INVENTORY MANAGEMENT IN PAPER INDUSTRY
– A Comparative Study in SPML and International Paper APPML

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ABSTRACT

The word inventory in accounting language refers to the stocks of the product (finished goods) of a firm offering for sale. In a manufacturing concern, it may include raw materials, work-in-process, finished goods and stores. Raw materials consist of those units or input which are used to manufacture goods that require further processing to give a shape of finished goods. Finished goods are products ready for sale. Inventory should neither be too low to effect the production adversely nor too high to block the funds unnecessarily. About 90 per cent part of working capital is invested in inventories. Therefore, it is necessary for management to give proper attention to inventory management. A proper planning of purchasing, handling, storing and accounting should form a part of inventory management.

In India, there are 759 pulp and paper mills in India as on March, 2014 with an installed capacity of 12.7 MTPA (Million Tons Per Annum), producing around 10.90 MTPA paper, paper board and newsprint. The production is anticipated to grow up to 14.0 MTPA by the year 2016. The average annual turnover of the industry is approximately ' 30,000 crores, which accounts for approximately 0.37% of the national GDP. It contributes ' 3000 crores to exchequer and provides direct employment opportunities to about 0.37 Million people and indirect employment of over 1.2 Million people. The Indian paper share in World's production is just 2.6% only. In this connection, inventory is the major role play in the production process. Hence there is need to study the inventory management in paper industries.

KEY WORDS: inventory, profit, paper, employment, paper mills, working capital

INTRODUCTION

Inventory constitutes an important item in the working capital of any business concern. The dictionary meaning of inventory is 'Stock of Goods or A List of Goods'. The word inventory in accounting language refers to the stocks of the product (finished goods) of a firm offering for sale. In a manufacturing concern, it may include raw materials, work-in-process, finished goods and stores. Raw materials consist of those units or input which are used to manufacture goods that require further processing to give

a shape of finished goods. Finished goods are products ready for sale. The classification of inventories and the levels involved vary from organisation to organisation depending upon the nature of business. For example steel is a finished product for a steel industry, but it is raw material for an automobile manufacturer. Thus, inventory may be defined as "Stock of goods that is held for future use". Since inventories constitute about 50 to 60 per cent of current assets, the management of inventories is crucial for successful working capital management. Working

Capital requirements are influenced by inventory holding. Hence, there is need for effective and efficient management of inventories.

NEED OF THE STUDY

A good inventory management is important for successful operations of any organisations but unfortunately the importance of inventory is not always appreciated by top management. This may be due to a failure to recognise the link between inventories and achievement of organisational goals'. Inventory management refers to an optimum investment in inventories. It should neither be too low to effect the production adversely nor too high to block the funds unnecessarily. About 90 per cent part of working capital is invested in inventories. Therefore, it is necessary for management to give proper attention to inventory management. A proper planning of purchasing, handling, storing and accounting should form a part of inventory management.

In India, there are 759 pulp and paper mills in India as on March, 2014 with an installed capacity of 12.7 MTPA (Million Tons Per Annum), producing around 10.90 MTPA paper, paper board and newsprint. The production is anticipated to grow up to 14.0 MTPA by the year 2016. The average annual turnover of the industry is approximately ' 30,000 crores, which accounts for approximately 0.37% of the national GDP. It contributes ' 3000 crores to exchequer and provides direct employment opportunities to about 0.37 Million people and indirect employment of over 1.2 Million people. The Indian paper share in World's production is just 2.6% only. In this connection, inventory is the major role play in the production process. Hence there is need to study the inventory management in paper industries.

OBJECTIVES OF THE STUDY

The main objective of the study is to analyse the inventory management in paper industry. It includes;

1) To study the components of inventory in select companies
2) To analyse the inventory conversion period in select companies and
3) To evaluate the impact of inventory on profits of select companies.

RESEARCH METHODOLOGY

The study is based on secondary data. The secondary data was collected include the following: earlier studies/reports on selected paper units, annual reports of the selected undertakings, textbooks, journals, periodicals, daily news papers, web sites etc., The data collected on inventory management in paper industry processed, tabulated and analysed in a systematic manner with the help of various statistical techniques such as percentages, averages, ratios and such other relative measures.

Selection of sample: In order to carry out my research, I have selected two established paper manufacturing companies located in two neighbouring states viz., Andhra Pradesh and Telangana State;

1) **Sirpur Paper Mills Limited (SPML):** It is situated at Sirpur town in Adilabad district of Telangana State.
2) **International Paper (APPM-formerly known as The Andhra Pradesh** Paper Mills**) Limited (International Paper APPML):** It is located at Durganagar, Sriramnagar, Rajahmundry, Andhra Pradesh.

