

# **Impact of Inventory Management on the Financial Performance of the firm**

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**Abstract:** *In the present era, where there is a competitive world in the area of business it is very important to control various costs to sustain in the market. And the most importantly customer is to be considered as the most important part of any business. In such fast moving and rapid environment, inventory management plays an important role to make a control over the financial statement of the organization. Inventory involves in the whole process cycle of the organization as it starts with the shop floor to the top level management commitment. In this paper, we will discuss and analyze some of the parameters which directly show the impact of inventory management to the financial statement of the form. This paper also consists of different parts where the inventory management concepts are discussed, different inventory control techniques are discussed, and their interrelationship with the financial statement of the firm. This paper also introduces the various costs incurred due to the storage inventory, economic order quantities, reorder level, shortage costs, inventory methods.*

**Keywords:** *Economic Order Quantities, Financial Statement, Inventory, Inventory Management, Reorder level, Shortage Costs.*

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## **I. Introduction**

Inventories are the current assets which are expected to be converted within a year in the form of cash or accounts receivables. Thus, it is a significant part of the assets for the business firms. Actually, inventories are the goods that are stocked and have a resale value in order to gain some profit. It shows the largest costs for the trading firms, wholesalers and retailers. Normally, it consists of 20-30% of the investment of the total investment of the firm. Thus, it should be managed in order to avail the inventories at right time in right quantity. Inventory refers to the stock of the resources which are held to sales and/or future production. It can be also viewed as an idle resource which has an economic value. So, better management of the inventories would release capital productively. Inventory control implies the coordination of materials controlling, utilization and purchasing. It has also the purpose of getting the right inventory at the right place in the right time with right quantity because it is directly connected with the production. This implies that the profitability of the firm is directly or indirectly affected by the inventory management. In this paper, three major steel manufacturing companies of India are taken for the analysis. Among three of the steel industries, one is of public sector and rest of two are of private sector. These steel manufacturing companies are: SAIL, TATA Steel Ltd. and JSW Steel. In the steel industry there are lots of inventories at different stages. So after various discussions and analysis we will see that really there is any impact of the inventory management over the financial statement of the firm or not.

## **II. Literature Review**

**Rich Lavelly (1998)** asserts that inventory means “Piles of Money” on the shelf and the profit for the firm. However, he notices that 30% of the inventory of most retail shops is dead. Therefore, he argues that the inventory control is facilitate the shop operations by reducing rack time and thus increases profit. He also elaborates the two types of inventory calculations that determine the inventory level required for profitability. The two calculations are “cost to order” and “cost to keep”. Finally, he proposes seven steps to inventory control. The limitation of this literature is that he does not outline the calculation method that actually evaluates the inventory level and cost of handling it.

**James Healy (1998)** highlights that the distributors carry 10-30% of additional inventory that is unnecessary. These inventories unnecessarily increase costs and loss of customers, lost of sales and lost profit due to inefficient inventory management. He points out there is a need to set out procedures to find out physical inventories to determine the true cost of handling cost of the inventory. He further points out some misconceptions of the inventory management such as adequacy of Enterprise Resource Planning System in handling the inventory, the importance of turns in measuring the success of the inventory system and confidence on profitability of using the inventory optimization method. The limitation of this literature is that it does not give reasons for the causes of the unnecessary inventory.

**Dave Piasecki (2001)** presents an inventory model for calculating the optimal order quantity that used the Economic Order Quantity method. He points out that many companies are not using EOQ model because of

poor results resulted from inaccurate data input. He says that EOQ is an accounting formula that determines the point at which the combination of order costs and inventory costs are the least. He highlights that EOQ method would not conflict with the JIT approach. He further elaborates the EOQ formula that includes the parameters such as annual usage in unit, order cost and carrying cost. Finally, he proposes several steps to follow in implementing the EOQ model. The limitation of this literature is that it does not elaborate further relationship between EOQ and JIT. It does not associate the inventory turns with the EOQ formula and fails to mention the profit gain with the quantity is calculated.

**Farzaneh (1997)** presents a mathematical model to assist the companies in their decision to switch from EOQ to JIT purchasing policy. He defines JIT as “to produce and deliver finished goods just in time to be sold, sub-assemblies just in time to be assembled in goods and purchased material just in time to be transformed into fabricated parts”. He highlights that the EOQ model focuses on minimizing the inventory costs rather than minimizing the inventory. Under the ideal condition where all the conditions meet, it is economically better off to choose the JIT over the EOQ because it results in purchase price, ordering cost. The limitation of this literature is that he only compares the cost saving and required quantities of choosing the system.

**Morris (1995)** stressed that inventory management in its broadest perspective is to keep the most economical amount of one kind of asset in order to facilitate an increase in total value of assets of the organization.

**Rosenblatt (1977)** says that the cost of maintaining inventory is included in the final price paid by the consumer. Good in inventory represents a cost to their owner. The manufacturer has the expense of material and labour. The wholesaler also has funds tied up.

**Christopher Benjamin and Kamalavalli (2009)** investigated the influence management of the working capital on the profitability of Indian hospitals by taking 14 out of 51 listed hospitals in India. The result of their analysis depicted that the inventory turnover ratio, debtor turnover ratio and working capital turnover ratio were positively related with the return on investment, a variable used for the measurement of the firm’s profitability.

**Ghosh and Kumar (2007)** defined inventory as a stock of goods that is maintained by a business in anticipation of some future demand. The definition was also supported by **Brag (2005)** who stressed that the inventory management has an impact on all business functions, particularly operations, marketing, accounting and finance. He established that there are three motives for holding inventories, which are transaction, precautionary and speculative motives.

