

**RELATIONSHIP BETWEEN WORKING CAPITAL AND PROFITABILITY
- A STATISTICAL APPROACH**

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ABSTRACT

Working capital is one of the vital decisions of financial management function. Profitability and working capital relationship is frequently emphasized for deciding on the level of investment in working capital. All manufacturing firms need to understand the association between these two variables to arrive at optimal financial decisions. Though theories exist on the topic, empirical methods are inadequately focused in arriving at conclusions. Use of statistical methods in understanding the relationship is systematic and scientific, which may provide better insight for decision making. This paper is an endeavor to understand the relationship between working capital and profitability in a detailed manner.

Keywords: *Working Capital, Operating Cycle, Profitability, Long-term funds, Short term funds, Statistical Analysis, correlation coefficient between profitability and working capital, Test of Significance for Level of working capital on Profitability.*

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1. IMPORTANCE OF WORKING CAPITAL

Two essential aspects of financial soundness of a firm are the financial position and economic performance. Working capital management is most crucial aspect of economic performance of a firm. Effective working capital decisions contribute to the profitability and attainment of overall objectives of an organization on one hand and provide liquidity to the firm on the other. For several reasons, capital budgeting decisions are influenced by operating managers to larger extent and the day to day management of liquidity, short term obligations, uninterrupted operations calls for effective working capital decisions that forms the domain of finance function¹. Theoretically, leaving other things constant, level of investment in current assets has a bearing on the profitability of the firm. Excess of investment in working capital casts a negative impact on the profitability of a firm and positive impact on the liquidity. Studies on the association of level of investment in current assets and the profitability have always claimed inverse relationship in the research on the degree of association both at micro and macro levels. Let us have a glance on the impact of investment in various current assets on the profitability theoretically through Table 1.

THEORETICAL RELATIONSHIP BETWEEN VARIOUS CURRENT ASSETS AND PROFITABILITY

TABLE I

CURRENT ASSET	EXCESS	SHORTAGE
Cash	As non earning assets reduces profitability.	Causes liquidity crisis by lagging in payments, disruption of operations, ultimately affecting the overall turnover and profits.
Receivables	Cost of Collection efforts, Default risks, low profitability	Lower turnover, lower profitability
Inventory	Opportunity cost of funds, price declines, carrying costs adversely affect profits	Interrupted production schedules, limited supplies, lower turnover and profits

¹ The role of financial management; Fundamentals of Financial Management By JamesC.Vanhorne and John M.Wacoiwicz, JR; Twelfth Edition; Pearson Education, Prentic Hall 2006

Table I reflects the epitome of business literature on role and importance of working capital decisions and an effective financial management function calls for trade-off between the costs and benefits on each of them. One more important aspect here is that the decision on any one of current assets will have impact on others and the financial manager is constrained with the availability of funds to be risk conservative. Risk Conservativeness refers to marinating high liquidity to minimize the risk. That means when the available funds are limited, a decision to buy more stocks for example, may limit the cash balances to be maintained and the investment in receivables.

The level of working capital needed by a firm is a function of nature of the industry, size of the firm, availability of raw materials, production cycle of the firm, Production policy of the firm, nature of demand for the products, competition in the industry etc.,

$$f(W_L) = \{N, Q, R, P_c, P_p, D, \text{ and } C \dots n\}$$

Where W_L is the level of working capital

Q = Size of firm

R= Availability of Raw-material

P_c = Production Cycle of the firm

P_p = Production policy of the firm

D= Nature of demand for the products of the firm

C= competition in the industry

The list of factors is exemplary but not exhaustive. There can be differences in the investment in various types of current assets. For example, firms in services industry have negligible size of investment in stores but considerable size of investment in cash and receivables where as manufacturing firms invest comparatively large sums in inventories.

Optimum level of working capital is investment decision in current assets that varies with the risk-return preferences of firms. Conservative firms are risk averse and satisfy with the available profitability at lowest risk and aggressive firms prefer high profitability even for higher risk. Once the level of investment in current assets is determined, firms need to make decision on financing the current assets either from long term or short term sources. Long term sources of finance offer flexibility to the firms as the funds are available over a period of time beyond the normal accounting cycle, but attract higher cost. Short term sources are comparatively cheaper but not flexible in the sense that firms should oblige the short- run payment schedules.