COMPONENTS OF INVENTORY OF SPML AND INTERNATIONAL PAPER APPML

The data in table 1 reveals that the major components of inventory are Chemicals, Stores and Spare parts and Raw Material. The proportion of Chemicals, Stores and Spare parts represent 44 per cent to that of total inventory in the year 2003-04 and declined to 41 per cent by the year 2012-13. The average proportion of Chemicals, Stores and Spare parts stood at 39 per cent for the period of the study. The proportion of raw materials to inventory of SPML indicates 39 per cent of the total inventory in the year 2003-04 and declined to 28 per cent in the year 2012-13.

The average raw material proportion is 33 per cent for the study period. The stock of input in terms of raw materials and chemicals and stores in SPML were piled up may be due to scarcity or to meet un-anticipated demand for products in unseasonal periods. The next component of inventory is process stock and its share in total inventory account for 18 per cent in the study period. This indicates that the production cycle is short in the select company. The stock of finished goods on an average represented only 7 per cent in total inventory and thus indicates that SPML products are kept as stock for short period and their disposals are very fast. Stores in transit were recorded at 3% in SPML.

Table – 1: Breakdown of Inventory and Its Proportion to Total Inventory of SPML

(` in Lakhs)

Financial Years	Finished Goods		Process Stocks		Raw Materials		Chemicals, Stores and Spare parts		Stores-in-Transit		Total Inventory	
	`	%	`	%	`	%	`	%	`	%	`	%
2003-04	110.54	5	192.01	8	888.00	39	1015.72	44	81.02	3	2287.29	100
2004-05	102.39	4	385.54	14	1123.43	42	1024.85	38	46.67	2	2682.88	100
2005-06	86.57	3	352.90	14	926.16	36	1130.05	44	52.10	2	2547.78	100
2006-07	62.19	2	332.16	11	1368.22	47	1053.23	36	66.24	2	2882.49	100
2007-08	111.22	5	397.61	17	705.22	30	991.53	42	121.55	5	2327.13	100
2008-09	437.84	14	741.26	24	621.85	20	1033.21	34	230.37	7	3064.53	100
2009-10	279.41	8	766.21	22	795.21	22	1540.26	44	140.16	4	3521.30	100
2010-11	143.19	5	724.00	24	785.54	26	1248.85	41	126.73	4	3030.31	100
2011-12	508.18	11	771.07	17	1803.85	25	1470.07	41	67.78	1	4620.95	100
2012-13	299.53	7	860.17	21	1150.02	28	1679.11	41	106.73	3	4095.56	100
Average	214.106	7	552.293	18	1016.35	33	1218.688	39	103.735	3	3106.222	100

Source: *Annual Reports of SPML from 2003-04 to 2012-13.*

The data in table 2 reveals that the various components of inventory and their ratios to that of total inventory. The major components of inventory are Chemicals, Stores and Spare parts and Raw Material. The proportion of Chemicals, Stores and Spare parts represent 30 per cent in the year 2003-04 and increased to 39 per cent in the year 2012-13. The average proportion of Chemicals, Stores and Spare parts is 34 per cent for the period of the study. The highest proportion of Chemicals, Stores and Spare parts were recorded at 42 per cent in the year 2010-11.

The proportion of raw materials to inventory of International Paper APPML indicates that 42 per cent of the total inventory in the year 2003-04 and it declined to 38 per cent in the year 2012-13. The average proportion of raw material was 31 per cent during the entire study period. The same kind of pattern we observed in respect of raw materials and chemicals as both components are mostly depend on seasonal and scarce inputs. The next component of inventory is finished goods on an average they stood at 25 per cent of total inventory over the study period. The work in progress recorded at 8 per cent of the inventory and its level speaks about the short period of production cycle in converting raw materials into the end products. Stores-in-Transit recorded 2 per cent in total inventory representing that the industry is located near to the raw material centre.

The Chemicals, Stores and Spare parts and Raw Material are the major components of the inventory in International Paper APPML. The piled up inventory which calls for immediate attention to have proper control as these two components together constitute 65% of total inventory. Hence, it is advised that proper inventory control techniques like maximum, minimum, danger levels of orders to be used in order not to cause any interruptions in production schedule.