**Agus and Noor (2006)** examined the relationship between the inventory management and financial performance of the firm. The study measured the manager’s perceptions of the inventory management practices and financial performance of the firm.

**Koumanakos (2008)** studied the effect of inventory management on firm performances. 1358 manufacturing firms operating in three industrial sectors of Greece, food, textiles and chemicals were used in the study covering period of 2000-2002. The hypothesis that lean inventory management leads to an improvement in a firm’s financial performance was tested. The findings suggests that the higher the level of inventories preserved by a firm, the lower the rate of return.

**Roumiantsev and Netessine (2005)** investigated the association between inventory management policies and the financial performance of a firm. The purpose of the study was to assess the impact of inventory management practice on financial performances across the period 1992-2002.

### **III. Methodology and data collection**

All data for this paper is secondary data and taken from various sources. Some of the sources are from journals, articles, magazines and referred books from the library. Some data are also downloaded from the internet through different sources like google, money control and emerald. All financial data are taken from the money control database for the completion of my paper. From these collected data from different sources of secondary data, we interpret these and find the impact of inventory management on the financial condition of the firm. We have taken three major steel manufacturing companies of India. These companies are SAIL, TATA Steel and JSW Steel. After collecting data from the sources we correlate the inventory turnover with profitability of the firm using correlation concept. We will find the Pearson correlation coefficient and analyze it to show the impact of inventory management on the profitability of the firm.

### **IV. Inventory Management**

There is need for controlling the inventories for any firm in developing countries like India. A firm must install some better inventory control techniques to improve their financial condition. According to Kotler, inventory management is the technique of managing, controlling and developing the inventory levels at different stages i.e. raw materials, semi-finished goods and finished goods so that there is regular supply of resources at minimum costs. According to Coyle, inventory management is the management of the materials in motion and

at rest. According to Rosenblatt, the inventory management costs are the price which is paid by the customer but it is the cost to the owner. Different authors defined inventory management in different way.

Sometimes, inventory and stock are considered as the same thing. But there is a slight difference between them. Stock is the storage of material kept in specified place only. Inventory management involves all activities which are done for the continuous supply of materials with optimal costs.

Basically, inventory management has two goals. First goal is to avail the goods at right place in right time. Because it is very important to keep operations running to give specific service. Second goal is to achieve the service level against optimal cost. It is very difficult to achieve goal against optimal cost. All items cannot be stocked, so there is need to specify the important goods to be stocked.

The supplies inventories involves the materials required for the maintenance, repair and operating that do not go to the final product. But it is also considered as the types of inventories. Thus, inventory management is also defined as it is the science and art of managing the level of stock of group of items which incurred least costs and also reach the objectives set by the top management. So, on the final note the primary objective of inventory management is to improve the customer satisfaction level. For this one has to keep adequate amount of inventory for demand fluctuations and variability. The secondary objective is to increase the production efficiency. Increasing production efficiency means that the production control, maintaining the level of inventory for efficient materials management.

## **V. Some Factors Related To Inventory Management**

There are some factors listed below which are essential to be discussed for understanding the concept of inventory management. These activities are associated with inventory management and to be considered to achieve its objectives. These factors are:

1. Costs related to inventory.
2. Inventory costing methods.
3. Inventory models.
4. Inventory control techniques

**5.1. Costs related to inventory:-** There are various costs which are related to the inventories. These costs are incurred due to the inventories. These costs are:-

**5.1.1 Purchase cost:-** Purchase cost is the cost of purchasing the inventory items and it depends upon the quantity of the items to be purchased.

**5.1.2 Ordering Cost:-** It is the cost related to the bringing the inventory to the production system. It includes all costs which are directly or indirectly involved in bringing the inventory to the production system. Costs included in ordering costs are tendering cost, quality inspection cost, transportation cost etc.

**5.1.3 Carrying cost:-** It is the cost which is associated with costs which are spent to the storage of the inventory items in the store. It depends upon the quantity and period of time till when the inventory is to be stored. It includes storage cost, damage cost, depreciation, handling cost, insurance cost etc.

**5.1.4 Shortage cost:-** Shortage cost simply means the cost due to the absence of inventory items in the store. It is associated with the lost sales. Generally, shortage costs incurred for those items which is more costly and which incurs more handling costs.

**5.2. Inventory Costing methods:-** These are the methods which are used for give the values to the inventories. These valuation methods can be explained as:-

**5.2.1 First In First Out:-** In this method, the materials coming first will be considered first and then next consignment will be taken. This method is useful when the price of material is falling because material charge to production will be high while the replacement cost will be low.

**5.2.2 Last In First Out:-** It is the method in which materials coming latest will be considered first. The last consignment is taken first and when it is exhausted then second last consignment is taken. This method is more useful when the price is rising and show a charge to production which is closely related to current price.

**5.2.3 Weighted Average Cost method:-** In this method, material issued price is based upon the calculation of weighted average cost of the material. It is calculated with using formula:-

$$\text{WAC} = \frac{\text{Value of material in stock}}{\text{Quantity in stock}}$$

**5.2.4 Standard Price method:-** In this method, a standard price is predetermined. The price is predetermined for the stated period of time taken in the account all the factors affecting price such as anticipated market trends, transportation charges etc. standard prices are predetermined irrespective of purchase price. Any difference between the predetermined price and actual price is the material price variance.

**5.2.5 Current Price:-** In this method, material issued is priced at the replacement or realizable price at the time of issue. So, the cost at which material could be purchased should be ascertained.

