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Focus: Manufacturing

Material Flow Cost Accounting (MFCA) in Manufacturing SME

Economic Reforms and Employment Pattern in India

Manufacturing Productivity Growth in India

Regional Concentration of Manufacturing Industries

Intra-State Concentration of Unorganized Manufacturing Enterprises

Six Sigma Marketing and Productivity

Managing Agility via Fuzzy Logic

Industrial Expenditure and Industrial Growth Rate

Working Capital Performance on Profitability of Dairy Industry

Knowledge Attitude and Practices Study on Energy Conservation

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Impact of Working Capital Performance on Profitability of Dairy Industry in Andhra Pradesh

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Dairy industry is an important component of Indian economy; it is supplementary to the agricultural sector providing additional income to the farmers. Working capital is the lifeblood of any firm. Keeping in view of this fact, working capital analysis is made for seven units across the undivided Andhra Pradesh state for seven years from 2005-06 to 2011-12. Working capital is estimated for all the sample units using regression technique. The average working capital turnover ratio is more than '8' times in the case of Sangam, Heritage, Krishna, Tirumala, Nandi and Mulukanoor dairy units and confirms their excellent performance. In the case of Vijaya Dairy, the average working capital turnover ratio is less than '5', which indicates poor performance. To study the intensity of the linear relationship between the working capital ratios and profitability, coefficient of correlation has been computed.

1. Introduction

In this paper, an attempt has been made to analyze the working capital performance in the select dairy units with the help of various ratios. It covers aspects such as dairy-wise analysis of net working capital and their comparison and also the impact of working capital performance on profitability.

2. Working Capital Ratios

The working capital performance is analyzed with the help of various ratios such as current ratio, quick ratio, inventory to current assets ratio, inventory turnover ratio and working capital turnover ratio. These ratios have been calculated for each of the dairy units.

2.1. Current Ratio

Current ratio indicates the firm's ability to pay its current liabilities. Donald Miller describes the current ratio as one which is generally recognized as the patriarch among ratios. He states that at one time it commanded such widespread respect that many businessmen regarded it as being endowed with the infallibility of the nature's law. It was a law of gravity applied to the balance sheet. By using the current ratio, a credit manager or lending officer can lay aside his 'Flipping coins', and arrive at decisions based on some figures of logic and accuracy (Rathnam, *Financial Management*, p. 553). This ratio can be calculated as follows.

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

2.2. Liquid Ratio

It is the ratio between quick or liquid assets and quick liabilities. It is also called 'Acid Test Ratio', 'Quick Ratio'

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or 'Near money ratio'. The normal for such ratio is taken to be 1.1. As a tool for the assessment of liquidity position of firms, it is considered to be much better and reliable than the current ratio as it eliminates the snags, since it indicates the relationship between strictly liquid assets, whose realisable value is almost certain on the one hand, and strictly liquid liabilities on the other. Liquid assets comprise all the current assets minus stock, and liquid liabilities comprise all the current liabilities minus bank overdraft. Stock is excluded from current assets on the ground that it is not converted into cash in the immediate future and at the same time, the bank overdraft is excluded on the ground that it is not required to be paid off in the immediate future (Paul, 2012, p. 325). The formula to calculate liquid ratio is given below.

$$\text{Liquid Ratio} = \frac{\text{Liquid assets}}{\text{Liquid / Current liabilities}} \quad (\text{or}) \quad \frac{\text{Current assets} - \text{Stock}}{\text{Current liabilities} - \text{Bank overdraft}}$$

2.3. Inventory to Current Assets Ratio

This ratio just attempts to study the composition of current assets. It expresses the relationship between inventory and current assets. It highlights as to how much amount per rupee of the current asset is represented by stock. The higher the value of this ratio, the poorer shall be the efficiency of current assets. Too much stock in total current assets is not a good sign (Gupta, 2002, p. 85). The formula may be as under:

$$\text{Inventory to current assets ratio} = \frac{\text{Inventories}}{\text{Current assets}}$$

2.4. Inventory Turnover Ratio

This ratio indicates the number of times inventory is replaced during the year. It measures the relationship between the cost of goods sold and the inventory level. This ratio can be computed by dividing the cost of goods sold by the average inventory at cost (Khan and Jain, 1994, p. 111).

$$\text{Inventory turnover ratio} = \frac{\text{cost of goods sold}}{\text{Average inventory}}$$

2.5. Working Capital Turnover Ratio

This ratio indicates the velocity of utilization of net working capital. This ratio indicates the number of times the working

capital is turned over in the course of an year. This ratio measures the efficiency with which the working capital is being used by a firm. A higher ratio indicates efficient utilization of working capital and a lower ratio indicates otherwise (Sharma and Gupta, 1997, p. 431). This ratio can be calculated as:

$$\text{Working capital turn over ratio} = \frac{\text{Net Sales}}{\text{Net working capital}}$$

3. Analysis of Net Working Capital in Select Dairy Units

3.1. Sangam Dairy

The working capital of Sangam Dairy has been analyzed by using five select ratios and the results are shown in Table 1.

It is evident from the Table 1 that the current assets of Sangam Dairy which stood at Rs 3039.24 lakh in 2005-06 increased to Rs 5300.15 lakh in 2011-12. There was a decreasing trend in current assets during 2007-08 and 2008-09 due to fluctuations in the current assets.

The current liabilities of Sangam Dairy which stood at Rs 751.49 lakh in 2005-06 increased to Rs 2115.81 lakh in 2011-12. The highest current liabilities are noticed in the year 2009-10 to the extent of Rs 2293.05 lakh.

The net working capital of Sangam Dairy shows a mixed trend during the study period. It was highest in the year 2011-12, i.e., Rs 3184.34 lakh and the least in the year 2009-10, i.e., Rs 1213.6 lakh.

The current ratio of Sangam Dairy varied between 4.04 and 1.53 during the study period, with an average of 2.83. The overall solvency position of the firm in terms of current ratio was above the standard norm of 2:1.

The quick ratio of Sangam Dairy varied between 1.09 and 0.40, with an average of 0.81. It is below the standard norm of 1:1 except in 2005-06. It shows that the liquidity position of the dairy in terms of quick ratio is not up to the mark.

The ratio of inventory to current assets shows a fluctuating trend during the period under study. It varied from 0.54 to 0.77, with an average of 0.70. It shows that more than 70 per cent of the current assets is in the form of inventory, except in the year 2008-09 when 54 per cent of the current assets was in the form of inventory.

Table 1: Analysis of Working Capital of Sangam Dairy

S. No.	Ratio	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total	(Rs in lakhs)	
										Average	
1.	Current Assets	3039.24	3141.45	2924.15	2930.55	2506.65	3745.57	5300.15	28008.28		3501.04
2.	Current Liabilities	751.49	828.24	1005.35	1666.03	2293.05	1942.96	2115.81	11429.27		1428.66
3.	Net Working Capital	2287.75	2313.21	1918.8	1264.53	1213.6	1802.61	3184.34	16579.02		2072.38
4.	Current Ratio	4.04	3.79	2.91	1.76	1.53	1.93	2.51	22.61		2.83
5.	Quick Ratio	1.09	0.86	0.81	0.81	0.40	0.55	0.65	6.48		0.81
6.	Inventory to Current Assets Ratio	0.73	0.77	0.72	0.54	0.74	0.71	0.74	5.63		0.70
7.	Inventory Turnover Ratio	5.27	5.91	7.01	10.43	10.37	9.63	9.42	58.04		8.29
8.	Working Capital Turnover Ratio	5.90	5.92	8.12	15.00	17.52	13.93	9.66	76.05		10.86

Source: Compiled from the annual reports of Sangam Dairy.

The inventory turnover ratio of Sangam Dairy showed an increasing trend during the first four years under study and a decreasing trend during the last three years under study. It ranged between 5.27 and 10.43 with an average of 8.29.

The working capital ratio of Sangam Dairy showed an increasing trend during the first five years under study and a decreasing trend during the last two years under study. It ranged between 5.90 and 17.52, with an average of 10.86.

It is evident from the analysis of current ratio that the liquidity position of Sangam Dairy is satisfactory and

from the point of view of Quick Ratio, the liquidity position of the dairy is not so satisfactory. Inventory to current assets ratio showed that more than 70 per cent of the current assets were in the form of inventory. The dairy has utilized the inventory and working capital in its business operations moderately.

3.1.1. Trend values for the net working capital of Sangam Dairy

The trend values for the net working capital of Sangam Dairy are calculated by the method of least squares and presented in Table 2 and graphically shown in Figure 1.

Table 2: Computation of Net Working Capital of Sangam Dairy by the Method of Least Squares

Obs	X	Y	X	XY	X ²	Trend
1	1	2287.75	-3	-6863.25	9	1894.62
2	2	2313.21	-2	-4626.42	4	1929.02
3	3	1918.8	-1	-1918.8	1	1963.43
4	4	1264.53	0	0	0	1997.84
5	5	1213.6	1	1213.6	1	2032.24
6	6	1802.61	2	3605.22	4	2066.65
7	7	3184.34	3	9553.02	9	2101.05
Total		13,984.84		963.37	28	13984.84

Source: Table 1.

