



## “A COMPARATIVE ANALYSIS OF MATERIAL MANAGEMENT PRACTICES AMONG TWO LEADING TRACTOR MANUFACTURING INDUSTRIES OF INDIA”

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### ABSTRACT

*Management of materials is of paramount importance to a business enterprise to achieve increased productivity and growth in profitability. Since materials constitute a major portion of production cost, any increase in the effectiveness of this function has a significant impact on the financial strength and competitiveness of the enterprise. Improper application of materials management can cause disasters like piled-up inventories, shortage of working capital, etc., there by leading to poor productivity. On the other hand, better utilization of materials results in maintaining and improving profitability of the firm, both in the short run and long run.*

*Thus materials management is an important element in manufacturing industries such as tractor manufacturing companies. In this backdrop the current research study entitled “A Comparative Analysis of Material Management Practices among Two Leading Tractor Manufacturing Industries of India” was undertaken with the objective of comparatively evaluating the prevailing materials management practices with reference to two leading tractor manufacturing companies of India viz **HMT** and **SONALIKA Tractors**. Paper will discuss an opinion survey conducted to comparatively evaluate the internal and external factors influencing the practice of*

*materials management. Exploratory and analytical research methodology for data collection and analysis was used in current research study on 100 respondents (materials management professionals) each from brands of Tractor Company was randomly selected. Respondents opinion were statistically analyzed with One Way ANOVA with the help of SPSS Software and the obtained P value was highly significant therefore the results concluded in rejection of null hypothesis and acceptance of alternate hypothesis which states that  $H_1$  - There is a significant difference between internal as well as external factors and*

*successful material management among HMT and Sonalika Tractor Manufacturing Companies. The paper concludes that evidently, the opinion survey confirms that the knowledge-ability of the individual Materials Management Professionals about the materials management function perse is far ahead of the actual materials management practices of their respective organizations. Thus, it is noted by the researcher that the perception of the Materials Management Professionals seems to be more scientific; however, the implementation, especially in the Sonalika tractors, is lax.*

**Key Words:** - HMT, Materials Management, Internal factors, External factors, Sonalika and ANOVA

## **1. INTRODUCTION**

Materials management is the system for planning and controlling all of the efforts necessary to ensure that the correct quality and quantity of materials are properly specified in a timely manner, are obtained at a reasonable cost and most importantly are available at the point of use when required. Thus materials management is an important element in project management. Materials management requires the right blend of

technical and commercial expertise, operating within the framework of an appropriate and good organizational structure if it is providing the most efficient and effective service demanded of it. Increasingly, selective techniques are being applied to all the functions within the materials management to achieve an efficient method to reduce the inventory cost. Materials Management is a key business function that is responsible for

coordination of planning, sourcing, purchasing, moving, storing, and controlling materials in an optimum manner so as to provide a pre-decided service to the customer at a minimum cost. (*Gopalakrishan P. et al, 2011*)

In the present situation of continuing scarcity of material resources and their ever increasing costs, Materials Management has assumed a crucial significance especially in Tractor Manufacturing Companies of India. In Developed Countries, increasing emphasis is being laid on Materials Management for its strategic importance and it is being stressed that use of better materials and its better management can give rise to 'Breakthrough Manufacturing', i.e. a competitive edge for products. In India, though there is growing appreciation of Materials Management, its full potential has yet not been realized. The reasons mentioned are poor vendor. buyer cooperation, improper inventory management, etc. However, one of the major reasons is the lack of proper application of Materials Management function for achieving the highest productivity. All this and the sheer value of the materials purchased every year point to the need for research in Materials

Management function on a short term as well as long-term basis. (*Mahadevan V., 2000*)

Therefore the current research paper is to pragmatically peruse "A *Comparative Analysis of Material Management Practices among Two Leading Tractor Manufacturing Industries of India*". The aim of this research is to ensure optimal decisions, particularly relating to materials planning and programming, purchasing, storage, storekeeping and stores accounting, inventory control, materials handling and traffic, and finally, disposal of surpluses, wastes and obsolete materials. Thus, the need and scope of research in materials management is vast.