**5.3. Inventory models:-** Among different inventory models EOQ model is most popular and commonly used inventory model. These models are used to determine the economic order quantity of the materials to be stored.

**5.3.1 EOQ Model:-** As inventory is determined as the most important factor which affects the operations, then a mathematical model was developed to control the inventory levels. The most widely used model is EOQ model. It was first developed by F.W. Haris in 1913 but still R.H. Wilson is given credit for this model due to his early in-depth analysis. This model is also known as Wilson EOQ model. According to this model, some costs like ordering costs are declined with inventory holdings while some costs like holding costs rise and thus total inventory cost curve has a minimum point where inventory costs can be minimized. The economic quantity is the level for inventory which minimizes the total inventory costs. It is the optimal level of inventories which satisfies the demand constraints and cost constraints.

Derivation of EOQ formula:-

The derivation of Economic Order Quantity formula is as follows:-

Let us assume,

D = Annual Demand

$C_o$  = Ordering cost

$C_c$  = Carrying cost

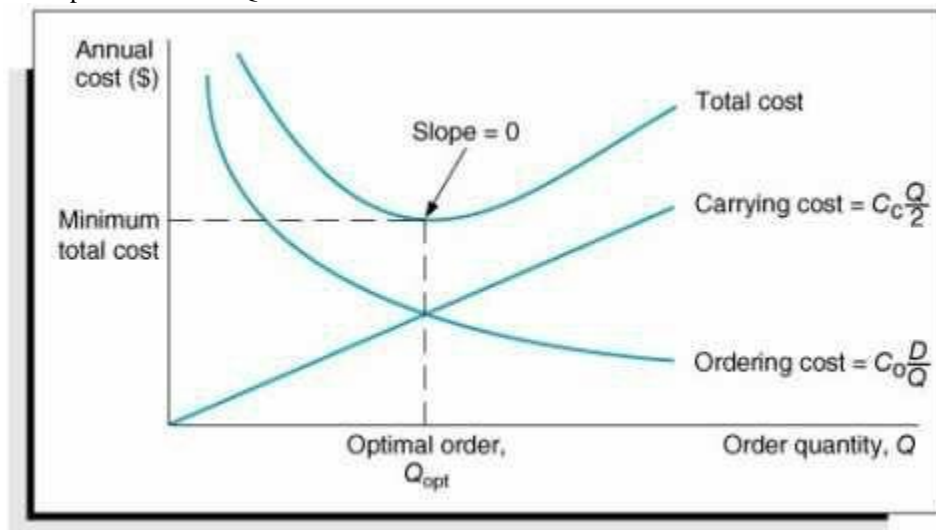
Q = Quantity

Then,

Annual Stock =  $Q/2$

Total Annual Carrying Cost =  $C_c \cdot Q/2$

No. of orders per annum =  $D/Q$



**Fig.1.** EOQ model

Annual ordering cost =  $C_o \cdot D/Q$

Therefore, total inventory cost = total ordering cost + total carrying cost

Or,  $TIC = C_c \cdot Q/2 + C_o \cdot D/Q$

The order quantity at which the cost will be minimized is obtained by differentiating total cost with respect to Q. In this problem, Q will be the economic order quantity.

By differentiating, we get,

$$d(TIC)/dQ = C_c/2 - C_o \cdot D/Q^2$$

When cost is minimum then  $d(TIC)/dQ$  will be 0.

Then,

$$C_c/2 - C_o \cdot D/Q^2 = 0$$

$$\text{Or, } Q = (2 \cdot C_o \cdot D / C_c)^{1/2}$$

Assumptions of EOQ model:-

There are some assumptions on which EOQ is calculated. These assumptions are:-

- i. There is known and constant holding cost.
- ii. There is a known and constant ordering cost.
- iii. The rates of demand are known.
- iv. There is known constant price per unit.
- v. No stock-outs are allowed.
- vi. Replenishment is made instantaneously.

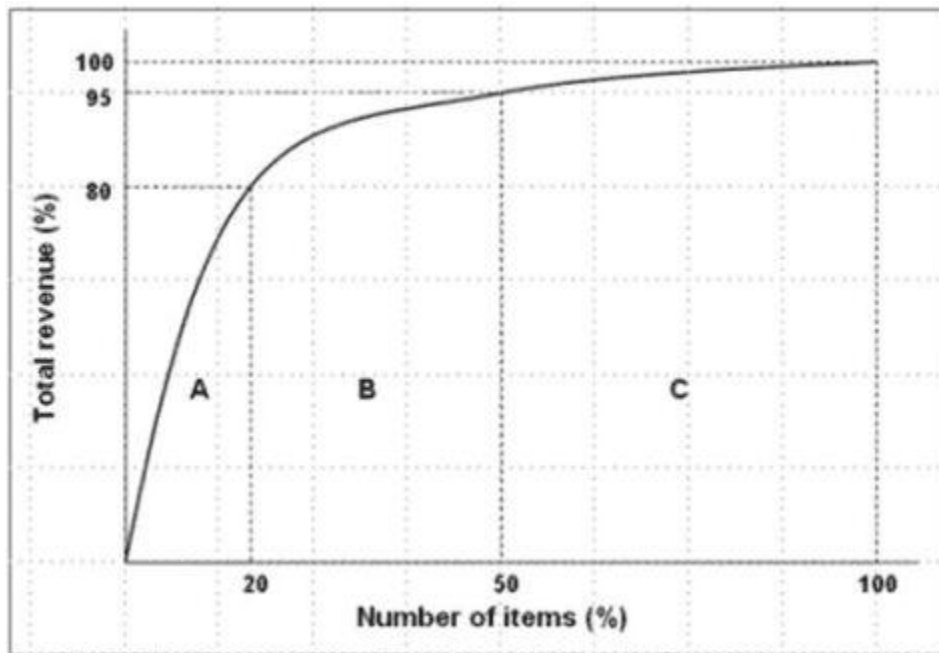
**5.4. Inventory control techniques:-** There are various techniques used by a firm to control the inventories. Some of these techniques can be explained as:-