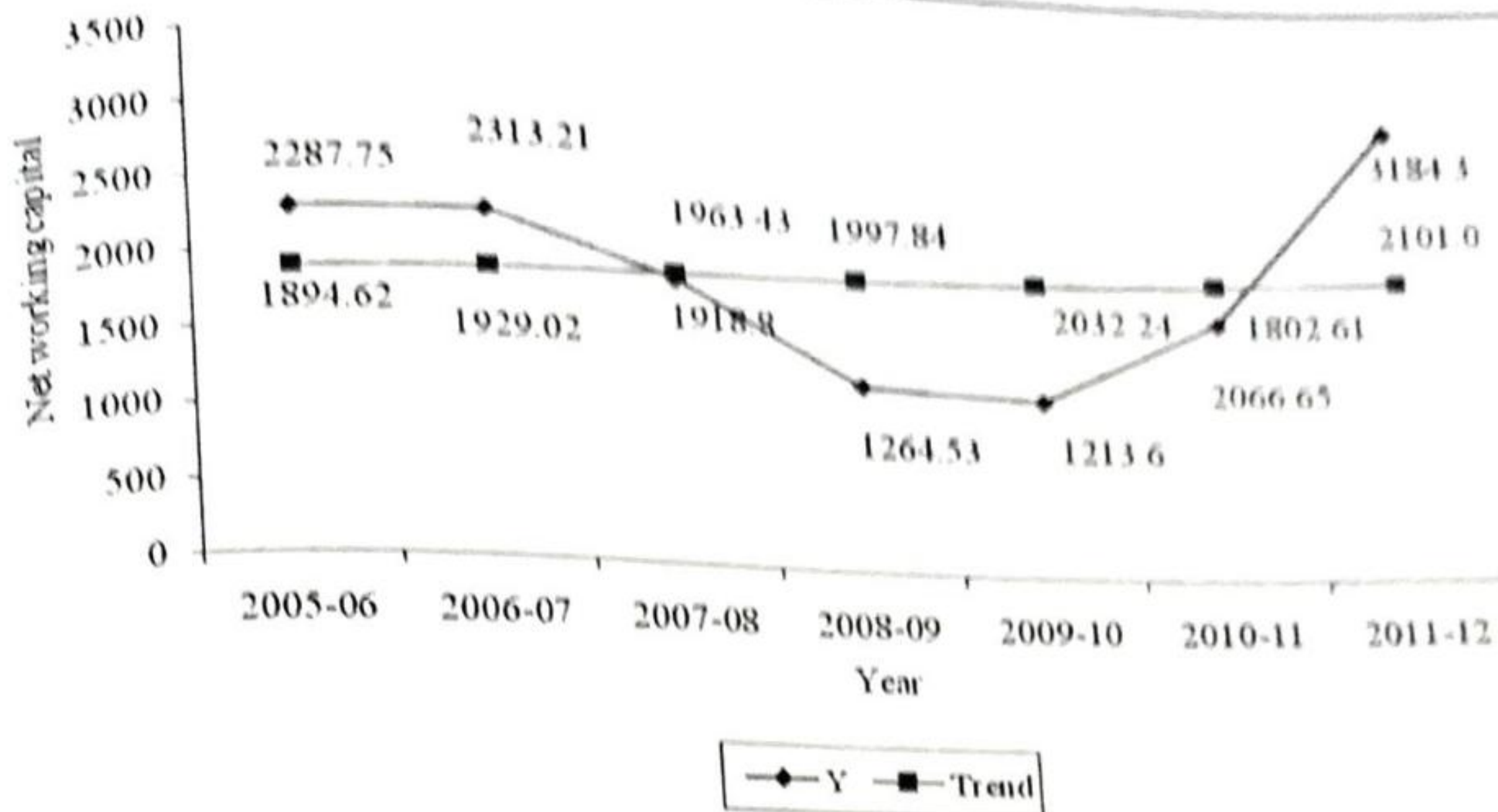


Figure 1. Trend Values for Net Working Capital of Sangam Dairy

The formula used to predict the working capital is given by the linear regression.

$$y_t = a + bx$$

Where y_t = Working capital for the year 't'

X = Time period and a, b are constants.

The method of least squares gives the following equations to get the value of 'a' and 'b'.

$$\Sigma y = na + b\Sigma xy$$

$$\Sigma xy = \Sigma x + b\Sigma x^2$$

when $\Sigma x = 0$

$$a = \frac{\Sigma y}{n} \text{ and } b = \frac{\Sigma xy}{\Sigma x^2}$$

For the Sangam Dairy, the estimates are

$$a = 1997.83$$

$$b = 34.41$$

The model is $y_t = 1997.83 + 34.41(x)$

For the year 2017, we have $x = 8$. Substituting this value weight

$$y_t = 1997.83 + 34.41(8)$$

$$= 2273.11 \text{ Lakh}$$

Result: The Sangam Dairy's predicted net working capital for the year 2017 would be Rs 2273.08 lakh.

3.2. Heritage Foods (India) Limited

The working capital of Heritage Foods (India) Limited has been analyzed by using select ratios. The details are presented in Table 3.

It is evident from Table 3 that the current assets of Heritage Foods (India) Ltd, which stood at Rs 7010 lakh in 2005-06 increased to Rs 16878 lakh in 2011-12. There is a continuous rising trend in the current assets, except in the year 2008-09.

The current liabilities of Heritage Foods (India) Ltd stood at Rs 3505 lakh in 2005-06 and increased to Rs 17559 lakh in 2011-12. There is a continuous rising trend in the current liabilities of Heritage Foods (India) Ltd. In the year 2011-12, the current liabilities were more than the current assets by Rs 681 lakh; this might be due to non-payment of the outstanding bills at the end of the year.

The net working capital of Heritage Foods (India) Ltd for the first three years of study increased, and for the remaining four years there was a decreasing trend and in the year 2011-12 it became negative.

The current ratio of Heritage Foods (India) Ltd ranged between 0.96 and 2.26 with an average of 1.63, which is below the normally accepted level of 2:1.

Table 3: Analysis of Working Capital of Heritage Foods (India) Limited

S. No.	Ratio	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total	Average
1.	Current Assets	7010	10265	13940	12630	14906	14436	16878	90065	12886.43
2.	Current Liabilities	3505	4550	7635	8067	10261	10648	17559	62225	8889.29
3.	Net Working Capital	3505	5715	6305	4563	4645	3788	-681	27840	3977.14
4.	Current Ratio	2.00	2.26	1.83	1.57	1.45	1.36	0.96	11.43	1.63
5.	Quick Ratio	1.26	1.26	1.23	0.95	0.74	0.74	0.57	6.75	0.96
6.	Inventory to Current Assets Ratio	0.37	0.44	0.33	0.39	0.49	0.46	0.41	2.89	0.41
7.	Inventory Turnover Ratio	10.90	9.70	13.47	16.58	13.95	15.07	20.20	99.87	14.27
8.	Working Capital Turnover Ratio	8.33	6.06	9.33	17.37	19.38	28.94	-204.61	-115.2	-16.46

Source: Compiled from the annual reports of Heritage Foods (India) Ltd.

The quick ratio of Heritage Foods (India) Ltd ranged between 0.57 and 1.26 with an average of 0.96 which is below the standard norm of 1:1, except in the years 2005-06, 2006-07 and 2007-08. It shows that the liquidity position is not normal from the point of view of quick ratio.

The ratio of inventory of current assets is almost consistent ranging between 0.33 and 0.49 with an average of 0.41, which implies that almost 41 per cent of the current assets consist of inventories.

The inventory turnover ratio of Heritage Foods (India) Ltd showed a mixed trend and varied between 9.70 and 20.20 with an average of 14.27.

The working capital turnover ratio of Heritage Foods (India) Ltd has a wide variation ranging between 6.06 and

204.61 with an average of -16.46.

It is evident from the analysis of current and quick ratio that the liquidity position of the company is not satisfactory. Inventory to current assets ratio showed that 41 per cent of the current assets comprised inventory. The company has utilized the inventory and working capital in its business operations moderately.

3.2.1. Trend values for the net working capital of Heritage Foods (India) Limited

The trend values for the net working capital of Heritage Foods (India) Ltd are calculated by the method of least squares and presented in Table 4 and graphically shown in Figure 2.

Table 4: Computation of Net Working Capital of Heritage Foods (India) Limited by the Method of Least Squares

Obs	X	Y	X	XY	XY	Trend
1	1	3505	-3	9	-10515	5913.44
2	2	5715	-2	4	-11430	5268.00
3	3	6305	-1	1	-6305	4622.58
4	4	4563	0	0	0	3977.15
5	5	4645	1	1	4645	3331.72
6	6	3788	2	4	7576	2686.15
7	7	-681	3	9	-2043	2040.86
Total		27840		28	-18072	27840

Source: Table 5.

