

# Estimation of Working Capital on the Basis of Sales and Vice-Versa (A Case Study of IFFCO Ltd.)

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**Abstract:** Any movement in working capital (WC) must get reflected in the sales of organization. Current assets and current liabilities must be managed effectively in order to achieve financial discipline. Management of WC in synchronization with sales is of immense importance for the purpose of cost effectiveness and thus profit maximization. Impressive WC ratios are not the only indicators of efficient WC management. There should be positive and strong correlation between WC and sales, so that any increase or decrease in one is supported by the same in other. Efficient WC management should have least deviations in projected and actual values of WC and sales.

This research article discusses the degree of association between WC and sales of IFFCO Limited and highlights the deviations in working capital and sales as a comparison between the projected and actual values of working capital and sales for ten financial years, from 2006-07 to 2015-16.

## 1. INTRODUCTION

Working capital comprises of current assets, which are totally distinct from other assets. In the first instance, current assets consist of those assets, which are of shorter life span as compared to other assets. The actual life span of these assets is contingent upon the time required in the activities relating to procurement, production, sales and collection and degree of synchronization among these activities. Working capital cycle starts with cash and ends at cash. The amount required as working capital should solely depend on the level of sales, for two basic reasons; first is that all goods manufactured are for the purpose of sale and second is that cash generates from sales only. The correlation between working capital and sales should be of highest order. Any change in working capital must immediately be reflected in sales and vice-versa.

For all practical purposes, the working capital should be adequate i. e. neither short nor excess. No enterprise can afford to have surplus or deficit working capital. It is this challenge of correct estimation of working capital requirement, which is faced by all Financial Managers and to a great extent, affects the profitability of the organization. The near to accurate estimation of working capital requirement, prevents the organization from the situation of over-trading or under-trading. Over-trading arises when a business expands beyond the level of funds available. Over-trade means an attempt to finance a certain volume of sales with inadequate working

capital while under-trade is an opposite situation, where sales figures do not support the large working capital figures.

IFFCO Ltd. is a strong name in cooperatives, being the largest cooperative in our nation. Established in 1967, IFFCO Ltd. is the largest producer of fertilizers with 5 mega plants of the production capacity of 129 Lakh MT per annum. IFFCO Ltd. has 35,214 member societies. Its sales mounted to Rs 15,775 crore in 2015-16. Since IFFCO LTD. is doing enormous manufacturing with numerous types of raw materials, including some natural resources; it has been chosen to analyze the degree of correlation between WC and sales and the deviation of actual figures of WC and sales from the projected ones.

## Objectives of the study

The present study has been undertaken with the following objectives:

- (i) Calculation and analysis of correlation coefficient between WC and sales.
- (ii) Calculation of trend values of WC and their comparison with actual values.
- (iii) Calculation of trend values of sales and their comparison with actual values.

## Methodology

For the purpose of calculating trend values, regression analysis technique has been utilized. Regression equations have been used to calculate the estimated figures. Regression quotients have also been used for the purpose. Trend values have been compared with actual values to find the deviations in either direction.

## Technique of estimating working capital requirement

Regression analysis method is a useful statistical technique applied for forecasting working capital requirement. It is the technique of estimating the value of one dependent variable given the value of another independent variable, after establishing the fact that two variables are correlated. Besides regression analysis, the statistical technique of correlation analysis has also been used in order to find out the strength of association between two variables. It depicts the tendency of the variables to move together.

The methodology used in determining regression equations is as follows:

- (i) Series of one variable is taken as 'X' and of another variable is taken as 'Y'.
- (ii)  $\bar{x}$  is calculated by  $\sum X/n$  and  $\bar{y}$  is calculated by  $\sum Y/n$ .
- (iii) Deviations of actual values from mean value are calculated and then regression equation is formed as follows.
- (iv) The regression equation of Y (sales) on X (WC) is –  $Y - \hat{Y} = b_{YX}(X - \bar{x})$  where  $b_{YX} = \frac{\sum xy}{\sum x^2}$ , where  $x = X - \bar{x}$  and  $y = Y - \bar{y}$
- (v) The regression equation of X (WC) on Y (sales) is –  $X - \bar{x} = b_{XY}(Y - \bar{y})$  where  $b_{XY} = \frac{\sum xy}{\sum y^2}$ , where  $x = X - \bar{x}$  and  $y = Y - \bar{y}$
- (vi) Trend values of sales (Y) are calculated on the basis of WC (X), using the regression equation of Y on X and deviations are studied as comparison with actual.
- (vii) Trend values of WC (X) are calculated on the basis of sales (Y), using the regression equation of X on Y and deviations are studied as comparison with actual.
- (viii) The coefficient of correlation is calculated by using the following formula:

$$r = \frac{\sum xy}{(\sqrt{\sum x^2})(\sqrt{\sum y^2})}$$

where  $\sum xy$ ,  $\sum x^2$  and  $\sum y^2$  have same meaning as above.

**Degree of correlation between working capital and sales of IFFCO Ltd.**

Any change in sales must get reflected in WC figures and vice-versa. There should be a high degree of association between WC and sales, in order to avoid the situation of over-trading or under-trading and achieve financial discipline. Correlation analysis deals with the association between two or more variables. It determines whether any relation or interdependence exists between the variables and the degree of such relation. It also predicts the direction of movement of one variable in response to the change in other variable. Correlation analysis is used with regression analysis to measure how well the regression equation explains the variations of variables in response to each other. The strength of correlation between working capital and sales of IFFCO LTD. is calculated as follows (Refer to Table 1):

$$r = \frac{16607309425}{\sqrt{(18096343912)(15270705304)}} = 0.999$$

It suggests that WC and sales are positively correlated to a great degree. It suggests that in almost all instances, WC and sales move in same direction. With reference to Table 1, it can be seen that sales have shown an increasing trend continually from 2010-11 to 2012-13 and WC also moved in same direction in relation to sales. In the year 2014-15, sales and WC dropped

steeply. On the basis of the ten years data, it can be inferred that sales and WC of IFFCO Ltd. have strong and positive correlation.

**Analysis of projected & actual figures of sales & WC of IFFCO Ltd.** (Refer Table 2 & 3)

It is evident that in IFFCO Ltd. during the past ten years WC and sales moved in same direction in maximum instances, as the correlation coefficient is 0.999. However, there is deviation in projected and actual values of sales and WC. In the year 2006-07, 2010-11, 2011-12 and 2012-13, actual sales were less than the projected sales, to the extent of 21.25%, which is quite considerable. During the year 2009-10, actual sales were more than estimated sales by 31.01%. These percentages gain significant values as the sales and WC figures are in crores and any deviation would cost dearly to the organization.

In the year 2007-08, actual sales are Rs 484.06 crore more than the projected sales. During six years of the study, actual sales are more than the expected sales and during four years, actual sales are less than expected sales, -21.25% to 31.01% being the range of such deviations. Least deviations is in the year 2015-16, when actual sales were higher by Rs 329.3 crores, in comparison to the trend value for that year.

If the actual figure of WC is more than the projected figure, it implies that there is situation of under-trading. Under-trading is the situation when the management is not able to utilize the funds engaged as working capital. During the year 2006-07, 2010-11, 2011-12 and 2012-13, actual WC is more than the estimated value. This depicts the situation of under-trading. While during the year 2007-08 to 2009-10 and 2013-14 to 2015-16, WC actually implied is less than the trend values. This entails the situation of over-trading. In terms of percentage, the highest deviation on positive side is Rs 2,563.61 crores which is really substantial. It means that the funds utilized as WC were more than requirement. In terms of rupees, highest deviation is of Rs 3075.99 crores, during the year 2012-12. This is really alarming and might be possible that the management of IFFCO Ltd. had taken some harsh steps as during the next year itself i.e. 2013-14, the actual WC is short by Rs 3787.47 crores. The range of deviation is from -23.59% to 28.40%. This is highly undesirable, as deviations of this extent exhibit less control over cost and thus profitability.