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Table – 2: Breakdown of Inventory and Its Proportion to Total Inventory of International Paper APPML

(` in Lakhs)

Financial Years	Chemicals, Stores and Spare parts		Raw Materials		Materials –in – Transit		Work in Process		Finished Goods		Total Inventory	
	`	%	`	%	`	%	`	%	`	%	`	%
2003-04	2605.28	30	3665.38	42	35.22	0.4	144.56	1.6	2253.50	26	8703.94	100
2004-05	2765.72	32	3865.00	45	25.76	0.3	128.55	1.7	1839.26	21	8624.29	100
2005-06	3,056.63	38	4,504.61	56	20.16	0.2	313.08	3.8	198.80	2.4	8,093.28	100
2006-07	3,545.24	40	3,342.78	37	31.52	0.3	863.33	9.7	1,163.43	13	8,946.30	100
2007-08	4,253.14	40	2,677.97	26	193.02	1.8	1,157.39	11.04	2,199.84	21	10,481.84	100
2008-09	4,419.78	33	2,223.50	16	430.74	3.18	2,030.35	15	4,420.48	33	13,524.85	100
2009-10	4,020.72	35	2,659.20	23	319.28	2.7	895.36	7.73	3,692.64	32	11,587.20	100
2010-11	5,152.89	42	3,512.48	29	190.81	1.6	1,142.31	9.4	2,108.36	17	12,106.85	100
2011-12	4,806.39	23	4,525.71	21	386.90	1.8	1,413.95	6.67	10,058.82	47	21,191.77	100
2012-13	6,735.84	39	6,692.44	38	527.84	3	1,016.54	6	2,506.65	14	17,479.31	100
Average	4136	34	3767	31	216	2	910	8	3044	25	12074	100

Source: Annual Reports of International Paper APPML from 2003-04 to 2012-13.

INVENTORY TURNOVER RATIO OF SPML AND INTERNATIONAL PAPER APPML

Inventory turnover Ratio establishes the relationship between the sales with inventories. This ratio measures the velocity of conversion of stock into sales. Usually, a high inventory turnover indicates efficient management of inventory because the stocks are sold more frequently and lesser amount of money is required to finance the inventory. A low turnover ratio indicates inefficient management of inventory as over investment in inventories makes the business dull and ultimately lead to low profits or high losses and poor liquidity. An extraordinary high inventory turnover may be the result of low level of inventory, which results in shortage of goods produced in relation to demand and thus slips the market into the hands of competitors. The turnover may also be high due to a conservative method of valuing inventories at a lower value or the policy of being to buy frequently in small lots. Inventory turnover ratios are calculated to indicate whether inventories have been used efficiently or not. The inventory turnover ratio also known as stock velocity ratio is normally calculated as sales/average inventory cost.

Inventory Turnover Ratio =

$$\frac{\text{Cost of goods sold/Net Sales}}{\text{Average inventories}}$$

Inventory conversion period may be calculated to find the average time taken for clearing the stocks.

Inventory Conversion Period =

$$\frac{\text{Days in a Year}}{\text{Inventory Turnover Ratio}}$$

In this backdrop, there is a need to analyse the select units Inventory Turnover Ratios to facilitate comparison. The relevant data collected in this regard are presented in the Table – 3 covering the study period of ten years i.e. from 2003-04 to 2012-13.

Table – 3:
Inventory Turnover Ratios of SPML & International Paper APPML

(` in Lakhs)

Financial Years	SPML			International Paper APPML		
	Net Sales	Inventory	ITR	Net Sales	Inventory	ITR
2003-04	21657	2287	**9.5**	44339	8704	**5.09**
2004-05	22026	2683	**8.2**	39352	8624	**4.56**
2005-06	23333	2548	**9.2**	50853	8093	**6.28**
2006-07	24186	2882	**8.4**	52279	8946	**5.84**
2007-08	24308	2327	**10.4**	62824	10481	**5.99**
2008-09	34621	3065	**11.3**	65733	13525	**4.86**
2009-10	33549	3521	**9.5**	66934	11587	**5.78**
2010-11	36459	3030	**12.1**	79862	12107	**6.60**
2011-12	40023	4621	**8.7**	60160	21192	**2.84**
2012-13	36520	4096	**8.9**	125362	14479	**8.66**

Source: Annual Reports of SMPL& International Paper APPML from 2003-04 to 2012-13.