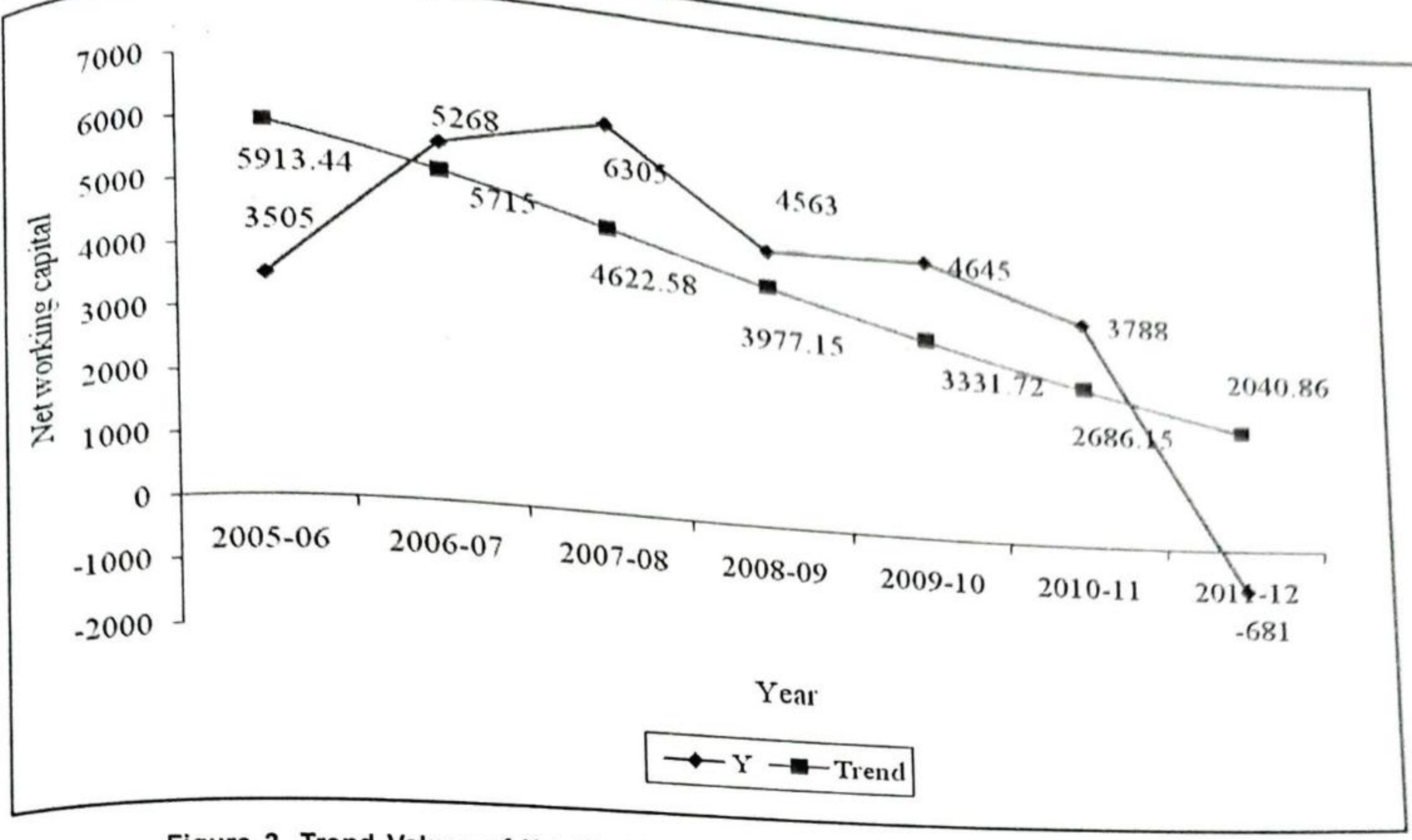


Figure 2. Trend Values of Net Working Capital of Heritage Foods (India) Limited

The formula used to predict the working capital is given by the linear regression.

$$y_t = a + bx$$

Where y_t = working capital for the year 't'

X = Time period and a, b are constants.

The method of least squares gives the following equations to get the value of 'a' and 'b'.

$$\Sigma Y = na + b\Sigma X$$

$$\Sigma XY = a\Sigma X + b\Sigma X^2$$

When $\Sigma x = 0$

$$a = \frac{\Sigma Y}{n} \text{ and } b = \frac{\Sigma XY}{\Sigma X^2}$$

For the company, the estimates are $a = 3977.14$
 $b = -645.43$

The model is $Y_t = 3977.14 - 645.43(X)$

For the year 2017, we have $X = 8$, substituting this value weight

$$Y_t = 3977.14 - 645.43(8)$$

$$= -1186.3 \text{ lakh}$$

Result: The Heritage Foods (India) Limited's predicted net working capital for the year 2017 would be Rs 1186.3 lakh.

3.3. Krishna Milk Union

The working capital of Krishna Milk Union has been analyzed by using select ratios. Results of the analysis are presented in Table 5.

It is evident from Table 5 that the current assets of Krishna Milk Union which stood at Rs 2741.92 lakh in 2005-06 increased to Rs 5031.03 lakh in 2011-12. In the first three years, there was a rising trend in the current assets of Krishna Milk Union. The current assets were very low in the year 2008-09, due to decrease in stock.

The current liabilities of Krishna Milk Union had a mixed trend. The current liabilities of the milk union which stood at Rs 1583.86 lakh in 2005-06 increased to Rs 2827.96 lakh in 2011-12. The highest amount of liabilities amounting to Rs 3029.51 lakh was recorded in the year 2009-10.

The net working capital of Krishna Milk Union had a fluctuating trend during the period of study. Lowest net working capital was recorded in the year 2009-10 with Rs 193 lakh and it was maximum in the year 2011-12 with Rs 2203.07 lakh.

Table 5: Analysis of Working Capital of Krishna Milk Union

S. No.	Ratio	(Rs in lakhs)								
		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total	Average
1.	Current Assets	2741.92	2856.27	3773.97	2668.41	3222.51	3346.18	5031.03	23640.29	3377.18
2.	Current Liabilities	1583.86	1518.90	1696.39	2439.22	3029.51	2523.22	2827.96	15619.06	2231.29
3.	Net Working Capital	1158.06	1337.37	2077.58	229.19	193	822.96	2203.07	8021.23	1145.89
4.	Current Ratio	1.73	1.88	2.22	1.09	1.06	1.33	1.78	11.09	1.58
5.	Quick Ratio	0.82	1.03	1.32	0.54	0.48	0.62	0.95	5.76	0.82
6.	Inventory to Current Assets Ratio	0.53	0.45	0.41	0.51	0.55	0.53	0.46	3.44	0.49
7.	Inventory Turnover Ratio	18.95	28.91	17.44	14.57	15.30	16.18	17.82	129.17	18.45
8.	Working Capital Turnover Ratio	12.32	12.20	8.20	41.10	34.43	35.10	16.53	159.88	22.84

Source: Compiled from the annual reports of Krishna Milk Union.

The current ratio of Krishna Milk Union ranged between 1.06 and 2.22 with an average of 1.58, which was below the standard norm of 2:1. The solvency position of the milk union in terms of current ratio was below the standard norm of 2:1, except in the year 2007-08.

The quick ratio of Krishna Milk Union varied from 0.54 to 1.32 with an average of 0.82, which is below the standard norm of 1:1. It confirms that the liquidity position of the milk union in terms of quick ratio was not normal except in the years 2006-07 and 2007-08.

The ratio of inventory to current assets is almost consistent between 0.41 and 0.53 with an average of 0.49. This implies that on an average, 49 per cent of the current assets comprise inventory.

The inventory turnover ratio showed a mixed trend during the study period ranging from 14.57 to 28.91 with an average of 18.45. The working capital turnover of Krishna Milk Union showed wide fluctuations during the study period, ranging from 8.20 in 2007-08 to 41.10 in 2008-09 with an average of 22.84.

It is evident from the analysis of current and quick ratio that the liquidity position of the union is not satisfactory. The ratio of inventory to current assets showed that 49 per cent of the current assets is of inventory. The Krishna Milk Union has utilized the inventory moderately and it used the working capital in a better way in its business operations.

3.3.1. Trend values for the net working capital of Krishna Milk Union

The trend values for the net working capital of Krishna Milk union are calculated by the method of least squares and are presented in Table 6 and graphically shown in the Figure 3.

The formula used to predict the working capital is given by the linear regression.

$$y_t = a + bx$$

Where y_t = working capital for the year 't'

X = Time period and a, b are constants.

The method of least squares gives the following equations to get the value of 'a' and 'b'.

$$\Sigma Y = na + b\Sigma X$$

$$\Sigma XY = a\Sigma X + b\Sigma X^2$$

When $\Sigma x = 0$

$$a = \frac{\Sigma Y}{n} \text{ and } b = \frac{\Sigma XY}{\Sigma X^2}$$

For the Krishna Milk Union, the estimates are $a = 1145.89$
 $b = -7.915$

The model is $Y_t = 1145.89 + 7.915(X)$

For the year 2017, we have $x=8$, substituting this value weight

$$Y_t = 1145.89 - 7.915(8) \\ = -1209.21 \text{ lakh}$$

Table 6: Computation of Net Working Capital of Krishna Milk Union by the Method of Least Squares

Obs	X	Y	X ²	XY	XY	Trend
1	1	1158.06	-3	9	-3474.18	1122.15
2	2	1137.37	-2	4	-2674.74	1130.06
3	3	2077.58	-1	1	-2077.58	1137.98
4	4	229.19	0	0	0	1145.89
5	5	193	1	1	193.00	1153.81
6	6	822.96	2	4	1645.92	1161.72
7	7	2203.07	3	9	6609.21	1169.62
Total		8021.23		28	221.63	8021.23

Source: Table 5.

