and the dependent variables. This table reveals that there is a poor correlation between CBTR and each of the remaining variables and hence CBTR has not been used in multiple regression analysis.

**Table-5a Correlation Matrix**

|      | ROCE   | CR     | QR     | CATA   | WCTR   | ITR    | DTR   | CBTR  |
|------|--------|--------|--------|--------|--------|--------|-------|-------|
| ROCE | 1.000  |        |        |        |        |        |       |       |
| CR   | 0.784  | 1.000  |        |        |        |        |       |       |
| QR   | 0.821  | 0.996  | 1.000  |        |        |        |       |       |
| CATA | 0.826  | 0.685  | 0.734  | 1.000  |        |        |       |       |
| WCTR | -0.708 | -0.915 | -0.934 | -0.776 | 1.000  |        |       |       |
| ITR  | 0.810  | 0.403  | 0.470  | 0.596  | -0.393 | 1.000  |       |       |
| DTR  | 0.227  | 0.412  | 0.404  | 0.291  | -0.353 | -0.019 | 1.000 |       |
| CBTR | -0.120 | -0.005 | 0.033  | 0.102  | -0.287 | -0.040 | 0.444 | 1.000 |

The pooled regression results of the model used in this analysis representing the impact of working capital on profitability of the firm under study are exhibited in Table-5b.

**Table-5b Multiple Regression Analysis Results**

**Multiple Regression Mode:**  $y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6$

| Variable                            | Regression coefficient                | Standard Error of regression coefficient | 't' value                          | Sig. t                 |
|-------------------------------------|---------------------------------------|--|------------------------------------|------------------------|
| x <sub>1</sub> (CR)                 | b <sub>1</sub> = 2.232                | 212.2                                    | 0.241                              | 0.832                  |
| x <sub>2</sub> (QR)                 | b <sub>2</sub> = -1.682               | 247.4                                    | -0.154                             | 0.892                  |
| x <sub>3</sub> (CATA)               | b <sub>3</sub> = 0.475                | 77.14                                    | 1.25                               | 0.338                  |
| x <sub>4</sub> (WCTR)               | b <sub>4</sub> = 0.344                | 25.16                                    | 0.272                              | 0.811                  |
| x <sub>5</sub> (ITR)                | b <sub>5</sub> = 0.552                | 2.47                                     | 0.688                              | 0.562                  |
| x <sub>6</sub> (DTR)                | b <sub>6</sub> = -0.172               | 0.67                                     | -0.086                             | 0.939                  |
| Constant                            | b <sub>0</sub> = 157.44               | 55.79                                    | -1.481                             | 0.277                  |
| <b>Multiple R = 0.986</b>           | <b>R<sup>2</sup> = 0.961</b>          | <b>Adjusted R<sup>2</sup> = 0.891</b>    | <b>Standard Error of R = 3.884</b> | <b>F ratio = 11.86</b> |
| <b>Durbin-Watson Test = 2.30281</b> | <b>F<sub>0.05, (2,6)</sub> = 5.14</b> | <b>Sig. F = 0.111</b>                    |                                    |                        |

Note: SPSS version 6.0 is used to compute the results shown in the table from the original values of dependent and independent variables.

Putting the respective values of all regression coefficients in equation-1 from Table-5b we obtain the required multiple regression equation as under:

$$y = 157.44 + 2.232x_1 - 1.682x_2 + 0.475x_3 + 0.344x_4 + 0.552x_5 - 0.172x_6$$

The multiple correlation coefficient of ROCE on CR, QR, CATA, WBTR, ITR and DTR is 0.98 which reveals that the profitability of the firm was highly influenced by those explanatory variables. The value of R<sup>2</sup> indicates that the explanatory variables taken together contributed about 96.10% of the variations in the profitability of the company. The regression analysis results also show that goodness of fit of the regression equation is statistically significant both at 11.10% and 5% level

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**Table-6. Risk and Profitability: The Relationship (using rank correlation)**

| Year      | Shareholders Equity (E <sub>i</sub> ) | Long term Debt (D <sub>i</sub> ) | Fixed Assets (A <sub>i</sub> ) | Current Assets (C <sub>i</sub> ) | Risk Factor (R <sub>i</sub> ) | Rank (r <sub>1</sub> ) | ROCE (%) | Rank (r <sub>2</sub> ) | d=r <sub>2</sub> -r <sub>1</sub> | d <sup>2</sup>      |
|-----------|---------------------------------------|----------------------------------|--------------------------------|----------------------------------|-------------------------------|------------------------|----------|------------------------|----------------------------------|---------------------|
| 1998-1099 | 242488                                | 2809                             | 74114                          | 96186                            | 0.22                          | 9                      | 25.3     | 9                      | 0                                | 0                   |
| 1992-2000 | 268102                                | 2263                             | 64001                          | 118919                           | 0.38                          | 8                      | 34.1     | 8                      | 0                                | 0                   |
| 2000-2001 | 303113                                | 1415                             | 58893                          | 139715                           | 0.61                          | 6                      | 42.4     | 6                      | 0                                | 0                   |
| 2001-2002 | 297222                                | 1213                             | 56008                          | 176659                           | 0.45                          | 7                      | 39.2     | 7                      | 0                                | 0                   |
| 2002-2003 | 357389                                | 1011                             | 53928                          | 214970                           | 0.62                          | 5                      | 54.0     | 4                      | 1                                | 1                   |
| 2003-2004 | 405431                                | 2118                             | 56684                          | 280615                           | 0.73                          | 4                      | 45.8     | 5                      | -1                               | 1                   |
| 2004-2005 | 468454                                | 1490                             | 58365                          | 321658                           | 0.82                          | 3                      | 58.8     | 1                      | 2                                | 4                   |
| 2005-2006 | 539597                                | 1069                             | 78422                          | 371615                           | 0.84                          | 2                      | 57.5     | 2                      | 0                                | 0                   |
| 2006-2007 | 619240                                | 696                              | 88391                          | 443953                           | 0.86                          | 1                      | 56.7     | 3                      | -2                               | 4                   |
|           |                                       |                                  |                                |                                  |                               |                        |          |                        |                                  | Σd <sup>2</sup> =10 |

Source: Annual Reports of ONGC (calculated values). Amounts in Million Rupees.