The need for working capital to run the day-to-day business activities cannot be overemphasized. We hardly find a business firm that does not require working capital and indeed, firms differ in their requirements of the working capital. In endeavoring to maximize shareholders wealth, firms need sufficient earnings from its operations. Earning a steady amount of profit requires successful sales activity. The firm has to invest enough of available funds in current assets for the success of sales activity. Current assets are required because sales do not get converted into cash instantaneously as there is always a time lag involved in the conversion of sales into cash. Thus, there is always a time gap between the sale of goods and receipt of cash. The significance of working capital is felt for this period in order to sustain the level of sales activity. The time lag varies with the nature of industry.

2. RATIONALE AND OBJECTIVES OF THE STUDY

The relationship between working capital and the profitability has been an interesting debate in financial management. Theoretically working capital decision affects both liquidity and profitability. Excess of Investment in working capital may result in low profitability and lower investment may result in poor liquidity. Management need to trade-off between liquidity and profitability to maximize shareholders wealth. To understand the impact of working capital on profitability, one needs to establish the relationship between these two. Statistical Measures such as correlation and regression models can be used to understand such relationship.

The present study focuses understanding the relationship between working capital and profitability using statistical methods through a case study on H.G. Pharma Limited. In order to analyse the relationship between working capital and profitability, the present paper is made to work with the following objectives, they are;

- Studying the working capital management of the **HG. Pharma Limited** during the period 2003-2008.
- Examining the efficiency of **H.G. Pharma Limited** in the managing it's working capital.
- Finding out the liquidity position of the **H.G. Pharma Limited** in order to determine its ability in meeting current obligations.
- Studying the impact of the working capital on profitability during the period 2003-2008.

- Examining that the use of long term funds for working capital finance over the period of study.

3. SCOPE AND LIMITATIONS

This study is carried on the basis of the data available for H.G Pharma Ltd, during the period 2003-2008. The study is confined to understanding the relationship between working capital and profitability of the case using Profit Before Tax (PBT) as a measure of profitability and the most common measures of working capital. Results of the tests can not be generalized to the firms in pharmaceutical industry nor on the company as the study is pertaining to a single unit and also based on the information for five years.

4. DATA SOURCES AND METHODOLOGY

The data used in the study is obtained from the published results of the company during 2003-2008. The conceptual framework of working capital and statistical methods are gathered from reference books, publications of reputed journals and industry websites. The study has been conducted through simple statistical methods such as correlation, regression and Chi-square test. PBT as a measure of profitability has been compared with various measures of working capital to understand the association between the variables.

An estimation of the working capital requirements of the company on the basis of linear regression model has been made.

The linear regression model is $Y=a+bX$.

Where Y=working capital.

X=Sales.

a=the intercept of line on the Y-axis. I.e., the

Amount of working capital required when sales are Nil.

b = the rate of growth in working capital.

The difference between working capital during different years has been found and the variation has been tested with the help of the most popular chi-square test at 5% level of significance.

The chi-square formula is used is

$$\chi^2 = \frac{(O - E)^2}{E}$$

Where O= Observed working capital.

E= Estimated working capital.

The impact of working capital on profitability of the company is done through coefficient of correlation.

5. PROFILE OF INDIAN PHARMACEUTICAL INDUSTRY

Indian Pharmaceutical industry is \$ 4.5 billions worth and growing at a rate of 8 to 9 percent annually and is one of the leading pharmaceutical manufacturing countries in terms of technology, quality and range of pharmaceutical products². The industry outreaches 70% of the country's demand with 20,000 registered units of which 260 are in the organized sector. Severe price competition is the one of the appealing feature of the industry due to fragmented unit ownership. The industry which barely existed in 1970s has recorded a compounded annual growth rate of 13.7% per annum in recent decade. It stands 4th largest manufacturer in the global economy in terms of its volume and 13th in terms of value.³

Due to faster Industrial development, people are migrating to the cities where the drinking water and other amenities are very much polluted. Because of this severe pollution, diseases spread very fast. Under these circumstances, usage of drugs has increased and as a result, the responsiveness to drugs has been declining and hence frequent changes of drugs are inevitable.