**Findings**

Major findings from the above analysis are:

- (i) There is strong and positive correlation between WC and sales of IFFCO Ltd. as the correlation coefficient is 0.999.
- (ii) Negative deviation in sales is supported by positive deviation in WC and vice-versa, which means that there is less accurate estimation of WC and sales figures.
- (iii) In-depth study is required for the year 2012-13 and 2013-14, for exorbitant sales figures and then steep drop in WC and sales during the year 2014-15.
- (iv) There is situation of under-trading during the year 2006-07, 2010-11, 2011-12 and 2012-13, which supported by negative deviations in sales.

Table 1: Calculations for Correlation Coefficient

(Rs. in Crores)

Year	Working Capital (X)	$x=X-v$	$x^2$	Sales (Y)	$y = Y - \hat{Y}$	$y^2$	$xy$
2006-07	6081	-24953	622652209	5558	-23163	536538466.9	577993824.9
2007-08	5776	-25258	637966564	5968	-22753	517691273	574690980.1
2008-09	7673	-23361	545736788.2	7388	-21334	455122489	498374442.9
2009-10	5823	-25211	635619228	7241	-21480	461390400	541542805.2
2010-11	11588	-19446	378129025.9	8529	-20192	407718479.4	392645121.5
2011-12	13049	-17985	323464541.4	11216	-17505	306427125.6	314830604.7
2012-13	123845	92811	8613807472	111047	82326	6777586741	7640734737
2013-14	107165	76131	5795929161	102041	73320	5375822400	5581924920
2014-15	12736	-18298	334824123.2	12448	-16273	264805647.1	297763863.9
2015-16	16604	-14430	208214799.1	15775	-12946	167602282	186808124.8
	310340		18096343912	287213		15270705304	16607309425

$v = 310340/10$   
 $= 31034$

$\hat{Y} = 287213/10$   
 $= 28721.3$

Table – 2 Calculations for Trend Values of Sales

(Rs. in Crores)

Year	Working Capital (X)	Trend Values of Sales on the basis of Working Capital (Y)	Actual Sales	Deviation	% of Deviation on Trend Value
<b>2006-07</b>	6081	$Y=0.92(6081)+170.02=5764.54$	5558	-206.54	-3.58
<b>2007-08</b>	5776	$Y=0.92(5776)+170.02=5483.94$	5968	484.06	8.83
<b>2008-09</b>	7673	$Y=0.92(7673)+170.02=7229.18$	7388	158.82	2.2
<b>2009-10</b>	5823	$Y=0.92(5823)+170.02=5527.18$	7241	1713.82	31.01
<b>2010-11</b>	11588	$Y=0.92(11588)+170.02=10830.98$	8529	-2301.98	-21.25
<b>2011-12</b>	13049	$Y=0.92(13049)+170.02=12175.10$	11216	-959.1	-7.88
<b>2012-13</b>	123845	$Y=0.92(123845)+170.02=114107.42$	111047	-3060.42	-2.68
<b>2013-14</b>	107165	$Y=0.92(107165)+170.02=98761.82$	102041	3279.18	3.32
<b>2014-15</b>	12736	$Y=0.92(12736)+170.02=11887.14$	12448	560.86	4.72
<b>2015-16</b>	16604	$Y=0.92(16604)+170.02=15445.70$	15775	329.3	2.13

Table – 3 Calculations for Trend Values of WC

(Rs. in Crores)

Year	Sales (Y)	Trend Values of Working Capital on the basis of Sales (X)	Actual Working Capital	Deviation	% of Deviation on Trend Value
2006-07	5558	$X=1.09(5558)-272.22=5786$	6081	295	5.1
2007-08	5968	$X=1.09(5968)-272.22=6232.90$	5776	-456.9	-7.33
2008-09	7388	$X=1.09(7388)-272.22=7780.70$	7673	-107.7	-1.38
2009-10	7241	$X=1.09(7241)-272.22=7620.47$	5823	-1797.47	-23.59
2010-11	8529	$X=1.09(8529)-272.22=9024.39$	11588	2563.61	28.4
2011-12	11216	$X=1.09(11216)-272.22=11953.22$	13049	1095.78	9.17
2012-13	111047	$X=1.09(111047)-272.22=120769.01$	123845	3075.99	2.55
2013-14	102041	$X=1.09(102041)-272.22=110952.47$	107165	-3787.47	-3.41
2014-15	12448	$X=1.09(12448)-272.22=13296.10$	12736	-560.1	-4.21
2015-16	15775	$X=1.09(15775)-272.22=16922.53$	16604	-318.53	-1.88