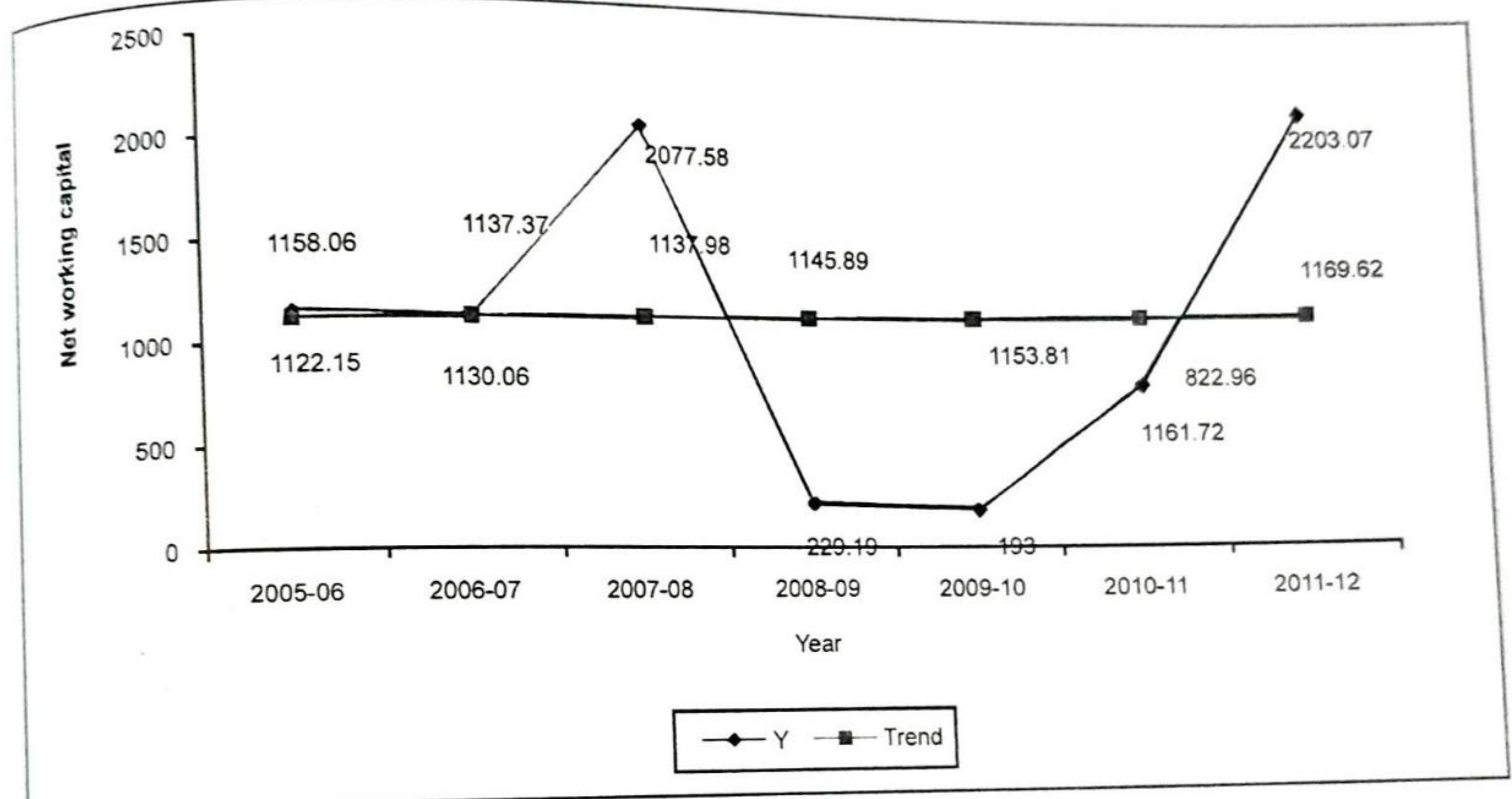


Figure 3. Trend Values for Net Working Capital of Krishna Milk Union

Result: The predicted net working capital of Krishna Milk Union for the year 2017 would be Rs 1209.21 lakh.

3.4. Tirumala Milk Products Private Limited

The working capital of Tirumala Milk Products Private Limited has been analyzed by using select ratios. Results of the analysis are presented in Table 7. It is very clear from Table 7 that the current assets of Tirumala Milk Products Private Limited which stood at Rs 3377.96 lakh in 2005-06, increased to Rs 19,205.39 lakh in 2011-12. There had been an increasing trend in the current assets

of the company. There was a sudden jump in the current assets from Rs 5,973.16 lakh in 2008-09 to Rs 12,224.89 lakh in 2009-10.

The current liabilities of the company which stood at Rs 686.49 lakh in 2005-06, increased to Rs 13,975.54 lakh in 2011-12. The current liabilities of the company showed an increasing trend during the study period. There was a sudden increase in the current liabilities from Rs 3,903.30 lakh in 2010-11 to Rs 13,975.54 lakh in 2011-12.

Table 7: Analysis of Working Capital of Tirumala Milk Products Private Limited

S. No.	Ratio								(Rs in lakhs)	
		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total	Average
1.	Current Assets	3377.96	4819.52	4992.32	5973.16	12224.89	15078.82	19205.39	65672.06	9381.72
2.	Current Liabilities	686.49	1737.35	2054.62	2194.43	2942.04	3903.30	13975.54	27493.77	3927.88
3.	Net Working Capital	2691.47	3082.17	2937.70	3778.73	9282.82	11175.52	5229.85	27718.59	3958.85
4.	Current Ratio	4.92	2.77	2.43	2.72	4.16	3.86	1.37	22.23	3.18
5.	Quick Ratio	3.45	1.28	1.11	1.31	2.01	2.02	0.65	11.83	1.89
6.	Inventory to Current Assets Ratio	0.30	0.54	0.54	0.52	0.52	0.48	0.53	3.43	0.49
7.	Inventory Turnover Ratio	20.51	15.51	13.62	15.42	12.28	11.78	12.90	102.02	14.57
8.	Working Capital Turnover Ratio	13.81	9.26	12.72	12.46	6.31	7.47	22.47	84.50	12.07

Source: Compiled from the annual reports of Tirumala Milk Products Private Limited.

The net working capital of Tirumala Milk Products Private Limited showed a mixed trend during the study period. Net working capital stood at Rs 2691.47 lakh in 2005-06 and increased to a maximum of Rs 11,175.52 lakh in 2010-11.

The current ratio of Tirumala Milk Products Private Limited varied between 1.37 and 4.92 during the study period with an average of 3.18. The solvency position of the company in terms of current ratio is much satisfactory, which is above the standard norm of 2:1, except in the year 2011-12.

The quick ratio of Tirumala Milk Products Private Limited varied from 0.65 to 3.45 with an average of 1.69, during the study period. The liquidity position of the company is much satisfactory from the point of view of quick ratio as it is above the standard norm of 1:1, except in the year 2011-12.

The ratio of inventory to current assets was ranging between 0.30 and 0.54 with an average of 0.49, which implies that 49 per cent of the current assets were in the form of inventory.

The inventory turnover ratio of Tirumala Milk Products Private Limited showed a mixed trend ranging from 11.78 to 20.51, with an average of 14.57. The working capital turnover ratio of the company had a fluctuating trend varying from 6.31 to 22.47, with an average of 12.07. There were wide fluctuations in the net working capital of the company.

It is evident from the analysis of current and quick ratio that the liquidity position of the company is satisfactory. The ratio of inventory to current assets made it clear that 49 per cent of the current assets is of inventory. The Tirumala Milk Products Private Limited has used its inventory and working capital in its business operations moderately.

3.4.1. Trend values for the net working capital of Tirumala Milk Products Private Limited

The trend values for the net working capital of Tirumala Milk Products Private Limited is calculated by the method of least squares and presented in Table 8 and graphically shown in Figure 4.

The formula used to predict the working capital is given by the linear regression.

$$y_t = a + bx$$

Where y_t = working capital for the year 't'

X = Time period and a, b are constants.

The method of least squares gives the following equations to get the value of 'a' and 'b'.

$$\Sigma Y = na + b \Sigma X$$

$$\Sigma XY = a \Sigma X + b \Sigma X^2$$

Table 8: Computation of Net Working Capital of Tirumala Milk Products Private Limited by the Method of Least Squares

Obs	X	Y	X ²	XY	XY	Trend
1	1	2691.47	-3	9	-8074.41	2224.01
2	2	3082.17	-2	4	6164.34	3300.68
3	3	2937.70	-1	1	-2937.70	4377.36
4	4	3778.73	0	0	0	5454.04
5	5	9282.85	1	1	9282.85	6530.72
6	6	11175.52	2	4	22351.04	7607.40
7	7	5229.85	3	9	15689.55	8684.08
Total		38178.29		28	30146.99	38178.29

Source: Table 7.

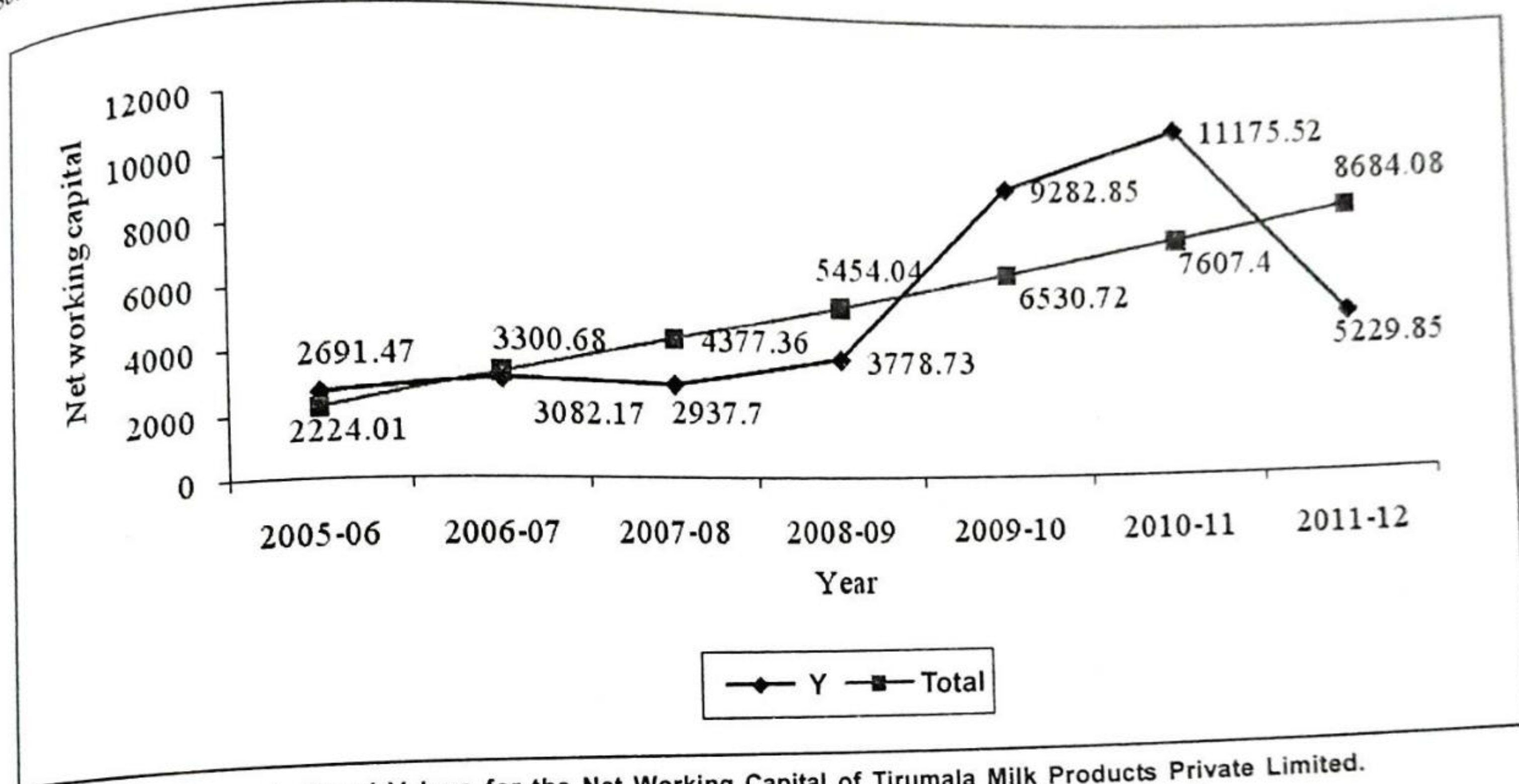


Figure 4. Trend Values for the Net Working Capital of Tirumala Milk Products Private Limited.