Since the usage of drugs has increased, the pharmaceutical industry is working on new methods, formulations, and vaccines for epidemics as well as diseases like Cancer, Aids, T.B., etc. Drugs are very useful to mankind in curing the diseases, reducing the pains, and prevention of diseases etc. successful research in Bio-drugs has helped minimising the production cost. Though the research on gene therapy is in progress, it may take many years to yield results. The supremacy of gene therapy is recognition of vulnerability of individuals for possible diseases based on their genes and that helps in taking preventive measures through vaccinations and changes in living habits.

The Indian pharmaceutical industry today is among the front-runners of India's healthcare industries with wide ranging capabilities in the complex field of drug manufacture and technology. It ranks among the most developed in the third world countries, in terms of technology, quality and range of medicines manufactured. From simple headache pills to

² [http://www.pharmaceutical-drug-manufacturers.com/pharmaceutical-industry/Indian Pharmaceutical Industry Overview](http://www.pharmaceutical-drug-manufacturers.com/pharmaceutical-industry/Indian%20Pharmaceutical%20Industry%20Overview)

³ FICCI Report for National manufacturing Competitiveness Council (NMCC), March 2005

sophisticated antibiotics and complex cardiac compounds, almost every type of medicine is now made in India.

The organized sector of the industry has played a key role in promoting and sustaining development in this vital field. Several multi-national companies associated with this sector that have stimulated, assisted and headed this dynamic development in the past 50 years and secured a position for the country in Global Pharmaceutical giants. One of the key contributors for growth of industry is contract manufacturing as the industry has become most favored destination for manufacturing outsource of drugs and pharmaceuticals for leading global manufacturers. Attainment of this status is accorded to manufacturing efficiency that could supply goods at competitive prices.

The industry has qualitative producers and many of them are approved by regulatory in e U.S. and U.K. It has a pool of vibrant skills with managerial and technical competence.

The recent regulatory and much awaited patent law changes lead the Indian Pharmaceutical Industry towards exploring newer avenues of drug development, thus, promising attractive destination for capital investment in the industry. The Indian Pharmaceutical Research is backed by Government support, and availability of surplus skilled technical human resource at lower costs.

6. PROFILE OF THE ORGANISATION

H.G. was established in early 1970's as a trading company and ventured into manufacturing of bulk drugs as an associate for a company in 1982. In 1995, H.G. set up its own manufacturing facility in Hyderabad, India. This facility is ISO 9001-2000 and WHO-GMP compliant manufacturing Active Pharmaceutical Ingredients (APIs) and Drug Intermediates (DIs) for both the domestic and international markets. The Company is currently marketing APIs and DIs in 11 countries across the globe. Customers include pharmaceutical majors in the regulated markets of Europe and the US.

In 2002, H.G. ventured into the manufacture of Pharmaceutical Formulations(PFs), setting up a new unit in its Hyderabad facility. This unit is GMP approved and is currently catering to the domestic market. Their products include Analgesics, Anti Inflammatory, Anti Bacterial and Anti Ulcerants among others. The company is committed towards Quality, Safety, Environment and Health(QSEH). The unit has been approved by multinational pharmaceutical companies and is currently in the process of setting up an USFDA compliant-API Production facility and Finished Dosages (Tablets and Capsules) facility. The API

facility was completed by December 2006 and the Finished Dosages facility by December 2007.

7. ANALYSIS, DISCUSSION AND FINDINGS

In analyzing working capital, the components of working capital, sources of working capital, estimation of working capital, Net working capital, and the relationship of various components of working capital with profitability play a vital role. A modest attempt has been made to exhibit the same aspects through tables II- VII.

7.1 COMPONENTS OF WORKING CAPITAL

Table II shows the component-wise analysis of working capital of HG Pharma Limited from 2003-04 to 2007-08. It is very to be noted from the table that inventory constituted as a major component of working capital that was 47.29 percent in 2003-04 and moved to 57.56 percent in 2007-08. The average figure for the period registered as 47.31 percent. Similarly, Sundry debtors moved between 22.36 percent and 17.32 percent with an average of 21.12 percent over the study period. Besides, Cash& Bank Balances, Advances, Deposits and others were recorded at averages 0.283 percent, 7.58 percent, 8.12 percent and 15.55 percent respectively. On the other hand, it is also evident from the table that the changing paradigm of percentage of current assets over total assets, which was 37.15 percent in 2003-04 moved to 34.40 in 2007-08.