The data presented in the above table reveals that the inventory turnover ratio of SPML was 9.5 times in the year 2003-04 and it decreased to 8.9 times in 2012-13. The ten years average is 9.6. In case of International Paper APPML the inventory turnover ratio is 5.09 times in 2003-04 and it has grown to 8.66 times in the year 2012-13. As there is no standard inventory ratio and norms in this respect differ from firm to firm the ratios displayed in both the companies never exceeded 12% relatively. SPML fared well as the ratios were high compared to International Paper APPML and thus the inventory management is quite appreciative in SPML. With regard to International Paper APPML though the ratios were less in the beginning years of the study but later raising trend was found as in the current year i.e. 2012-13 the ratio stood at 8.66. Thus it can be concluded that in both the companies' velocity of conversion of stock into sales is quite appealing and also admirable.

INVENTORY CONVERSION PERIOD (ICP) OF SPML AND INTERNATIONAL PAPER APPML

Management of inventory gathers much importance in a company that aims at making surplus through sales. Inventory conversion period stands as an index to judge how effectively the business being carried out. If the age of inventory is lower, it means that the company's activity position is satisfactory and thus they will be able to sell their product within a short period to realise the sound liquidity position in an organisation. On the other hand, if the age of inventory is too high, it indicates the slow movement of stock due to lower demand for product or excessive production by company leading to blockage of investment in stocks and shows a negative impact on short term paying capacity of the firm. The relevant data depicting inventory conversion period is tabulated in the Table –4 covering the study period of ten years i.e. from 2003-04 to 2012-13.

Table – 4: Inventory Conversion Period of SPML & International Paper APPML

Financial Years	SPML		International Paper APPML	
	ITR	ICP *(Days)*	ITR	ICP *(Days)*
2003-04	9.5	38	5.09	72
2004-05	8.2	44	4.56	80
2005-06	9.2	40	6.28	58
2006-07	8.4	44	5.84	63
2007-08	10.4	35	5.99	61
2008-09	11.3	32	4.86	75
2009-10	9.5	38	5.78	63
2010-11	12.1	30	6.60	55
2011-12	8.7	42	2.84	129
2012-13	8.9	41	8.66	42

Source: Annual Reports of SMPL& International Paper APPML from 2003-04 to2012-13

The data in table- 4 indicates that the inventory conversion period of SPML & International Paper APPML companies. In case of SPML, the inventory conversion period is 30 to 44 days in the study period. Whereas, in case of International Paper APPML, the inventory holding period is 42 to 129 days for the corresponding period. The average inventory holding for the entire study period in this company is just above 60 days and conversion period being 2 months just because of these ratios we cannot jump into a conclusions because, the quality of product, markets served verities of products and operating cycles in respect of these products should also be taken into account. Purely based on this ratio the SPML excelled the International Paper APPML as far as inventory conversion into sales are concerned and thus its operating cycle was very short in terms time/days involved.

ANALYSIS OF WORKING CAPITAL TURNOVER RATIOS OF SPML & INTERNATIONAL PAPER APPML

Working Capital turnover ratio indicates the velocity of the utilisation of net working capital. This ratio indicates the number of times the working capital is turned over in the course of year. In other words this ratio measures the efficiency with which the working capital is being used by a firm. This ratio is an outcome of cost of sales divided by average working capital. There is no standard norm for this ratio therefore this ratio is to be compared with that of other firms pursuing same kind of business. The data presented in table 5 indicates working capital ratios of both the firms viz., SPML and International Paper APPML, for the period of 10 years ending with 2012-13. A thorough analysis of these ratios indicates that International Paper APPML is far better in utilisation of working capital compared to that of SPML. Due to negative net working capital in three years viz., 2007-08, 2010-11 and 2011-12 in SPML the pathetic position was undergone by this company and was made to use long term funds to meet short term commitments. Except in one year i.e.2012-13 in remaining 9 years the International Paper APPML has done better in utilisation of its net working capital. The highest ratios were identified in 2005-06 and 2011-12 in International Paper APPML i.e. 45.57 and 39.81 respectively indicating efficient utilisation of working capital but the company should also take little bit of care to see that too greater is this ratio it leads to worst situation in terms of idle resources fetching no returns.

Table – 5: Co-efficient of Correlation of Inventory with Profit of SPML and International Paper APPML

(` in Lakhs)

Years	SPML		International Paper APPML	
	Inventory	Profit	Inventory	Profit
2003-04	2287	1792	8704	2336
2004-05	2683	1410	8624	2540
2005-06	2548	1459	8093	3503
2006-07	2882	1332	8946	2413
2007-08	2327	3262	10481	1654
2008-09	3065	-163	13525	1895
2009-10	3521	-1185	11587	5419
2010-11	3030	-1791	12107	4494
2011-12	4621	-1731	21192	-9781
2012-13	4096	-9710	14479	-2370
Co-efficient of Correlation (R)	-0.7307		-0.8424	

Source: Annual Reports of SMPL& International Paper APPML from 2003-04 to 2012-13.