**5.4.1. ABC Analysis:-** ABC analysis of inventories represent that the small portion of material contains bulk amount of money value while a relatively large portion of material consists less amount of money value. The money value is ascertained by multiplying the quantity by unit price. According to this approach, inventory control of high value items are closely controlled than low value items. Each item is categorized as A, B and C categories depending upon the amount spent for the particular item. It may also be clear with the help of following examples:

“A” category – 5% to 10% of the items represent 70% to 75% of the money value.

“B” category – 15% to 20% of the items represent 15% to 20% of the money value.

“C” category – 70% to 80% of the items represent 5% to 10% of the money value.



**Fig.2.** ABC Classification

After classification, the items are ranked by their value and then the cumulative percentage of the total value against the percentage of item is noted. A detailed example clearly indicates the figure that 10 per cent of item may account for 75 per cent of the value, another 10 per cent of item may account for 15 per cent of the value. The remaining part may account for 10 per cent of the value. The importance of this tool is that it directs give attention on the high valued items.

**5.4.2. Minimum level:-** The minimum level of inventories kept on the different bases like consumption during the lead time, stock-out costs, customer irritation and loss of goodwill etc. To continue production it is very essential to maintain optimal amount of inventories. The stock which takes care for the fluctuation in demand is known as safety stock. It also governs the ordering point.

**5.4.3. Maximum level:-** The maximum limit beyond which the quantity of any item is not normally allowed to rise is known as maximum level. It is the sum of minimum level and EOQ. The amounts to be fixed in maximum level depend upon the factors like space available, nature of material etc.

**5.4.4. Reorder level:-** It is the level of the stock at which a purchase requisition is initiated by the storekeeper for replenishing the stock. This level is set between the maximum and minimum level in a such way that before material ordered for are received into the stores. Its fixation depends upon maximum delivery period and maximum consumption.

**5.4.5. Just In Time system:-** Japanese firms popularized this technique in order to reduce the inventory level up to zero to eliminate the inventory costs. According to this system, the materials arrive at the manufacturing sites just few hours before they are going to use. This system also eliminates the necessity of carrying large inventories.

**5.4.6. Outsourcing:-** Earlier there was tendency of manufacturing companies to manufacture all parts in-house. Now, more companies are adopting outsourcing techniques. Outsourcing is a system of buying parts and components from other companies rather than manufacturing in house.

**5.4.7. Computerized Inventory Control System:-** It is the modern technique used for controlling the inventories. It enables a company to track large items of inventories easily. It is an automatic system of counting inventories, recording withdrawals and balances. There is an in-built system of placing order as the computer notices that the reorder point has been reached. The information system of the buyers and suppliers are linked to each other.

## VI. Data Presentation And Intepretation

For data interpretation and analysis three major steel manufacturing companies of India is taken. These are SAIL, TATA Steel and JSW Steel. Some financial points are taken to represent the impact of inventory on the financial condition of the firm. Let us start with operating profit per share.

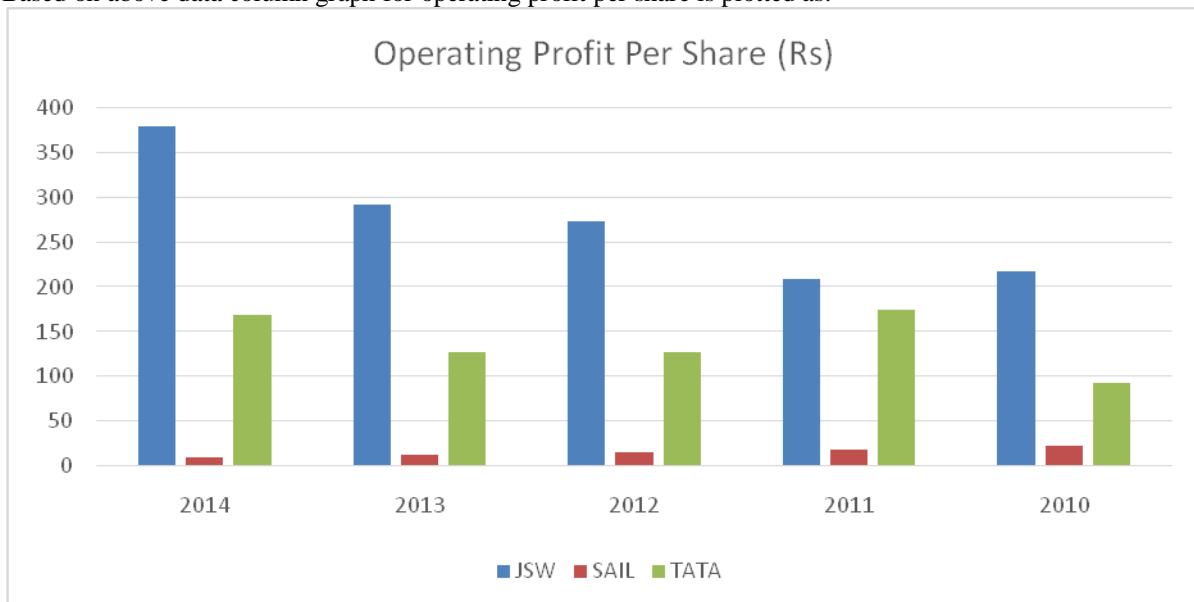
### 1.1. Operating profit per share

We have a table below which shows the data of operating profit per share of three steel manufacturing companies of last 5 years.