- (v) There is situation of over-trading during the year 2007-08, 2008-09, 2009-10, 2013-14, 2014-15 and 2015-16, continuously for two blocks of three years each.
- (vi) There is mismatch between trend values of WC and sales of IFFCO Ltd. during the ten years period of study.

### CONCLUSION

There should be strong and positive correlation between WC and sales. Sales and WC should be highly sensitive to each other. Therefore, there should be proper estimation of WC requirements on the basis of sales. As second step, there should be further analysis of sales on the basis of WC. The overall objective of this exercise is to avoid situation of under-trading or over-trading. Any change in WC should get reflected in sales and vice-versa. Reasons for deviations in projected and actual WC and sales during the past years should be analyzed in detail. Minor deviations can be allowed but major deviations are danger signals of financial indiscipline. Requirements of WC should be worked out on the basis of projected sales figures. All efforts should than be made to achieve the sales targets, so the situation of over-trading or under-trading is avoided. Deviations should be analyzed in terms of percentage as well as in terms of rupees. There should be down to earth disciplined approach towards management of WC and its components. IFFCO Ltd. should first properly assess its sales and then project the working capital requirements. There should not be disproportionate changes in WC and sales. WC management should be such that WC responds to and quickly adjusts itself to the changes in sales.



### REFERENCES

- [1] Annual Reports of IFFCO Ltd. from 2006-07 to 2015-16
- [2] Gupta M. P. & R. B. Khanna, *Quantitative Techniques for Decision Making*, 2<sup>nd</sup> Edition, PHI Learning Pvt. Ltd., New Delhi, 2007
- [3] Hrishikesh Bhattacharya, *Working Capital Management*, 2<sup>nd</sup> Edition, PHI Learning Pvt. Ltd., New Delhi, 2009
- [4] James C. Van Horne, John M. Wachowicz Jr & Saumitra N. Bhaduri, *Fundamentals of Financial Management*, 12<sup>th</sup> edition, Dorling Kindersley (India) Pvt. Ltd.
- [5] Khan M. Y. & Jain P. K., *Financial Management – Text, Problems & Cases*, 5<sup>th</sup> Edition, Tata Mcgraw Hill Publishing Company Ltd., New Delhi, 2007
- [6] Krish Rangarajan & Anil Misra, *Working Capital Management*, Excel Books, New Delhi, 2005
- [7] Kothari C. R., *Research Methodology – Methods & Techniques*, 2<sup>nd</sup> Edition, New Age International (P) Limited, New Delhi, 2007
- [8] Kulkarni P. V. & B. G. Satyaprasad, *Financial Management*, 13<sup>th</sup> edition, Himalaya Publishing House, Mumbai, 2009
- [9] Lyn M. Fraser & Aileen Ormiston, *Understanding Financial Statements*, 9<sup>th</sup> Edition, PHI Learning Pvt. Ltd., New Delhi, 2010
- [10] Pandey I. M., *Financial Management*, 9<sup>th</sup> Edition, Vikas Publishing House Pvt. Ltd., New Delhi, 2007
- [11] Ravi M. Kishore, *Financial Management*, 6<sup>th</sup> Edition, Taxmann Allied Services Pvt. Ltd., New Delhi, 2008
- [12] Srivastava T. N. & Shailaja Rego, *Statistics for Management*, 2<sup>nd</sup> edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2012
- [13] David R. Anderson, Dennis J. Sweeney & Thomas A. Williams, *Quantitative Methods for Business*, 10<sup>th</sup> edition, Cengage Learning India Pvt. Ltd., New Delhi, 2008
- [14] Vohra N. D., *Quantitative Techniques in Management*, 3<sup>rd</sup> Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2007