The relation between profitability and risk of ONGC over the period of nine years is analyzed in Table-6. This relationship is established by using the rank correlation between the risk factor (Rt) and profitability measured in terms of ROCE of the enterprise. The risk factor is measured by using the following formula:

$$R_t = \frac{(E_t + D_t) - A_t}{C_t} \quad (\text{symbols have their usual meanings and these are given in the previous section})$$

The rank correlation between the ranks of Rt and ROCE is calculated by using the following formula:

$$r_{Rank} = 1 - \frac{6 \sum di^2}{n(n^2 - 1)} \quad \text{where, } di = r1 - r2 \text{ and } n = \text{number of pairs of ranks}$$

Here, the rank correlation,  $r_{Rank} = 1 - \frac{6 \times 10}{9(81 - 1)} = 0.92$  This indicates that there is a high positive correlation between risk and profitability.

Here, we may set the null hypothesis

Ho :  $\rho = 0$  and the alternative hypothesis H1 :  $\rho \neq 0$ .

$$\text{The test statistic, } t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \sim t_{p,n-2}$$

Putting the values of n and r we get,

$$t = \frac{0.92\sqrt{9-2}}{\sqrt{1-(-0.92)^2}} = \frac{2.4341}{\sqrt{0.1536}} = 6.21$$

Since the actual value of t (6.21) is greater than table value of t (2.365 at 5% level and 3.499 at 1% level), the null hypothesis is rejected both at 5% and 1% level of significance with 7 d.f. and thus the alternative hypothesis H1 :  $\rho \neq 0$  is accepted both at 95% and 99% level of confidence. Hence, there is a sufficient reason to conclude that there is a direct relationship between risk and profitability. This relationship is statistically significant both at 1% and 5% level.

## IMPLICATIONS FOR MANAGERS AND ORGANIZATIONS

From our study, it is shown that there is a significant relationship between profitability and liquidity of the firm. Therefore, the performance of the company should not be judged only on the basis of surplus generating capability/profitability measured in terms of return on sales and investment. This performance has a direct link with the fluctuation of working capital of the firm. Thus, management should also emphasize the growth and efficiency of investment in working capital along with the effective management of fixed capital over time.

The study shows that there is a positive correlation between liquidity and profitability of the firm. It indicates that the investment in current assets lies in such a specified domain that

increase in liquidity leads to an increase in profitability and vice-versa. Thus, the management may increase its investment in current assets up to that point of liquidity-profitability frontier (i.e. according to Gentry's Hypothesis) where the curve changes its curvature from zero to negative because after that point the relationship between liquidity and profitability would become negative which is not desirable. Thus, liquidity-profitability analysis throws some light on the path of investment in current assets by which financial managers get an insight into the effect of their decisions regarding working capital investment in the way of achieving short term as well as long term goal of the organization.

The multiple regression analysis in the study shows that the profitability of the firm is highly influenced by different liquidity ratios taken as the explanatory variables. It indicates that the different components of working capital influence the profitability differently. Therefore, the change of composition of working capital should also be analyzed to get a clear picture about the corresponding change in the profitability of a firm.

In this study, we observe that there is a significant relationship between risk and profitability. The enterprise should always try to maintain a reasonable risk with optimum level of working capital for better profitability. Here the risk actually refers to the ability to meet the financial obligation (both short term & long term) by the firm. The lack of sufficient liquidity to meet its short term financial obligations has a considerable contribution towards risk. Therefore, the management should maintain adequate level of working capital along with the fixed capital so that the firm can minimize its risk which has a bearing on profitability. This study relating to liquidity and profitability helps the financial managers to make their important decisions regarding the investment side of the pool of fund procured from different providers of capital.

### **CONCLUDING REMARKS**

From the analysis so far it may be concluded that working capital management is very much useful to ensure better productive capacity, good profitability and sound liquidity of an enterprise, specifically the PSE in India, for managerial decision making regarding the creation of sufficient surplus for its growth and survival stability in the present competitive and complex environment. From our observation it is also clear that the overall financial health of an enterprise not only depends on the profitability of the concern but also it depends on the liquidity position of the firm. It is also observed that liquidity and profitability are two closely related concepts in financial management of a firm in the way of achieving its desired goals. Moreover the risk dimension of liquidity cannot be ignored in the measurement of overall performance of the firm. Thus, it can be said that the efficiency of financial managers largely depends on their effective utilization of working capital for the growth and sustainability of the enterprise in the present global scenario. It is obvious that our study suffers from the inherent limitations in the construction of different financial ratios under considerations. Further research study may be conducted in this field of enquiry rigorously to explore the real situation behind the day to day problem of running the wheel of the enterprises, particularly the PSEs, in India.

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