Companies	2009-10	2010-11	2011-12	2012-13	2013-14
SAIL	23.53	17.88	15.53	12.30	10.53
TATA Steel	92.85	174.71	127.85	126.86	168.97
JSW Steel	217.63	209.04	273.48	291.50	379.17

**Table1.** Operating profit per share (in Rs. Cr.)

Based on above data column graph for operating profit per share is plotted as:



**Graph1.** Operating profit per share (in Rs. Cr.)

#### 1.1.1. Data Interpretation

As we see the graph, it is clearly seen that the operating profit per share of JSW steel is increasing according to the year while operating profit per share of SAIL is decreasing. Also, JSW steel has highest operating profit per share among these three companies.

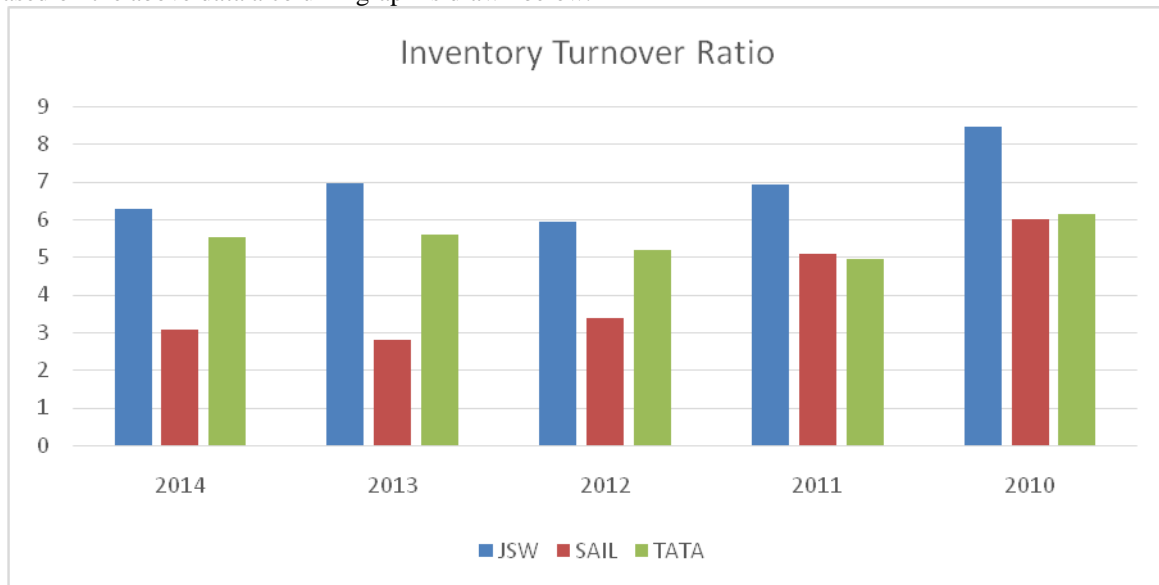
**1.2. Inventory Turnover Ratio:**

Inventory turnover ratio is the ratio of cost of goods sold to the average inventory. High inventory turnover ratio represents good inventory management since it implies rapid movement of merchandise to lower inventory investment. The table shows the data of inventory turnover ratio of last 5 years.

Companies	2013-14	2012-13	2011-12	2010-11	2009-10
SAIL	3.07	2.79	3.36	5.08	6.01
TATA Steel	5.53	5.59	5.19	4.94	6.14
JSW Steel	6.28	6.95	5.94	6.91	8.4

**Table2.** Inventory Turnover Ratio

Based on the above data a column graph is drawn below.



**Graph2.** Inventory Turnover Ratio

**1.2.1. Data Interpretation**

From the above graph of inventory turnover ratio it is seen that in 2010 each company has highest inventory turnover ratio while it decreased with number of years. From 2010 to 2014 SAIL has least inventory turnover ratio which indicates that it has poor inventory management as compared to JSW steel and TATA steel. On the contrast, all companies have to install better inventory control techniques to improve inventory turnover ratio.