When $\sum X = 0$

$$a = \frac{\sum Y}{n} \text{ and } b = \frac{\sum XY}{\sum X^2}$$

For the Tirumala Milk Products Private Limited, the estimates are $a = 5454.04$

$$b = 1076.678$$

The model is $y_t = 5454.04 + 1076.678(X)$

For the year 2017, we have $X = 8$, substituting this value weight

$$Y_t = 5454.04 + 1076.678(8) = 14067.47 \text{ lakh}$$

Result: The predicted net working capital of Tirumala Milk Products Private Limited, for the year 2017 would be Rs 14067.47 lakh.

3.5. Vijaya Dairy

The working capital of Vijaya Dairy has been analyzed by using select ratios. Results of the analysis are presented in Table 9.

Table 9: Analysis of Working Capital of Vijaya Dairy

S. No.	Ratio	(Rs in lakhs)								
		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total	Average
1.	Current Assets	6977.80	7726.96	13494.35	15715.80	12240.73	15615.87	18015.27	89786.78	12826.68
2.	Current Liabilities	4043.70	3345.34	4062.43	4669.41	5658.29	6484.96	5327.61	33591.74	4798.82
3.	Net Working Capital	2943.1	4381.62	9431.92	11046.39	6582.44	9130.91	12687.66	56195.04	8027.86
4.	Current Ratio	1.73	2.31	3.32	3.37	2.16	2.41	3.38	18.68	2.67
5.	Quick Ratio	1.43	2.01	2.93	2.91	1.74	1.94	2.52	15.48	2.21
6.	Inventory to Current Assets Ratio	0.17	0.13	0.12	0.13	0.20	0.19	0.25	1.19	0.17
7.	Inventory Turnover Ratio	14.57	23.02	27.74	31.77	20.48	17.05	17.61	152.24	21.75
8.	Working Capital Turnover Ratio	7.08	5.30	3.01	3.41	5.49	4.45	3.89	32.63	4.66

Source: Compiled from the annual reports of Vijaya Dairy.

It is evident from Table 9 that the current assets of Vijaya Dairy stood at Rs 6977.80 lakh in 2005-06, and it increased to Rs 18015.27 lakh in 2011-12. There was an increasing trend in the current assets of Vijaya Dairy except in the year 2009-10.

The current liabilities of Vijaya Dairy which stood at Rs 4043.70 lakh in 2005-06, increased to Rs 5327.61 lakh in 2011-12. There was a fluctuating trend in the current liabilities of the dairy.

The net working capital of Vijaya Dairy showed an increasing trend except in the year 2009-10. The net working capital of the dairy, which stood at Rs 2934.1 lakh in 2005-06 increased to Rs 12687.66 lakh in 2011-12.

The current ratio of Vijaya Dairy varied between 1.73 and 3.38 with an average of 2.67, which is above the standard norm of 2.1. The solvency position of Vijaya Dairy, in terms of current ratio, was very much satisfactory except in the year 2005-06, which was 1.73 in that year.

The quick ratio of Vijaya Dairy ranged from 1.43 to 2.93 with an average of 2.21 which is far above the required standard norm of 1:1. The liquidity position of the dairy is good in terms of quick ratio.

Inventory to current assets ratio of Vijaya Dairy ranged between 0.12 and 0.25 with an average of 0.17 which implies that the inventory component in the current assets was only to the extent of 17 per cent.

The inventory turnover ratio of Vijaya Dairy ranged between 14.57 and 31.77 with an average of 21.75. It showed a mixed trend during the study period.

The working capital turnover ratio of Vijaya Dairy had a fluctuating trend during the study period ranging between 3.01 and 7.08 with an average of 4.66.

It is evident from the analysis of current ratio and quick ratio that the liquidity position of the dairy is good. The ratio of inventory to current assets made it clear that only 17 per cent of the current assets are composed of inventory. The Vijaya Dairy has used the inventory in a better way and the working capital moderately in its business operations.

3.5.1. Trend values for the net working capital of Vijaya Dairy

The trend values for the net working capital of Vijaya Dairy are calculated by the method of least squares and presented in Table 10 and graphically shown in Figure 5.

The formula used to (predict) estimate the net working capital is given by linear regression.

$$Y_t = a + bx$$

Where Y_t = working capital for the year 't'

X = Time period and a, b are constants.

Table 10: Computation of Net Working Capital of Vijaya Dairy by the Method of Least Squares

Obs	X	Y	X ²	XY	XY	Trend
1	1	2934.10	-3	9	-8802.3	4180.39
2	2	4381.62	-2	4	-8763.24	5462.88
3	3	9434.92	-1	1	-9431.92	6745.37
4	4	11046.39	0	0	0	8027.86
5	5	6582.44	1	1	6582.44	9310.35
6	6	9130.91	2	4	18261.82	10592.85
7	7	12687.66	3	9	38062.98	11875.34
Total		56195.04		28	35909.78	56195.04

Source: Table 9.

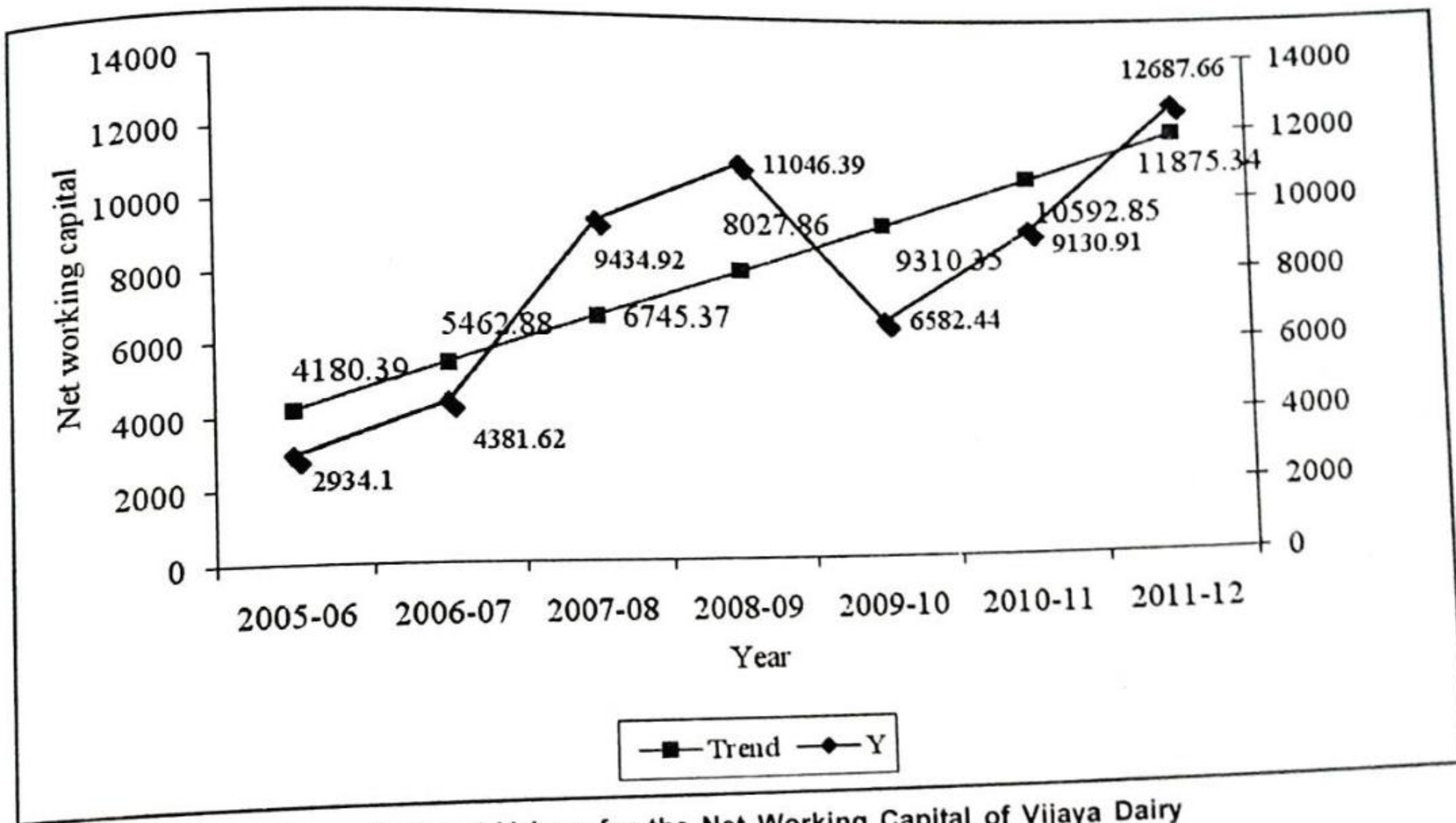


Figure 5. Trend Values for the Net Working Capital of Vijaya Dairy

The method of least squares gives the following equations to get the value of 'a' and 'b'.

$$\sum Y = na + b\sum X$$

$$\sum XY = a\sum X + b\sum X^2$$

When $\sum X = 0$

$$a = \frac{\sum Y}{n} \text{ and } b = \frac{\sum XY}{\sum X^2}$$

For Vijaya Dairy, the estimates are $a = 8027.86$
 $b = 1282.49$

The model is $y_t = 8027.86 + 1282.49(X)$

For the year 2017, we have $X = 8$, substituting this value weight

$$Y_t = 8027.86 + 1282.49(8) = \text{Rs } 18287.80 \text{ lakh}$$

Result: The estimated net working capital of Vijaya Dairy for the year 2017 would be Rs 18287.80 lakh.