## **2. REVIEW OF LITERATURE**

A detailed Literature has been reviewed to make the study relevant. Few key observations obtained from Literature cited are elaborated below:

*Aggarwal S.K. et al (2016)* in his study on Materials Management: A case Study of Bharat Heavy Electricals Limited, Bhopal Unit, (BHEL), has evaluated the existing systems of inventory management. He emphasizes the need for automatic replenishment system in the undertaking

offer studying the application of ABC analysis and EOQ technique of inventory control. He also points out the accumulation of surplus stores and non-moving items in the organization and recommends that the surplus and absolute stores which are no longer required should be disposed off as early as possible at the best available price. Further, he suggests the preparation of monthly class wise statements on inventories for effective control over them and the introduction of reconciliation system of stores ledgers with account ledgers to avoid misappropriation of stores, and spares for production and operation are above their actual consumption level. The inventories in general are found to be above their routine requirements. The holdings of stores and spares corresponding to two to three year's requirements should be considered excess.

*Rao Sambasiva K (2015)* in his Study on Materials Management in Public Sector Ship Building Industry evaluates. The performance of materials management and identifies some problems faced by materials management in the heavy engineering industry. The method of investigation involves the documentary evidence and survey of expert opinion. He evaluates the existing purchase systems and lead time

involved in procurement of materials and suggests that the long lead time should be reduced. His study points at the excess inventory in terms of number of months cost of production in all the engineering units. He also highlights some of the problems in the area of materials management such as delay on the part of customers in supplying their own materials, existence and disposal of surplus and non-moving items, excessive lead times and excessive dependence on imports. According to him the administrative and procurement lead times of the company are on the higher side due to the peculiar nature of the industry. He suggests liberalized purchase procedures, increased financial powers to the personnel, Opening up of liaison offices in various countries to reduce the lead time.

*Swami H. R. et al (2014)* in his research work materials management in public undertakings evaluates the performance of materials management in the central public undertakings in Rajasthan Viz., Instrumentation Limited, Kota Unit, HMT, Ajmer Unit, Hindustan Zinc Limited, Debari Unit, Hindustan Copper Limited, Khetri Unit and Sambhar salts limited. The study covers various aspects of materials management in these enterprises from 1977-

78 to 1981-82. The methods of investigation includes questionnaire interview, on the spot study and desk work techniques etc. It is observed that the cost of materials accounts for more than 50 percent of the total cost of production in the selected units of the study. The importance of proper materials management has not been fully realized by the public undertakings in Rajasthan and very little attention has so far been paid to the task of controlling investment in inventories through the application of various scientific techniques of materials management. The researcher expresses the view that materials management should not cover the inspection function and that an autonomous and independent cell be created in the organization for this purpose. The study reveals that the lead time in the selected public enterprises is considerably long and suggests reduction of administrative lead time by expediting purchase matters.

*Gupta P et al. (2013), and Madan G et al. (2014)* applied that ABC (Always Better Control) and VED (Vital, Essential, and Desirable) selective inventory control techniques are applied for cutting tool inventory modeling and medical stores in an industry. An ABC-VED matrix was

constructed for economic analysis of drug expenditure and cutting tools of priced of different items. It was suggested that to sell off the scraps and extra unused items in order to reduce the inventory holding costs and empty the space which have been unnecessarily being occupied. By this study of selective inventory control techniques they concluded that their inventory more effectively and hence later it helped them to reduce the inventory which added increased productivity, business growth and reduce the losses.

*Kasim M. et al. (2012)* analyzed an improving on site material tracking for inventory management in construction projects. It is important to manage all materials and inventory throughout construction activities and process. Failure in managing site inventory will result in cost overrun, delays in project completion and reduce overall project performance.

*Ali L et al. (2012)* conducted that the previous study in Decision tree analysis will determine the best alternative whether forecasting and EOQ are necessary to be used and it will minimize the cost of raw materials inventory. The results of the analysis are inventory management of iron, cement, sand and split inventory should use

Forecasting method and EOQ (Economic Order Quantity) model. So, companies can manage their inventory management efficiently and effectively.