Hence, the major components of working capital are Inventory, Sundry Debtors, Deposits and Advances. The size of the working capital increased and decreased over the years as percentage of total assets due to changes in scale of operations.

TABLE II

Particulars	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	Average
Inventory	150.98 (47.29)	198.3 (37.86)	215.42 (46.03)	384.05 (47.79)	410.92 (57.56)	47.31
Sundry Debtors	71.40 (22.36)	176.76 (33.74)	65.46 (13.98)	146.41 (18.22)	123.71 (17.32)	21.12
Cash & Bank Balances	1.75 (0.548)	1.36 (0.25)	.62 (0.13)	1.97 (0.24)	1.83 (0.25)	0.283
Advances	15.54 (4.86)	14.73 (2.81)	24.83 (5.31)	107.26 (13.34)	82.95 (11.61)	7.58

Deposits	45.82 (14.35)	52.74 (10.06)	27.49 (5.87)	55.18 (6.86)	24.76 (3.46)	8.12
Others	33.76 (10.57)	79.88 (15.25)	134.12 (28.66)	108.67 (13.52)	69.70 (9.76)	15.55
Gross working capital	319.25 (100)	523.77 (100)	467.94 (100)	803.54 (100)	713.87 (100)	100
Total Assets	859.17	1287.20	1794.37	2061.03	2074.98	
% C.A. to T.A.	37.15	40.69	26.07	38.98	34.40	35.46

Source: Annual Reports of the company

Note: Figures in parentheses indicate percentage of each component to total Working capital.

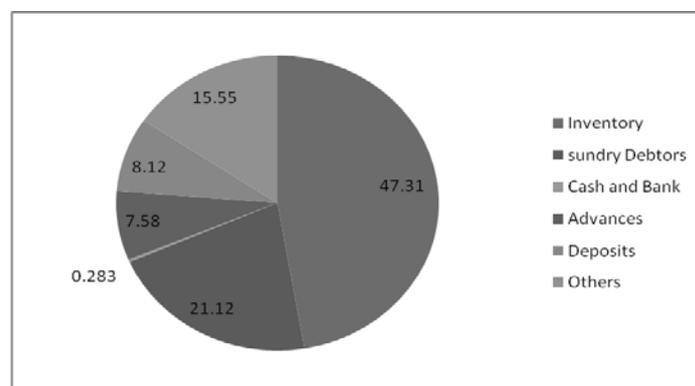


Figure 1: Proportional Average Investment in various current assets

7.2 SOURCES OF WORKING CAPITAL

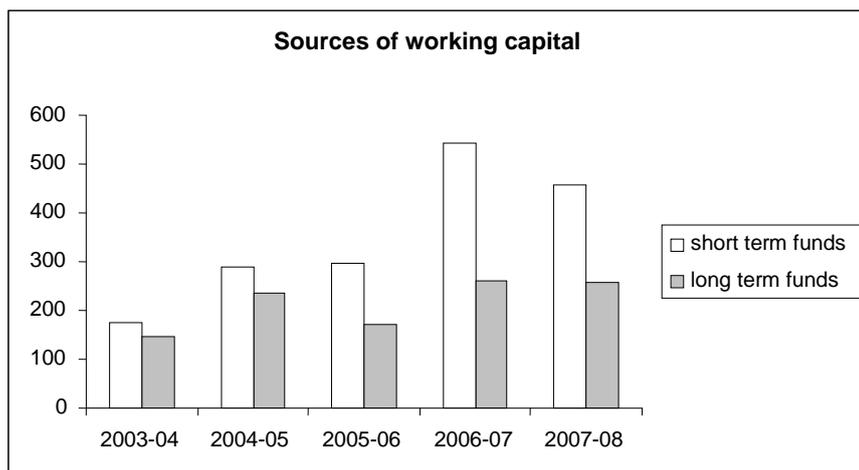
In Table. III an attempt has been made to explain the composition of long-term and short-term funds in financing working capital. It is transparent from the table that the percentage of financing working capital has shown both increasing and decreasing trends during the period of study. It came from 74.06% in 2003-2004 to 51.37% in 2007-2008. The decreasing trend shows that the company utilized its long-term funds more effectively by investing them in fixed assets. On the other hand increasing trend is an indication of firm's inability of financing working capital with short-term sources.