3.6. Nandi Milk Products Private Limited

The working capital of Nandi Milk Products Private Limited has been analyzed by using select ratios. Results of the

Table 11: Analysis of Working Capital of Nandi Milk Products Private Limited

										(Rs in lakhs)
S. No.	Ratio	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total	Average
1.	Current Assets	134.08	99.52	115.41	106.55	123.77	195.88	358.81	977.98	139.71
2.	Current Liabilities	80.84	49.85	43.53	68.69	186.87	193.42	280.79	903.99	129.14
3.	Net Working Capital	53.24	49.67	71.88	37.86	-63.1	2.46	78.02	73.99	10.57
4.	Current Ratio	1.66	2.00	2.65	1.55	0.66	1.01	1.27	10.25	1.46
5.	Quick Ratio	1.54	1.78	2.20	1.10	0.40	0.72	0.44	8.18	1.17
6.	Inventory to Current Assets Ratio	0.07	0.11	0.17	0.29	0.40	0.29	0.39	1.72	0.25
7.	Inventory Turnover Ratio	122.22	62.48	42.07	40.53	62.02	66.68	40.49	436.49	62.36
8.	Working Capital Turnover Ratio	15.76	12.75	9.25	27.42	20.02	71.85	42.88	114.17	16.31

Source: Compiled from the annual reports of Nandi Dairy.

analysis are presented in Table 11. Table 11 shows that the current assets of Nandi Milk Products Private Limited stood at Rs 134.08 lakh in 2005-06 and increased to Rs 358.81 lakh in 2011-12. The current assets of the Nandi Dairy reflect a fluctuating trend.

The current liabilities of Nandi Milk Products Private Limited stood at Rs 80.84 lakh in 2005-06 and it increased to Rs 280.79 lakh in 2011-12. There was a fluctuating trend in the current liabilities of the company. In the year 2009-10, the current liabilities were more than the current assets of the dairy.

The net working capital of Nandi Milk Products Private Limited had a wide range of fluctuations throughout the study period. Particularly in the years 2009-10, the net working capital of the dairy was negative. The net working capital in the year 2005-06 was Rs 53.24 lakh, whereas the net working capital in the year 2011-12 was Rs 78.02 lakh.

The current ratio of Nandi Milk Products Private Limited ranged between 0.66 and 2.65 with an average of 1.46 which was below the standard norm of 2:1. The solvency position of the Nandi dairy, in terms of current ratio, was not satisfactory and it was alarming, especially in the years 2009-10 when it was not even 1:1.

The quick ratio of Nandi Milk Products Private Limited varied between 0.40 and 2.20 with an average of 1.17, which was above the standard norm of 1:1. The overall

solvency in terms of quick ratio was satisfactory, but it was very low in the years 2009-10 to 2011-12.

The ratio of inventory to current assets of Nandi Milk Products Private Limited varied from 0.07 to 0.40 with an average of 0.25. It implies that only 25 per cent of the current assets were in the form of inventory. There was a wide fluctuation in the inventory to current assets ratio of Nandi Dairy.

The inventory turnover ratio of Nandi Milk Products Private Limited ranged from 40.49 to 122.22 with an average of 62.36.

The working capital turnover of the dairy varied from 9.25 to 71.85, with an average of 28.56. It shows that there was a wide fluctuation in the working capital turnover ratio.

It is evident from the analysis of current ratio and quick ratio that the liquidity position is not satisfactory. The ratio of inventory to current assets made it clear that 25 per cent of the current assets comprised inventory. Nandi Dairy has used the inventory and working capital in a better way in its business operations.

3.6.1. Trend values for the net working capital of Nandi Milk Products Private Limited

The trend values for the net working capital of Nandi Dairy is calculated by the method of least squares and are presented in Table 12 and graphically shown in Figure 6.

Table 12: Computation of Net Working Capital of Nandi Milk Products Private Limited by the Method of Least Squares

Obs	X	Y	X ²	XY	XY	Trend
1	1	53.24	-3	9	159.72	49.37
2	2	49.67	-2	4	-99.34	43.87
3	3	71.88	-1	1	71.88	38.36
4	4	37.86	0	0	0	32.86
5	5	-63.10	1	1	-63.10	27.36
6	6	2.46	2	4	5.92	21.86
7	7	78.02	3	9	234.06	16.35
Total		230.03		28		230.03

Source: Table 11.

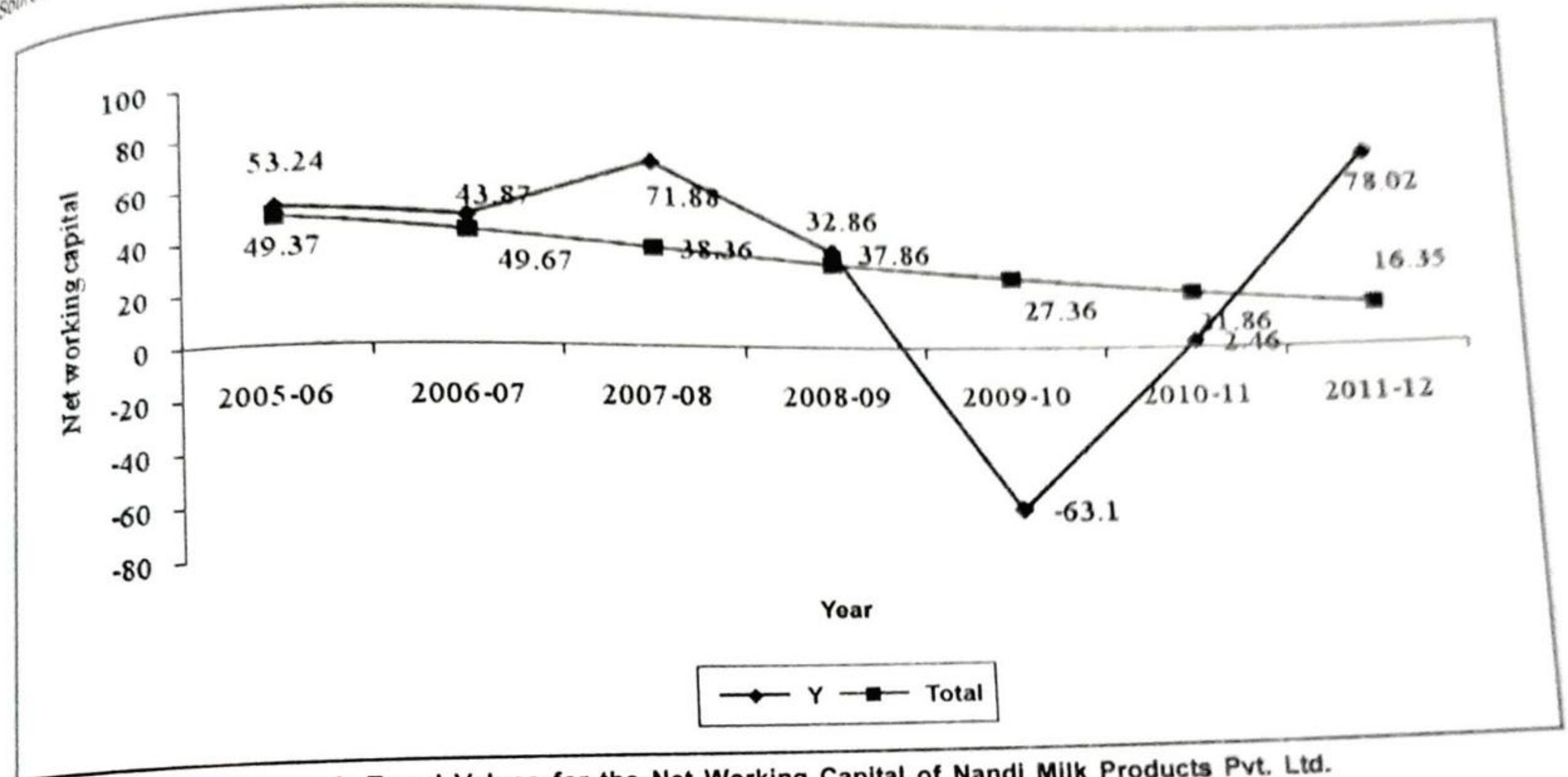


Figure 6. Trend Values for the Net Working Capital of Nandi Milk Products Pvt. Ltd.

The formula used to (predict) estimate the net working capital is given by linear regression.

$$Y_t = a + bx$$

Where Y_t = working capital for the year 't'
 X = Time period and a, b are constants.

The method of least squares gives the following equations to get the value of 'a' and 'b'.

$$\begin{aligned} \Sigma Y &= na + b\Sigma X \\ \Sigma XY &= a\Sigma X + b\Sigma X^2 \end{aligned}$$

When $\Sigma X = 0$

$$a = \frac{\Sigma Y}{n} \text{ and } b = \frac{\Sigma XY}{\Sigma X^2}$$

For Nandi Milk Products Private Limited, the estimates are

$$\begin{aligned} a &= 32.86 \\ b &= -5.50 \end{aligned}$$

The model is $y_t = 32.86 - 5.50(X)$

For the year 2017, we have $X = 8$, substituting this value weight

$$Y_1 = 32.86 - 5.50(8) = -11.16 \text{ lakh}$$

Result: The net working capital of Nandi Milk Products Private Limited for the year 2017 may be Rs -11.16 lakh.

3.7. Mulukanoor Women's Cooperative Dairy

The working capital of Mulukanoor Women's Cooperative Dairy has been analyzed by using select ratios. Results of the analysis are presented in Table 13.