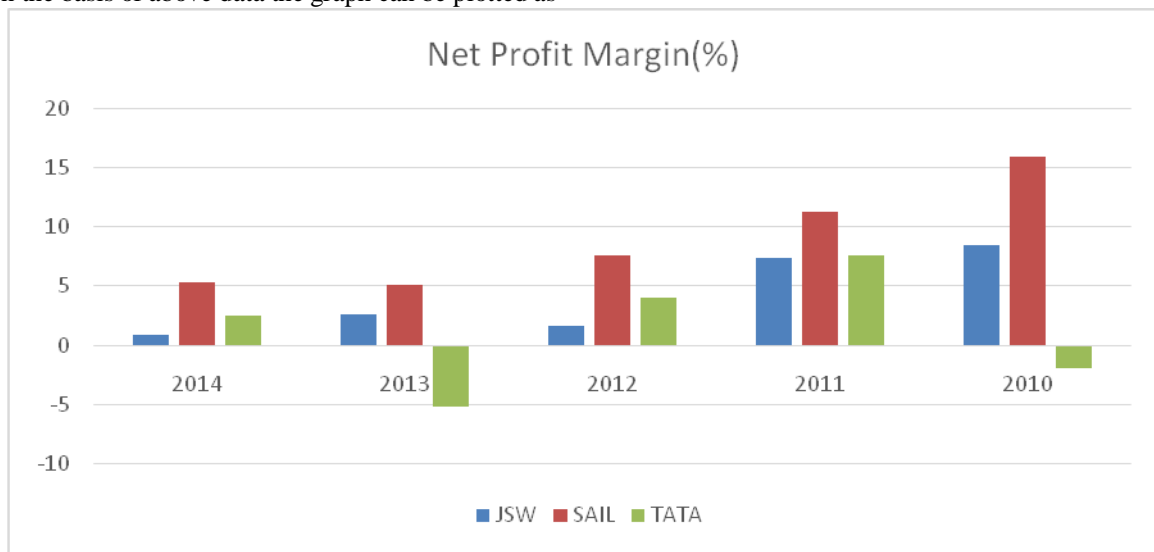
**1.3. Net Profit Margin**

Net profit is nothing but is excess revenues over the expenses. It is calculated by deducting expenses from the revenues. On the basis of collected data we have table of operating profit margin.

Companies	2013-14	2012-13	2011-12	2010-11	2009-10
SAIL	5.53	5.09	7.5	11.25	15.93
TATA Steel	2.41	-5.22	4.00	7.52	-1.95
JSW Steel	0.88	2.52	1.56	7.31	8.42

**Table3.** Net Profit Margin (%)

On the basis of above data the graph can be plotted as



Graph3. Net Profit Margin (%)

**1.3.1. Data Interpretation:**

From the above graph of net profit margin it is observed that in 2010 and 2013, TATA Steel suffered from the loss. It may be different factors independent to inventory. But all companies reduced their net profit margin accordingly. The same condition was in inventory turnover ratio too.

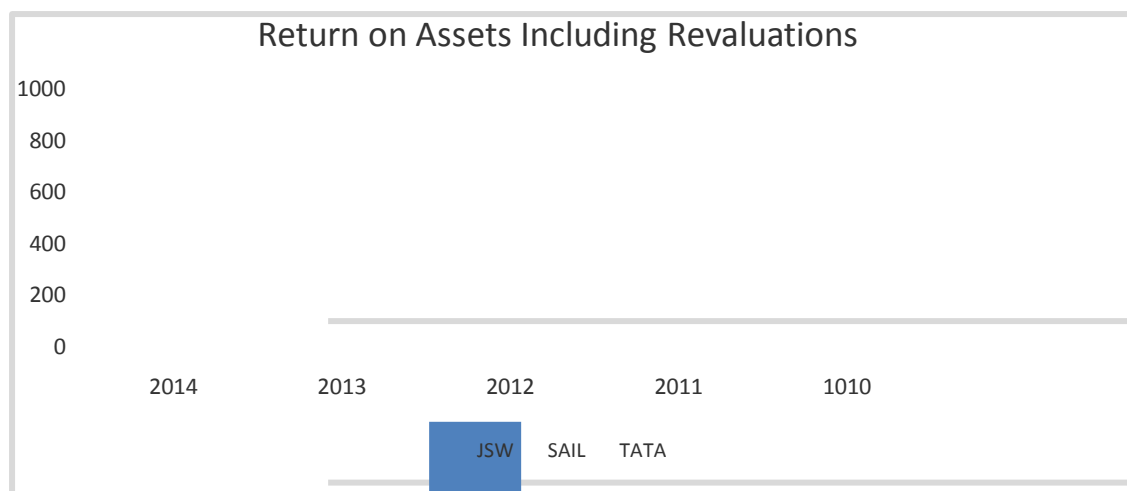
**1.4. Return on Assets (including revaluations):**

Return on asset is nothing but return on investment. It is a measure of profitability from a given level of investment. The data for return on assets of 5 years for the taken companies are shown in table below.

Companies	2013-14	2012-13	2011-12	2010-11	2009-10
SAIL	104.83	100.82	97.5	91.04	81.68
TATA Steel	417.33	351.85	438.79	369.16	259.67
JSW Steel	875.96	764.83	738.2	704.6	479.99

Table 4.Return on Assets (including Revaluation)

And the graph from the data can be plotted as



Graph 4. Return on Assets (including Revaluation)

**1.4.1. Data Interpretation:**

In this graph, all companies have higher value and increased with the number of years. TATA Steel has highest Return on Assets in 2013 and then decreased. But JSW Steel is increasing its return on assets since last 5 years.



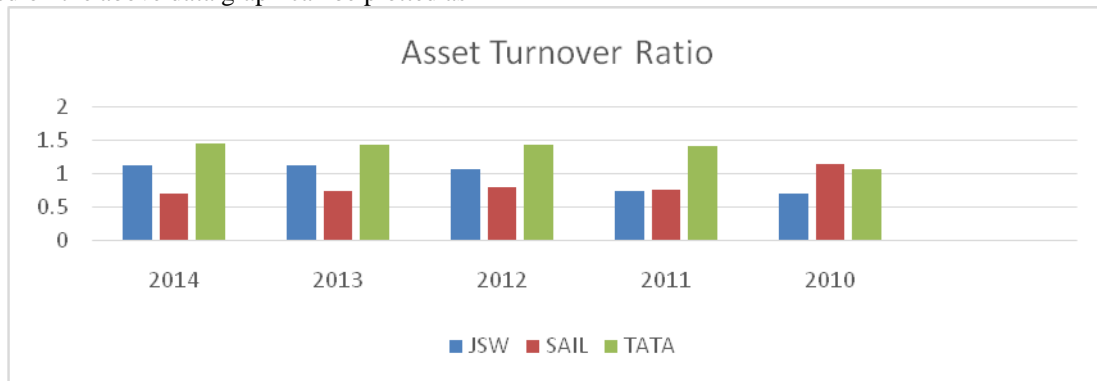
**6.5. Asset Turnover Ratio:**

Asset turnover is the ratio of total sales to the average total assets. It measures the firm’s efficiency in utilizing its assets. It means if asset turnover of any firm is high we can infer that firm is utilizing its assets efficiently. The data for asset turnover can be shown in the table below.