In this backdrop it was obtained that there is paucity of literature available with opine survey on material management professionals therefore the current research study entitled “*A Comparative Analysis of Material Management Practices among*

*Two Leading Tractor Manufacturing Industries of India*” was undertaken with the objective of comparatively evaluating the prevailing materials management practices with reference to two leading tractor manufacturing companies of India viz HMT and SONALIKA Tractors.

### 3. RESEARCH METHODOLOGY

RESEARCH METHODOLOGY	
Objectives of Research	<ul style="list-style-type: none"> <li>• To comparatively examine the prevailing materials management practices with reference to tractor manufacturing companies under study.</li> <li>• To undertake an opinion survey among the materials management professionals of the study units to comparatively evaluate the internal and external factors influencing the practice of materials management.</li> </ul>
Hypothesis of Research	<p><math>H_0</math>: There is no significant difference between internal factors and successful material management among HMT and Sonalika Tractor Manufacturing Companies.</p> <p><math>H_0</math>: There is no significant difference between external factors and successful material management among HMT and Sonalika Tractor Manufacturing Companies.</p>
Research Design	<p>Exploratory – To know the parameters and formulate the hypotheses.</p> <p>Analytical – To analyze the parameters found out.</p>
Selected Major Manufacturers of Tractor in India	<p>HMT LIMITED</p> <p>SONALIKA TRACTORS PVT LIMITED</p>
Sampling Design	Stratified Random sampling Method

Sample Size	(a)Material Management Professionals of HMT (Sample Size= 100) (b) Material Management Professionals of Sonalika (Sample Size= 100)
Data collection Techniques	Primary Data collection – A framed set of opinion survey for material management professionals of both companies through Google Docs ( Google Form- E Survey) Secondary Data Collection – Research reports of Tractor Companies, Annual reports, Management books, journals, research papers etc.
Analytical tools For Pilot Study	Cronbach’s alpha for reliability
Statistical Analysis for hypothesis testing	Multivariate ANOVA, Students’’ test.

## 4. RESULTS AND ANALYSIS

### 4.1 Demographic Details of respondents

Demographic study means study of both quantitative and qualitative aspects of selected human population. Quantitative aspects include composition, age, gender,

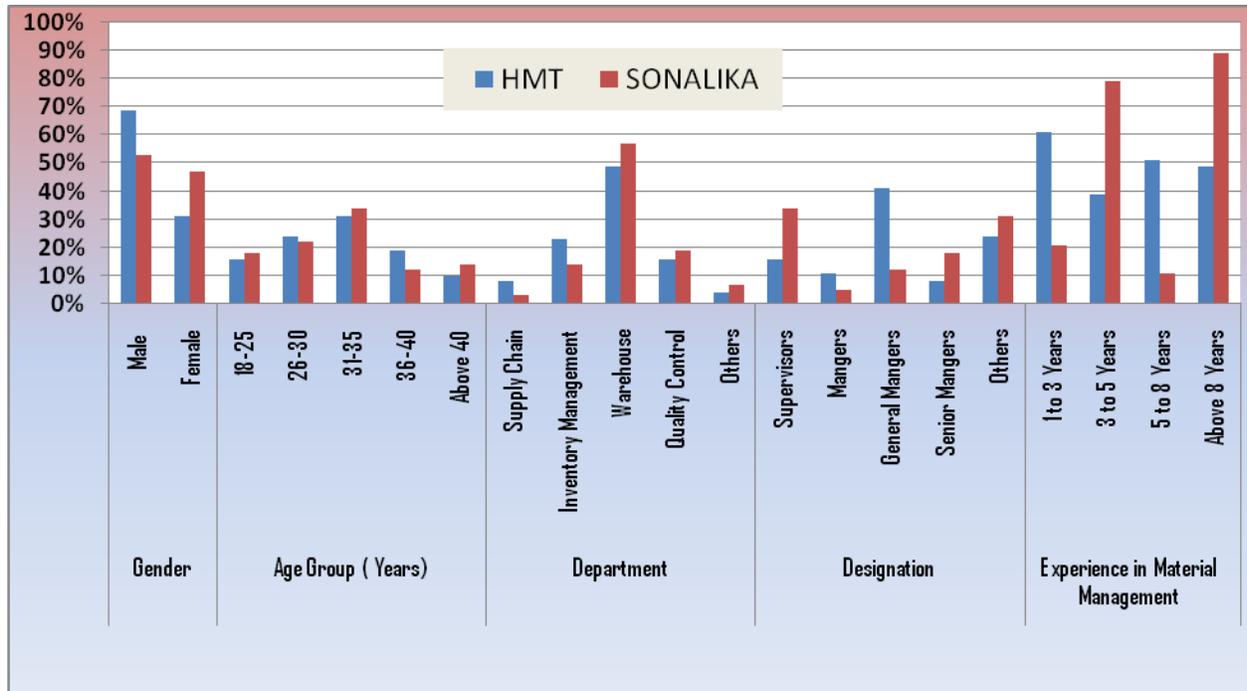
size, and structure of the population. Qualitative aspects are the research specific factors such as current tractor manufacturing material management professionals, etc. Demographic variables of current research study are evaluated in table 1 below.