In the Mulukanoor Women's Cooperative Dairy, the current assets had an increasing trend except in the years 2007-08 and 2008-09. In the year 2005-06, the current assets were Rs 249.57 lakh which rose to Rs 613.18 lakh in the year 2011-12. The dairy maintained an average of Rs 376.43 lakh current assets during the study period.

The current liabilities of the Mulukanoor Women's Cooperative Dairy had a mixed trend during the study period. In 2005-06, the current liabilities of the dairy stood at Rs 179.52 lakh and gradually increased to Rs 247.32 lakh in 2011-12.

Table 13: Analysis of Working Capital of Mulukanoor Women's Cooperative Dairy

										(Rs in lakhs)	
S. No.	Ratio	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total	Average	
1.	Current Assets	249.57	301.40	295.56	300.30	409.66	465.31	613.18	2634.98	376.43	
2.	Current Liabilities	179.52	143.70	100.55	167.18	241.08	218.89	247.32	1298.24	185.46	
3.	Net Working Capital	70.05	157.7	195.01	133.12	168.58	246.42	365.86	1336.74	190.96	
4.	Current Ratio	1.39	2.10	2.94	1.80	1.70	2.13	2.48	14.54	2.08	
5.	Quick Ratio	0.68	0.53	1.66	0.94	0.94	1.29	1.22	7.26	1.04	
6.	Inventory to Current Assets Ratio	0.51	0.75	0.44	0.48	0.45	0.39	0.51	3.53	0.50	
7.	Inventory Turnover Ratio	11.34	14.06	16.06	27.23	28.02	30.14	25.92	152.77	21.82	
8.	Working Capital Turnover Ratio	22.89	15.82	14.66	28.06	27.37	22.12	17.48	148.4	21.2	

Source: Compiled from the annual reports of Mulukanoor Women's Cooperative Dairy.

The net working capital of the dairy stood at Rs 70.05 lakh in 2005-06 and rose to Rs 365.86 lakh in 2011-12. The average net working capital during the study period was Rs 190.96 lakh.

The current ratio of Mulukanoor Women's Cooperative Dairy varied between 1.39 and 2.94 with an average of 2.08, which is above the acceptable standard norm of 2:1. The solvency of the dairy with respect to current ratio is satisfactory.

The quick ratio of the Mulukanoor Women's Cooperative Dairy ranged from 0.53 to 1.66 with an average of 1.04, which is just above the acceptable standard norm of 1:1. The liquidity of the dairy with regard to the quick ratio is satisfactory except for the years 2005-06 and 2006-07.

The inventory to current assets ratio of the dairy ranged between 0.39 and 0.75 with an average of 0.50 which implies that 50 per cent of the current assets was inventory component on an average, during the study period.

The inventory turnover ratio kept increasing continuously throughout the study period, except in the year 2011-12. The ratio has been ranging between 11.34 and 30.14 with an average of 21.82.

The working capital turnover ratio is almost consistent, ranging from 14.66 to 28.06, with an average of 21.2.

It is evident from the analysis of current and quick ratios that the liquidity position is satisfactory during the

study period. The ratio of inventory to current assets makes it clear that 50 per cent of the current assets comprises inventory. The Mulukanoor Women's Cooperative dairy used its inventory and working capital in a better manner.

The formula used to estimate the net working capital is given by linear regression.

$$Y_t = a + bx$$

Where Y_t = working capital for the year 't'

X = Time period and a, b are constants.

The method of least squares gives the following equations to get the value of 'a' and 'b'.

$$\sum Y = na + b\sum X$$

$$\sum XY = a\sum X + b\sum X^2$$

3.7.1. Trend values for the net working capital of Mulukanoor Women's Cooperative Dairy

The trend values for the net working capital of Mulukanoor Women's Cooperative Dairy are calculated by the method of least squares and presented in Table 14 and graphically shown in Figure 7.

Table 14: Computation of Net Working Capital of Mulukanoor Women's Cooperative Dairy by the Method of Least Squares

Obs	X	Y	X ²	XY	XY	Trend
1	1	70.05	-3	9	-210.15	79.70
2	2	157.70	-2	4	-315.40	116.79
3	3	195.01	-1	1	-195.01	153.88
4	4	133.12	0	0	0	190.96
5	5	168.58	1	1	168.58	228.05
6	6	246.42	2	4	492.84	265.14
7	7	365.86	3	9	1097.58	302.22
Total		1336.74		28	1038.44	1136.74

Source: Table 13.

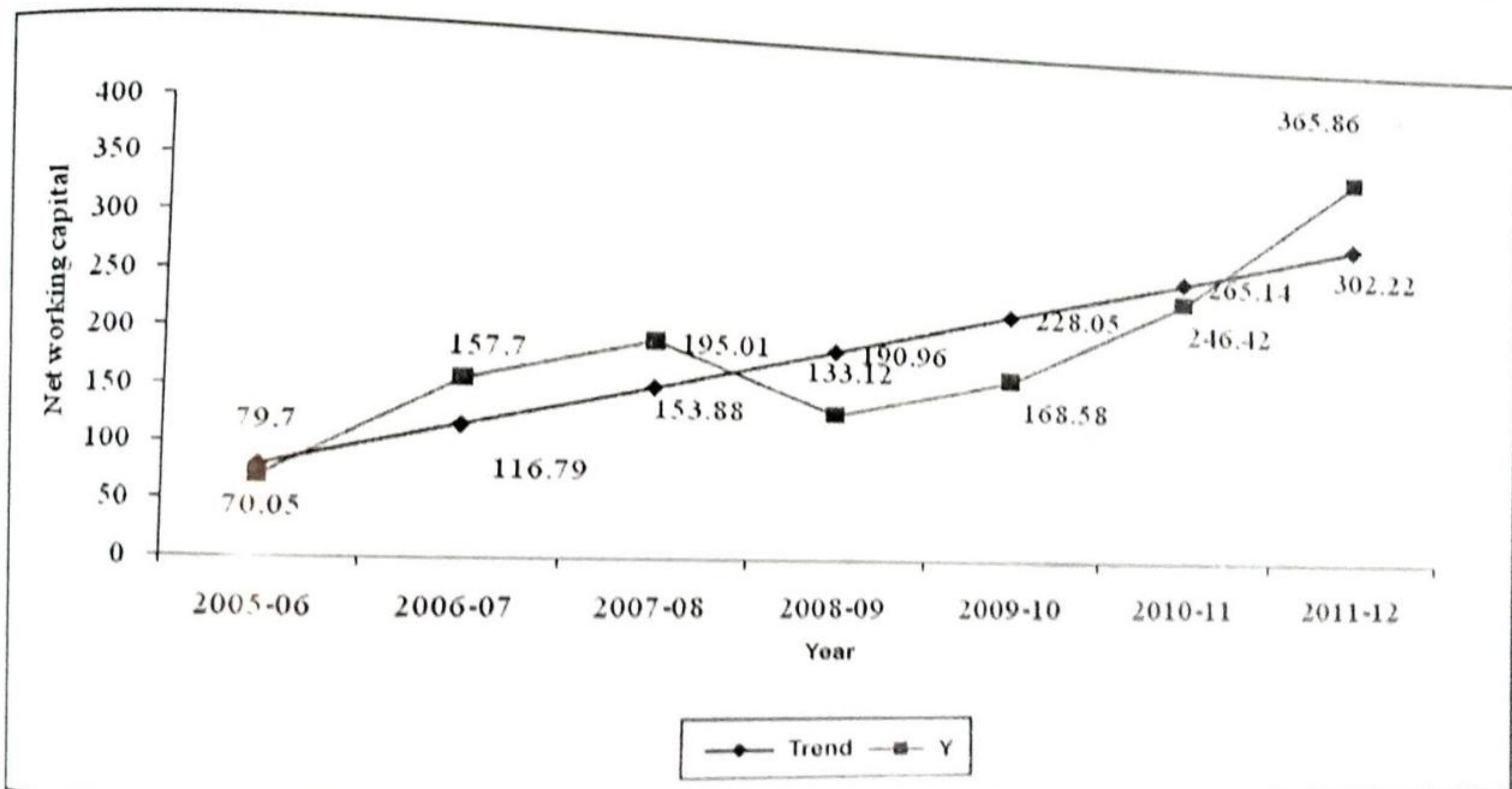


Figure 7. Trend Values for the Net Working Capital of Mulukanoor Women's Cooperative Dairy

When $\sum X = 0$

$$a = \frac{\sum Y}{n} \text{ and } b = \frac{\sum XY}{\sum X^2}$$

For Mulukanoor Women's Cooperative Dairy, the estimates are

$$a = 190.96$$

$$b = 37.09$$

The model is $y_i = 190.96 + 37.09(X)$

For the year 2017, we have $X = 8$, substituting this value weight

$$Y_i = 190.96 + 37.09(8) = \text{Rs } 487.66 \text{ lakh}$$

Result: The net working capital of Mulukanoor Women's Cooperative Dairy for the year 2017 would be Rs 487.66 lakh.

4. Comparison of Net Working Capital of Select Dairy Units

In order to compare the working capital of dairy units, the net working capital of each dairy unit has been presented in Table 15

It is inferred from Table 15 that the average net working capital during the study period is high for Vijaya Dairy followed by Heritage Foods (India) Ltd and Tirumala Milk Products Pvt Ltd in the second and third places with Rs 8027.86, Rs 3977.14 and Rs 3959.80 lakhs respectively. The lowest net working capital during the study period is for Nandi Milk Products Private Limited, followed by Mulukanoor Women's Cooperative Dairy and Krishna Milk Union with Rs 10.57, Rs 190.96 and Rs 1145.89 lakh respectively, and in the middle is Sangam Dairy with a net working capital of Rs 2072.38 lakh.