Companies	2013-14	2012-13	2011-12	2010-11	2009-10
SAIL	0.71	0.74	0.80	0.77	1.14
TATA Steel	1.44	1.42	1.42	1.41	1.07
JSW Steel	1.13	1.12	1.07	0.74	0.71

Table 5. Asset Turnover Ratio

Based on the above data graph can be plotted as



**Graph 5.** Asset Turnover Ratio

**6.5.1. Data Interpretation:**

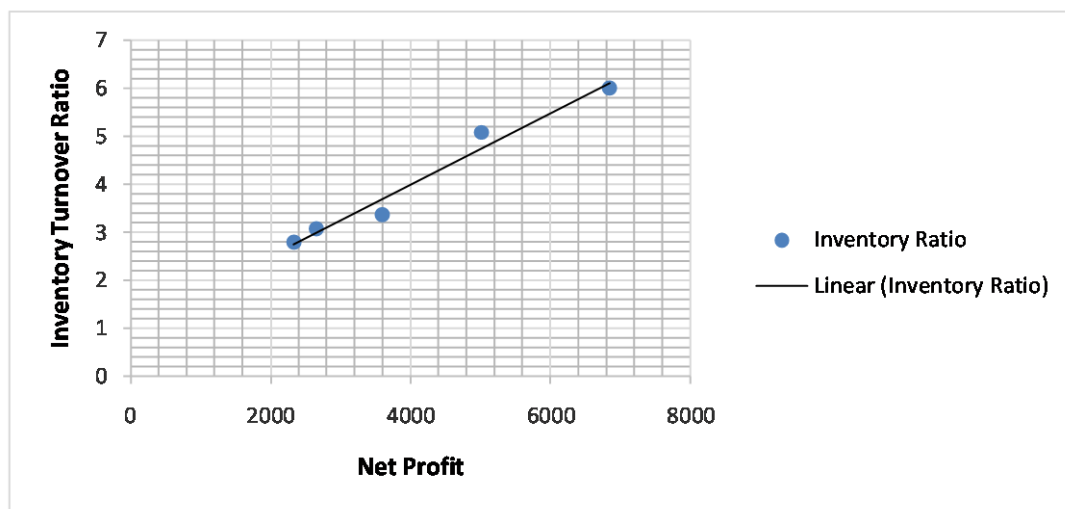
From the above graph, it is seen that in 2010, SAIL has highest asset turnover ratio. After 2010 its asset turnover ratio declined and TATA took its place and led till 2014. JSW Steel also increased its asset turnover ratio with respect to time but couldn’t lead. There is need to take care of asset utilization.

**VII. Data Analysis And Findings**

For analysis of data and finding the relationship between inventory turnover ratio and profitability of the firm correlation techniques are used. Both parameters are correlated to ensure is there any impact of inventory turnover ratio on the profitability of the firm is not. From the data interpretation we found that there is some relationship between the inventory turnover ratio and financial condition of the firm. Now analyze data one by one of all companies.

**1.5. SAIL**

For SAIL we have scatter diagram which shows the relationship between the inventory turnover ratio and net profit.



**Diagram1.** Scatter Diagram for SAIL

**1.5.1. Finding**

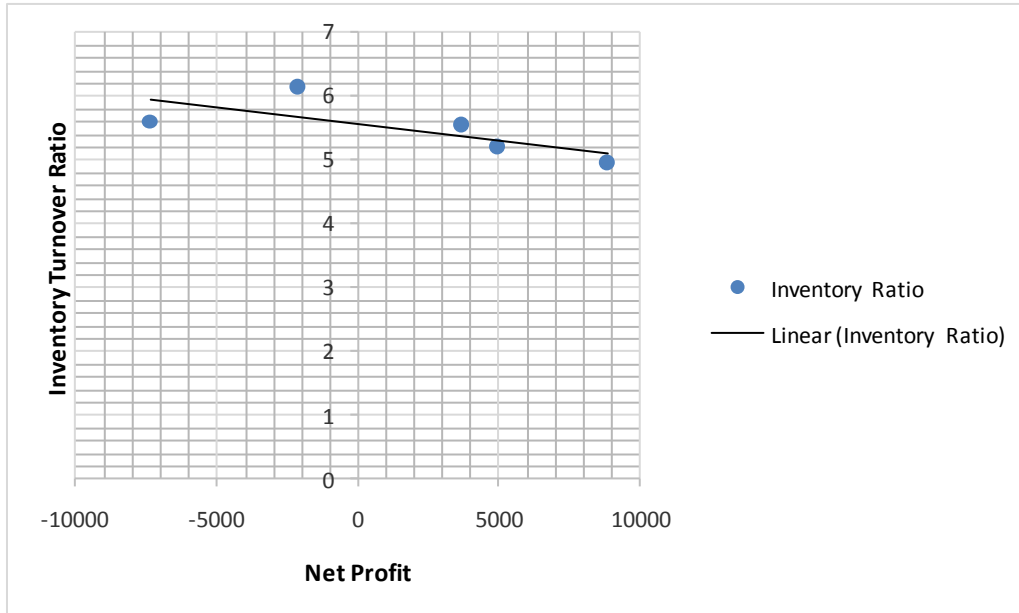
In the above diagram, there is some linearity. By finding the Pearson Correlation coefficient, we get the value.