TABLE- III

(Rupees In lacks)

Particulars	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
Gross Working Capital	319.25	523.77	467.94	803.54	713.87
Sources of Working capital:					
a) Short-term funds	174.16	288.72	295.03	543.81	458.16
b) Long-term funds	145.09	235.05	172.91	259.73	255.71
Total long-term Funds.	195.90	362.22	289.78	326.01	497.78
% of long-term Used for working Capital financing.	74.06%	64.89 %	59.66%	79.66%	51.37%

Source: Published Annual Reports of the company



7.3 ESTIMATION OF WORKING CAPITAL REQUIREMENTS

Table IV shows that there was a shortage of working capital except in the years 2004-2005 and 2006-2007. The shortage of working capital in 2003-2004 was Rs. 65.47 lakhs which increased to Rs.74.82 lakhs and 73.16 lakhs for the years 2005-06 and 2006-07 respectively.

On the other hand, the excessive working capital mode is increased from 59.96 in 2004-2005 to 172.27 in 2006-2007. The table value of the Chi-square test at 5% level of significance is 11.10. It is far below the calculated chi-square value of 83.02. It shows that difference between estimated and actual working capital is fluctuating and large.

TABLE -IV

(Rs. In lakhs)

Year	Actual Working capital (O)	Estimated Working capital (E)	Excess of Working capital	Shortage of Working capital	$\frac{(O - E)^2}{E}$ (X)
2003-2004	319.25	384.72	-----	65.47	11.14
2004-2005	523.77	463.81	59.96	-----	7.75
2005-2006	467.94	542.76	-----	74.82	10.31
2006-2007	803.54	631.27	172.27	-----	47.01
2007-2008	713.77	784.93	-----	73.16	6.81
				<i>E (X)</i>	83.02

Source: Published Annual Reports of the company

7.4 IMPACT OF WORKING CAPITAL ON PROFITABILITY

It appears from Table V that the Current Ratio (CR) of H.G. Pharma Limited has moved between 0.80:1 and 1.29:1 during the period of study. On an average it stands at 1.128:1 for the entire period against to conventional standard of 2:1. It reveals that the liquidity of H.G. Pharma Limited as measured by the current ratio is relatively low. The co-efficient of correlation between the profitability ratio and current ratio of the company is -0.69. This indicates that there is a comparatively higher degree of negative correlation between the two variables. The Quick Ratio (LR) of the company has moved between 0.45:1 and 0.85:1 during the study period, which is moderately good, when compared to the standard norm of 1:1. The co-efficient of correlation between the profitability ratio and quick ratio (LR) stands at -0.22. This indicates that there is a weak degree of negative correlation between the two variables. The Cash Ratio (CTR) of the company has moved between 0.19:1 and 0.87:1

during the study period, which is moderately good as compared to the standard norm of 0.5: 1. The co-efficient of correlation between the profitability ratio and cash ratio stands at 0.72. This indicates that there is high degree of positive correlation between the two variables. The correlation between profitability and working capital turnover ratio (WTR) is 0.38 that indicates a weak positive correlation between the variables. The correlation between Inventory turnover ratio and profitability is weakest with 0.04 and it can be said that there exists no correlation between inventory turnover and profitability as the results indicate.

The above observations indicate a strong negative correlation between current ratio and profitability and strong positive correlation between cash turnover ratio and profitability.(See Exhibit I for more details)

TABLE- V

Year	CR	LR	WTR	ITR	CTR	PBT
2003-2004	0.80	0.45	18.75	3.29	0.78	25.52
2004-2005	1.22	0.78	14.61	4.93	0.61	13.49
2005-2006	1.23	0.85	10.21	5.05	0.87	11.72
2006-2007	1.29	0.77	7.05	3.07	0.46	10.32
2007-2008	1.10	0.48	16.42	3.11	0.19	3.05
Coefficient of correlation (r)	-0.69	-0.22	0.38	0.04	0.72	

Source: Published Annual Reports of the company

7.5 NET WORKING CAPITAL

According to Table VI it is clear that the Net working capital has shown an increasing trend during the study period except in 2004-2005. It indicates that the portion of fixed working capital decreased year by year due to reduction in level of operation. The ratio moved from 7.13 percent to 8.37 percent during the period of the study.