Table 15: Comparison of Net Working Capital of the Select Dairy Units

S. No.	Dairy Unit								(Rs in lakhs)	
		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Total	Average
1.	Sangam Dairy	2287.75	2313.21	1918.8	1264.53	1213.6	1802.61	3184.34	16579.02	2072.38
2.	Heritage Foods (India) Limited	3505	5715	6305	4563	4645	3788	-681	27840	3977.14
3.	Krishna Milk Union	1158.06	1337.37	2077.58	229.19	193	822.96	2203.07	8021.23	1145.89
4.	Tirumala Milk Products Pvt. Ltd	2691.47	3082.17	2937.70	3778.73	9282.85	11175.52	5229.85	27718.59	3959.80
5.	Vijaya Dairy	2934.1	4381.62	9431.92	11046.39	6582.44	9130.91	12687.66	56195.04	8027.86
6.	Nandi Milk Products Pvt. Ltd	53.24	49.67	71.88	37.86	-63.1	2.46	-78.02	73.99	10.57
7.	Mulukanoor Women's Cooperative Dairy	70.05	157.70	195.01	133.12	168.58	246.42	365.86	1336.74	190.96

Source: Tables 1, 3, 5, 7, 9, 11 and 13.

5. Comparison of the Averages of the Working Capital Ratios

In order to analyze the working capital utilization by the select dairy units, the average current ratio, quick ratio, inventory turnover ratio, inventory to current assets ratio and working capital turnover ratio for each of the dairy units have been presented in Table 16.

The average current ratio of Heritage Foods India Limited, Krishna Milk Union and Nandi Milk Products is

below the standard norm, i.e., 1.63:1, 1.58:1 and 1.46:1 respectively. In the case of Sangam Dairy, Tirumala Milk Products, Vijaya Dairy and Mulukanoor Women's Cooperative Dairy, the average current ratio is above the standard norm, i.e., 2.83:1, 3.18:1, 2.67:1 and 2.08:1 respectively.

Regarding the average quick ratio, for the three dairy units viz., Sangam, Heritage and Krishna it is below the standard norm (1:1), and in the remaining four dairy units

Table 16: Comparison of Working Capital Performance of the Select Dairy Units

Dairy Unit	Current Ratio	Liquid Ratio	Inventory to Current Assets Ratio	Inventory Turnover Ratio	Working Capital Turnover Ratio
Sangam	2.83				
Heritage	1.63	0.81	0.70	8.29	10.86
Krishna	1.58	0.96	0.41	14.27	16.46
Tirumala	3.18	0.82	0.49	18.46	22.84
Vijaya	2.67	1.69	0.49	14.57	12.07
Nandi	1.46	2.21	0.17	21.75	4.66
Mulukanoor	2.08	1.17	0.25	62.36	16.31
		1.04	0.50	21.82	21.20

Source: Tables 1, 3, 5, 7, 9, 11 and 13

Tirumala, Vijaya, Nandi and Mulukanoor Women's Co-operative Dairy it is above the standard norm.

The average of the inventory to current assets ratio is not up to the mark and it is below 0.5 for Heritage, Krishna Union, Tirumala, Vijaya and Nandi, and more than 0.5 in the case of Sangam Dairy and Mulukanoor Women's Co-operative Dairy.

The average of the inventory turnover ratio is more than the standard norm in all the dairy units during the period under study. The highest ratio (62.36) is obtained in Nandi Milk products and the lowest ratio (8.29) noticed in the case of Sangam Dairy.

The average of the working capital turnover ratio is more than eight times in the case of Sangam, Heritage, Krishna, Tirumala, Nandi and Mulukanoor dairy units and confirms their excellent performance. In the case of Vijaya dairy, the average working capital turnover ratio is less than five, which indicates poor performance.

6. Impact of Working Capital Performance on Profitability

This section presents an analysis of the effect of the working capital performance on profitability. The study includes the analysis of current ratio, quick ratio, inventory turnover ratio, inventory to current assets ratio and working capital turnover ratio. Profitability is measured in terms of the ratio of net earnings on sales. To study the intensity of the linear relationship between the working capital ratios and profitability, co-efficient of correlation has been computed. The results are given in Table 17.

Table 17 shows that for Sangam Dairy, the current ratio has a high degree of positive correlation with profitability and the correlation co-efficient is significant at 5 per cent level. Inventory to current assets ratio has a high degree of negative correlation with profitability and its co-efficient is significant at 5 per cent level. All other working capital ratios have shown insignificant correlation with profitability.

In the case of Heritage Dairy, inventory to current assets ratio has a high degree of correlation with profitability and the co-efficient of inventory turnover ratio is found to be significant at 5 per cent level. All other working capital ratios have shown insignificant correlation with profitability.

In the case of Krishna Dairy, inventory turnover ratio has shown negatively high degree of correlation and significant at 1 per cent level with profitability.

For Tirumala Dairy, all ratios have shown positive and insignificant relation with profitability except working capital turnover ratio.

In the case of Vijaya Dairy, all the ratios have shown negative and insignificant relation with profitability, except inventory turnover ratio which has shown high degree of positive correlation with profitability and is significant at 5 per cent level.

In the case of Nandi Dairy, both current ratio and quick ratio have a moderate degree of positive correlation with profitability, whereas inventory turnover ratio correlates negatively and moderately with profitability.

Table 17: Co-efficient of Correlation between Working Capital Ratios and Profitability

Dairy Unit	Current Ratio	Liquid Ratio	Inventory to Current Assets Ratio	Inventory Turnover Ratio	Working Capital Turnover Ratio
Sangam	0.7345 (2.67)*	0.3461 (0.06)	-0.6534 (-2.92)*	0.2278 (0.61)	0.5082 (1.26)
Heritage	0.3607 (1.09)	0.5234 (1.42)	-0.8215 (-1.23)	-0.4211 (-2.65)*	-0.5236 (-0.19)
Krishna	-0.1362 (-1.21)	-0.5326 (-1.72)	0.4972 (0.67)	-0.6742 (-3.42)*	-0.1322 (-0.71)
Tirumala	0.4214 (0.72)	0.6507 (0.12)	0.3267 (0.66)	0.2212 (0.82)	-0.3306 (-0.43)
Vijaya	-0.2206 (-0.77)	-0.6032 (-0.62)	-0.3224 (-1.07)	0.6235 (2.94)*	-0.3207 (-0.45)
Nandi	0.6026 (1.07)	0.6315 (0.78)	0.4435 (0.67)	-0.5074 (-0.72)	0.4075 (0.88)
Mulukanoor	-0.6234 (-0.85)	-0.6823 (-0.33)	-0.4752 (-2.92)	-0.2565 (-0.76)	-0.4865 (-0.67)

Note: Figures in parenthesis are t-values.

* Significant at 5 per cent level.

All the working capital ratios have indicated negative and insignificant relationship with profitability in Mulukanoor Women's Co-operative Dairy.

7. Explaining Variations in Profitability

To study the nature and extent of variations in profitability, all the five ratios viz., current ratio, quick ratio, inventory to current ratio, inventory turnover ratio and working capital turnover ratio have been considered. However, to avoid the problem of multi-collinearity in the estimation of regression coefficients, the variables namely quick ratio, inventory to current assets ratio and inventory turnover ratio have been excluded on the basis of zero-order correlation co-efficient. Linear multiple regression has been computed by using the following formula:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2$$

X_1 = Current Ratio,

X_2 = Working capital turnover ratio

Y = Net profit,

β_0 = Intercept,

β_1 & β_2 = Regression co-efficients

The regression estimates of working capital on profitability are shown in Table 18.

It can be observed from Table 18 that the linear regression model was adequate only for the dairy units 2, 5 and 7. This could be due to many reasons like small volume of data in each unit, low correlation co-efficient between NPR and regression, etc. In the case of those units where regression is found to be significant, it is possible to estimate the NPR with given ratios, current ratio and working capital turnover ratio.

A further analysis has been carried out using stepwise regression in order to know relatively important variables that determine NPR. This is done by stepwise regression (with the help of SPSS) for each unit. No explanatory variable was found suitable for the units 1, 3, 4 and 6. For the remaining units, the following regression models have been obtained.

Unit No. 2

NPR = 4.12 - 0.078(WTO), $R^2 = 0.7164$, $F = 14.64$, $P = 0.05$

For the unit WTO alone accounts for 71.64 per cent of variation in NPR. The ratio CR is excluded from the model by the stepwise regression.

Table 18: Regression Estimates of Working Capital on Profitability

Dairy Unit	β_0	β_1	B_2	R^2	F-value
Sangam	-127.34 (1.03)	0.45 (0.46)	0.36 (1.64)	0.96	23.77
Heritage	-1061.32 (0.15)	32.64 (0.66)	76.22 (0.73)	0.99	342.84*
Krishna	-59.65 (0.42)	8.64 (0.86)	18.07 (1.67)	0.95	10.66
Trumala	-1267.07 (4.07)	1.15 (3.11)	0.45 (2.06)	0.96	32.61
Vijaya	-268.49 (4.14)	2.07 (2.65)	1.65 (0.98)	0.99	218.37*
Nandi	-66.08 (0.96)	15.64 (10.23)	10.07 (11.75)	0.88	14.08
Mulakanoor	-1540.33 (0.98)	12.05 (1.07)	8.26 (1.33)	0.99	156.02*

Note: Figures in parenthesis are t-values.
* Significant at 5 per cent level.

Source: Tables 1, 3, 5, 7, 9, 11 and 13

Unit No. 5

$NPR = 5.05 - 0.143(WTO)$, $R^2 = 0.6867$, $F = 19.07$,
 $P = 0.03$

For the unit WTO alone accounts for 68.67 per cent of variation in NPR. The ratio CR is excluded from the model by the stepwise procedure.

Unit No. 7

$NPR = 3.84 - 0.116(WTO)$, $R^2 = 0.6452$, $F = 16.07$,
 $P = 0.02$

For the unit WTO alone accounts for 64.52 per cent of variation in NPR. The ratio CR is excluded from the model by the stepwise regression.

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You need a stubborn belief in an idea in order to see it realised.

— James Dyson