**TABLE 1 DEMOGRAPHIC DETAILS OF RESPONDENTS**

Sample characteristic	Category	No of Respondents HMT (N=100)	No of Respondents SONALIKA (N=100)
<b>Gender</b>	Male	69%	53%
	Female	31%	47%
<b>Age Group ( Years)</b>	18-25	16%	18%
	26-30	24%	22%
	31-35	31%	34%
	36-40	19%	12%
	Above 40	10%	14%
<b>Department</b>	Supply Chain	8%	3%
	Inventory Management	23%	14%
	Warehouse	49%	57%
	Quality Control	16%	19%
	Others	4%	7%
<b>Designation</b>	Supervisors	16%	34%

<b>of Respondents</b>	Mangers	11%	5%
	General Mangers	41%	12%
	Senior Mangers	8%	18%
	Others	24%	31%
<b>Experience in Material Management</b>	1 to 3 Years	61%	21%
	3 to 5 Years	39%	79%
	5 to 8 Years	51%	11%
	Above 8 Years	49%	89%

**CHART 1 DEMOGRAPHIC DETAILS OF RESPONDENTS**



Both Male and Female material management professionals of HMT and Honda were analyzed as respondents of current study. 69% and 53 % of respondents were male whereas 31% and 47% of respondents were female respectively for HMT and Sonalika Tractors Manufacturing

Company. All age group of respondents acted as respondents of current research study, which makes the study more reliable.

Another important demographic parameter which correlates with current research study is material management sub department of respondents 8% and 3% of

Respondents were from Supply Chain department respectively of HMT and Sonalika, whereas 23% and 14% were analyzed from Inventory Management in same companies respectively. Other respondents were from Warehouse, Quality Control and other relevant departments. Respondents were acting at various designations viz Supervisors, Managers, General Managers, etc with varied experience level of handling material

management skills, which makes the present research endeavor more reliable.

#### 4.2 Comparative Analysis of Internal Factors of Material Management

In current research various internal factors having significant impact on the successful implementation of material management in the manufacturing organization was analyzed for selected respondents. Results are depicted in table 2 below:

**TABLE 2 - INTERNAL FACTORS OF MATERIAL MANAGEMENT**

S.No	INTERNAL FACTORS	Respondents Opinion HMT ( N =100)					Respondents Opinion SONALIKA (N =100)				
		1	2	3	4	5	1	2	3	4	5
(a)	Demand for the item	8	11	16	37	27	10	19	18	42	11
(b)	Supply of the item	4	16	10	32	38	5	19	20	44	12
(c)	Total lead time	15	18	19	38	10	9	17	14	38	22
(d)	Rejection rate	18	11	14	46	11	10	16	15	47	12
(e)	Storage capacity	17	27	12	37	7	12	21	16	41	10
(f)	Plant utilization	25	49	12	6	8	33	38	12	11	6
(g)	Delegation of authority	51	35	8	2	4	31	32	19	10	8
(h)	Cost criticality, reliability, availability of items	24	39	15	19	3	39	24	14	18	5
(i)	Forecasting techniques	11	54	12	10	13	24	20	12	25	19

(Where 5= Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, 1=Strongly Disagree.)