TABLE –VI

Particulars	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008

Current Assets (CA)	319.25	523.77	467.94	803.54	713.87
Current Liabilities (CL)	284.61	412.94	259.73	544.69	622.90
Net Working Capital.(NWC =CA-CL)	34.62	110.83	208.21	258.85	90.97
%of NWC to Net Assets.	7.13%	15.04%	17.69%	20.89%	8.37%

Source: -Published Amount Reports of the company.

7.6. WORKING CAPITAL AND PROFITABILITY-CORRELATION ANALYSIS

CORRELATION COEFFICIENTS OF VARIOUS MEASURES OF WORKING CAPITAL WITH PROFITABILITY

Table 7

Current Asset or working capital	Percentage of working capital (Average)	Correlation coefficient With Profitability	Working Capital Ratio	Correlation Coefficient with Profitability
Inventory	47.31%	-0.83	Current Assets to Total Assets	0.20
Sundry Debtors	21.12%	-0.40	Current Ratio	-0.68
Cash & Bank	0.283%	-0.02	Liquid Ratio	-0.22
Advances	7.58%	-0.64	Working Capital turnover Ratio	0.38

Deposits	8.12%	0.45	Inventory Turnover Ratio	0.04
Others	15.55%	-0.50	Current Assets Turnover Ratio	0.72
Current Assets	100%	-0.81		
Net working Capital		-0.42		

8. CONCLUSION

From the study the following conclusions are drawn:

The average percent of current assets in relation to the total assets is 35.46%. It indicates that the company has made investment in working capital following Conservative approach. Among the components of working capital, inventory (47.31%) and sundry Debtors (21.12%) are the dominative contributory causes for the galloping increase in working capital.

The increasing trend of long-term funds used for financing working capital shows that the company has not utilized its long-term funds more effectively by investing them in fixed assets.

The company experienced either excess or shortage of working capital in all the years during the period of study. Major discrepancies between actual and the estimated working capital were noticed in all the years except in 2004-2005 and 2006-2007.

The liquidity position of the company is considerable as current ratios are below the standard norms through the period of study and liquidity ratios (Quick ratio) are also below the standard norms over the study period. The Net working capital ratios showed increasing trend over the study period except in the period 2007-2008.

- Level of investment in total current assets has a negative correlation with the profitability with a coefficient of -0.81. It concludes the theory that the excess of investment in working capital has adverse effect on profitability.
- Levels of inventory has a strong negative correlation with profitability is evident from the observation with a correlation coefficient of -0.83. It concludes that excess of investment in inventory results in low profitability.

- Investment in advances also has a negative correlation with profitability with a coefficient of -0.64. One of the reasons could be that the advances might be fetching lesser returns than the cost of funds.
- Current Ratio has a strong negative correlation with profitability with a coefficient of -0.68, It does mean that current ratio has adverse impact on profitability. Amongst all the ratios, current assets turnover ratio has a strong positive correlation with profitability with a coefficient of 0.72.

Hence, current assets with larger proportion in total assets have shown a high degree of negative correlation and the current assets with considerable proportion in gross working capital have shown moderate degree of correlation with the profitability confirms the theory that excess of working capital results in low profitability.

Notes:

1. We call this as working capital, refers to the firm's investment in current assets. Current assets are the assets which can be converted into cash within an accounting year (or operating cycle) and include cash, short-term securities, debtors, bills receivables and stock (inventory).
2. It refers to the difference between current assets and current liabilities. Current liabilities are those claims of outsiders which are expected to mature for payment within an accounting year and include creditors, bills payable and outstanding expenses. Net working capital can be positive or negative. A positive working capital will arise when current assets exceed current liabilities. A negative net working capital occurs when current liabilities are in excess of current assets.
3. The two concepts of working capital –gross and net are not exclusive; rather they have equal significance from management viewpoint. The gross working capital concept focuses attention on two aspects of current assets management:
4. Optimum investment in current assets and
5. Financing of current assets
6. The total time lag among the phases of business operation viz., purchases of raw-materials, conversion of raw materials into finished goods, sale of finished goods on credit, and collection of receivables is known as operating cycle.

7. Financial resources used in the business that are either perpetual or having a maturity period exceeding the normal course of business (one year) are commonly referred as long term funds.
8. Financial Resources used in the business that have an obligation of repayment during normal course of business (one year) are referred as short term funds.

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