Pearson Correlation Coefficient,  $r = 0.984$

Here, we have positive slope which shows the strong relationship between the inventory turnover ratio and net profit of SAIL.

**1.6. TATA Steel**

For TATA Steel the scatter diagram can be shown as:



**Diagram2.** Scatter Diagram of TATA Steel.

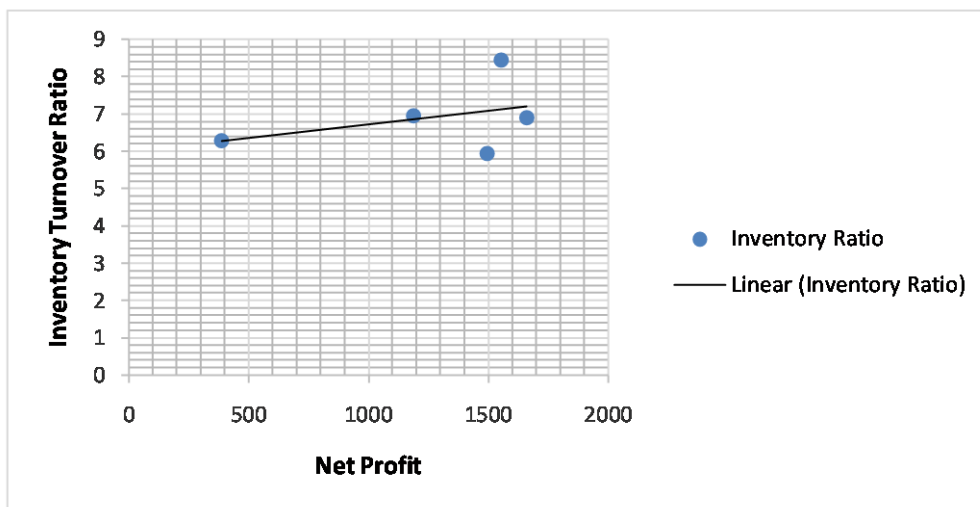
**1.6.1. Finding**

Pearson Correlation Coefficient for TATA Steel,  $r = -0.7$

This shows there is negative correlation. It may be due to other factors because in 2010 and 2013 TATA Steel suffered from loss

**1.7. JSW Steel**

The Scatter diagram for JSW Steel can be drawn as



**Diagram 4.** Scatter Diagram of JSW Steel.

**1.7.1. Finding**

The Pearson correlation coefficient for JSW Steel is,  $r = 0.388$   
This shows that there is moderate correlation between the inventory turnover ratio and profitability of JSW Steel.

### **VIII. Conclusion And Recommendations**

Inventory is the most important part of any business especially for manufacturing companies. It is hidden costs which are to be controlled for sustaining in present competitive market. Apart of costs, customer satisfaction is also the most important factors for the businesses. Inventory management also improves the level of customer satisfaction because customer wants product at least time as possible. So, a manufacturing firm must install the optimal inventory control techniques or improve their asset turnover as much as possible. Also, by different analysis it is concluded that inventory turnover ratio is correlated with the net profit of the companies. The inventory turnover ratio of JSW Steel is better than the other two companies. While TATA has the highest asset turnover ratio than other two companies. It simply indicates that TATA Steel is utilizing its assets efficiently but its inventory turnover ratio is lesser due to its poor inventory management. TATA Steel should take care of inventory management which is responsible for the loss. Hence, from different findings it is concluded that there is impact of inventory management on the financial condition of the firm.

Some recommendations are also for these companies according to the interpretation of the data available. SAIL is a public sector company and its net profit is reducing year by year. Its overall performance is also not good. Its profit margin is most than other two but it can be better more. Only its asset turnover in 2010 was better than other two companies. So it is recommended that install some appropriate inventory control technique to increase the inventory turnover ratio, asset turnover ratio, return on assets. After that the profitability will surely improved. TATA Steel also performed poor inventory management than JSW Steel. So, TATA Steel should take care of that issue. This remedy is also responsible for the loss of the firm. JSW Steel performed well in terms of inventory management but still there is some poor management due to which its profit margin is lowest than other two. So , it is recommended to JSW Steel to improve its asset utilization.

### **IX. Limitations of the Study**

There are some certain limitations of this study. It can be listed as:

- i. All the data used in this paper are secondary data which has been taken from different published journals, books and financial data are from money control database. And this paper is related with the financial variables so there may be some variations.
- ii. This study is based on only three major steel manufacturing companies. So it may reflect some partial view.
- iii. In this study only 5 years is taken as the period of time commencing from 2010-2014 which is a short period of time.
- iv. Also, inflation is the most crucial factor for financial terms. So, it is not considered in any type of interpretation.
- v. Correlation technique is used as statistical tools to interpret the data.

### **X. Acknowledgement**

I would like to acknowledge my departmental faculty members who supported me to complete this study. I am also thankful to all those who are directly or indirectly involved in this study. I would like to express my deep gratitude my father who always supported me in my dark part too and my "Mamma" who always keep her hands on my head wherever she is now. At the last I would like to thank sincerely my friend "Ru" who constantly motivated me in my miseries and also to complete this study.

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