IMPACT OF INVENTORY ON PROFITABILITY OF SPML & INTERNATIONAL PAPER APPML

To analyse the impact of inventory on profitability, the relationship between inventory and profits is calculated through co-efficient of correlation and its significance is tested through t-test. The relevant data collected and presented in the Table – 6 during the study period of ten years i.e. from 2003-04 to 2012-13. Overall analysis of the tabulated data mentioned above indicates that the co-efficient of correlation of inventory with profit in SPML is negative i.e., -0.7307. This is a moderately negative correlation, which means that there is a tendency for high inventory variable scores to go with low profit variable scores (and vice versa). In the case of International Paper APPML, the value is -0.8424. This is a strong negative correlation, which means that high inventory variable scores go with low profit variable scores (and vice versa).

To analyse the significance of coefficient of correlation between inventory and profit the t-test is applied for both companies.

In case of SPML:

Null Hypothesis (H_o): There is no significant relation between inventory and profit.

Table – 6: Significance Test by t-test between Inventory & Profit of SPML

Particulars	Calculated t-test Value	Table Value	Result
Significance between Inventory and Profit	0.0116	2.262	Null Hypothesis **Accepted**

Source: Compiled from Table –5

As per the details in table 7 the calculated value of t=0.0116, which is less compared to that of critical value t=2.262 at 5% level of significance. Hence, the null hypothesis is accepted. This means that there is no significant correlation between inventory and profit of SPML.

In case of International Paper APPML:

Null Hypothesis (H_0): There is no significant relation between inventory and profit.

Table – 7: Significance Test by t-test between Inventory & Profit of International Paper APPML

Particulars	Calculated t-test Value	Table Value	Result
Significance between Inventory and Profit	2.40	2.262	Null Hypothesis **Rejected**

Source: Compiled from Table – 5

As per data presented in table 8 the calculated value of t=2.40, which is more compared to the critical value t=2.262 at 5% level of significance. Hence, the null hypothesis is rejected. This means that there is significant correlation between inventory and profit of International Paper APPML.

FINDINGS OF THE STUDY

- The stock of input in terms of raw materials and chemicals and stores in SPML were piled up may be due to scarcity or to meet un-anticipated demand for products in unseasonal periods.

- The Chemicals, Stores and Spare parts and Raw Material are the major components of inventory in International Paper APPML. The piled up inventory which calls for immediate attention to have proper control as these two components together constitute 65% of total inventory. Hence it is advised that proper inventory control techniques like maximum, minimum, danger levels of orders are to be used in order not to cause any interruptions in production schedule.

- The two sample units of Paper Industry indicate that the major constituent of the gross working capital was inventory. The average inventory in paper industry was 39 per cent. Thus, it intends to have proper control over inventory to reap higher profitability and productivity.

- SPML fared well as the inventory ratios were high compared to International Paper APPML and thus the inventory management is quite appreciative in SPML. With regard to International Paper APPML though the ratios were less in the beginning years of the study but later raising trend was found as in the current year i.e. 2012-13 the ratio stood at 8.66. Thus it can be concluded that in both the companies' velocity of conversion of stock into sales is quite appealing and also admirable.

- In case of SPML, the inventory conversion period is 30 to 44 days in the study period. Whereas, in case of International Paper APPML, the inventory holding period is 42 to 129 days for the corresponding period. Purely based on this ratio the SPML excelled the International Paper APPML as far as inventory conversion into sales are concerned and thus its operating cycle was very short in terms of time/days involved.

- The International Paper APPML is far better in utilisation of working capital compared to that of SPML. Due to negative net working capital in three years viz., 2007-08, 2010-11 and 2011-12

in SPML the pathetic position was undergone by this company and was made to use long term funds to meet short term commitments.

- The co-efficient of correlation of inventory with profit in SPML is negative i.e., -0.7307. This is a moderately negative correlation, which means that there is a tendency for high inventory variable scores to go with low profit variable scores and vice versa. In the case of International Paper APPML, the value is -0.8424. This is a strong negative correlation, which means that high inventory variable scores go with low profit variable scores and vice versa.

- The calculated value of t=2.40, which is more compared to the critical value t=2.262 at 5% level of significance. Hence, the null hypothesis is rejected. This means that there is significant correlation between inventory and profit of International Paper APPML.

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