#### Interpretation

The above table 2 internal factors responsible for successful implementation of Material Management in Tractor Manufacturing companies. Various internal factors analysed in opinion survey are Demand for the item, Supply of the item;

Total lead time; Rejection rate; Storage capacity; Plant utilization; Delegation of authority; Cost criticality, reliability, availability of items and Forecasting techniques. All factors are rated on Likert's scale with the agreeability of responses.

It was attained from outcome that various internal factors have their outmost significance and relevance in material management.

### 4.3 Comparative Analysis of External Factors of Material Management

In current research various external factors having significant impact on the successful implementation of material management in the manufacturing organization was analyzed for selected respondents. Results are depicted in table 3 below:

**TABLE 3 - EXTRENAL FACTORS OF MATERIAL MANAGEMENT**

Q.No	EXTRENAL FACTORS	Respondents Opinion HMT ( N =100)					Respondents Opinion SONALIKA (N =100)				
		1	2	3	4	5	1	2	3	4	5
(a)	State of Health of National Economy	10	15	6	36	33	2	21	15	37	25
(b)	Technology availability	13	14	8	37	28	10	24	10	39	17
(c)	Seasonal factors	14	16	7	49	24	16	12	14	45	13
(d)	Business cycles	19	17	14	34	16	14	18	16	39	13
(e)	Import policy	10	18	15	45	12	11	12	15	55	07
(f)	Price trends and validity	15	18	19	38	10	9	17	14	38	22
(g)	Direct and Indirect taxes	18	11	14	46	11	10	16	15	47	12

(Where 5= Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, 1=Strongly Disagree.)

### Interpretation

Above table 3 explains the respondent's opinion on external internal factors responsible for successful implementation of Material Management in Tractor Manufacturing companies. Various internal factors analysed in opinion survey are State of Health of National Economy; Technology availability; Seasonal factors; Business cycles; Import policy; Price trends and validity and last but not least Direct and Indirect taxes

All factors are rated on Likert's scale with the agreeability of responses.

It was attained from outcome that various external factors have their outmost significance and relevance in material management.

### 4.3 Hypothesis Testing

In current research study on table 2 and 3 i.e on internal and external factors responsible for successful functioning of material management in tractor manufacturing companies under study, respondents opinion survey frequency values were statistically analyzed above

Likert's scale values with one way ANOVA  
by using SPSS and results are as mentioned :

ANOVA							
GROUP			Sum of Squares	df	Mean Square	F	P Value (Sig)
INTERNAL FACTORS	HMT	Between Groups	1.472	5	.294	1.010	.003
		Within Groups	58.610	5	.292		
		Total	60.082	5			
	SONALIKA	Between Groups	5.322	5	1.064	3.746	.097
		Within Groups	57.118	5	.284		
		Total	62.440	5			
EXTRENAL FACTORS	HMT	Between Groups	.580	5	.116	.546	.021
		Within Groups	42.710	5	.212		
		Total	43.290	5			
	SONALIKA	Between Groups	1.493	5	.299	.947	.085
		Within Groups	63.364	5	.315		
		Total	64.858	5			

Respondents opinion were statistically analyzed with One Way ANOVA with the help of SPSS Software and the obtained P value was highly significant in case of HMT in both Internal and External factors whereas in significant in case of Sonalika tractors company therefore the results concluded that null

hypothesis  $H_0$ - *There is no significant difference between internal factors as well as external factors and successful material management among HMT and Sonalika Tractor Manufacturing Companies is rejected* and Alternate Hypothesis  $H_a$ : *There is a significant difference between internal factors as well as external factors*

*and successful material management among HMT and Sonalika Tractor Manufacturing Companies is **accepted and proved.***

## **5. CONCLUSION AND RECOMMENDATIONS**

In order to achieve the objectives of Materials Management, both the tractor manufacturing companies under study have adopted an integrated approach towards materials management. HMT, have adopted centralized organizational structure in their materials departments. However, the delegation of commensurate authority to the subordinates is fully accomplished in HMT but lack in Sonalika Tractors Company. The notion of delegation of authority has made only tentative beginning in the Sonalika Tractors Company. Inventories constitute the largest component of current assets in Tractor Companies under study. Poor management of inventories, therefore, may result in business failures. A stock-out creates an unpleasant situation for the organization. In case of manufacturing organization, the inability to supply an item from inventory could, in extreme cases, bring production process to a halt. Conversely, in case of excessive inventories, the added carrying cost may represent the

difference between the profit and loss. Efficient inventory control, therefore, can significantly contribute to the overall profit position of the organization.

The paper concludes that evidently, the opinion survey confirms that the knowledge-ability of the individual Materials Management Professionals about the materials management function perse is far ahead of the actual materials management practices of their respective organizations. Thus, it is noted by the researcher that the perception of the Materials Management Professionals seems to be more scientific; however, the implementation, especially in the Sonalika tractors, is lax.

Having cross examined the above fact, the researcher was told by the Materials Management Professionals that the application of scientific materials management function does not suit the prevailing organizational environment

Finally, it can be suggested that it is advantageous to develop an organization's materials management manual describing all aspects of the materials management function by every unit of tractor manufacturing companies.

## REFERENCES

- **Aggarwal S., Muninarayanaappa** .(2016), “Impact of Cost of Holding Inventory on the Profits & Sales of the BHEL with the Help of ABC Analysis & EOQ- A Study”, Journal of Business Management & Social Sciences Research (JBM&SSR), ISSN: 2319-5614, Volume 2, No.1, 70-80.
- **Ali J., Khan R., Ahmad N., Masgood I** (2012)., “Random Forests and Decision Trees”, IJCSI International Journal of Computer Science Issues, ISSN No: 1694-0814 (Online), Volume 9, Issue 5, No 3, 272-278.
- **Gopalakrishan P., Sundaresan M.**,(2011) “Materials Management An Integrated Approach”, Third Edition, ISBN : 978-81-203-0027-9, PHI Learning Private Limited, January 2011.
- **Gupta R., Gupta K. K., Jain B.R., Garg R. K.**,(2007) “ABC and VED Analysis in Medical Stores Inventory Control”, Medical Journal of Advance Finance India (MJAFI), volume 63,Issue 4, 325-327.
- **Guidelines for Materials Management** in Public Sector Enterprises’, 1979, Ministry of Finance, Government of India, New Delhi.
- **Swami H. R., Harsh s., Pitroda J. P. and Bhavsar J. J.**,(2014) “ Analyzing Inventory Material Management Control Technique On Residential Construction Project”, International Conference on: “Engineering: Issues, opportunities and Challenges for Development, ISBN: 978-81-929339-3-1
- **Kasim N., Liwan S. R., Shamsuddin A., Zainal R., Kamaruddin N. C.**,(2012) “ Improving On-Site Materials Tracking For Inventory Management In Construction Projects”, International Conference of Technology Management, Business and Entrepreneurship, Article ID ICTMBE2012, 447-452.
- **Kulkarni P.U.**, (2007), ‘ABC Analysis: A Technique of Inventory Management’, The Management Accountant, Calcutta, p.875.
- **Madan G. K. and Gupta Ranganath P. S.**,(2014) “Application of Selective Inventory Control

Techniques for Cutting Tool Inventory Modeling and Inventory Reduction-A Case Study”, International Conference of Advance Research and Innovation (ICARI), ISBN 978-93-5156-328-0, 127-135.

- **Mahadevan V, (2000)**, ‘MM and its Role in Corporate Management’, The Materials Manager, Indian Institute of MM (IIMM), p.7.
- **Rao Sambasiva K and. G., Dube C. B.,(2015)** “Implementing an

improved inventory control system in a small company: a case study”, Production Planning and Control, ISSN: 0953-7287, Volume 17, Issue 1, January 2006, 67-76

- **Verma M.M., (1984)**, ‘Materials Management’, Sultan Chand and Sons, New Delhi. Vol. XXXIX No. 11, PP.39-43.