CHAPTER – 5

AN ANALYTICAL STUDY OF INVENTORY MANAGEMENT IN MAWANA SUGARS LIMITED

Inventories are goods held for eventual consumption / sale by any concern. These are one of the major & essential elements which help an organization in obtaining the desired levels of turnover. Also, inventories constitute a major element of the total working capital and hence it has been correctly observed that

"Good inventory management is good financial management"

Inventory management covers a large number of issues including fixation of minimum and maximum levels; determining the size of the inventory to be carried; deciding upon the issue price policy; setting up receipt and inspection procedure; determining the economic order quantity; providing proper storage facilities; keeping heck on obsolescence and setting up effective information system with regard to the inventories. However, management of inventories involves two basic problems-

1. Maintaining a minimum investment in inventories to minimize the direct-indirect costs associated with holding inventories to maximize the profitability, and
2. Maintaining a sufficiently large size of inventory for efficient and smooth production and sales operations.

Inventories should neither be excessive nor inadequate. If inventories are kept at a high level, higher interest and storage costs would be incurred. On the other hand, a low level of inventories may result in frequent interruption in the production schedule resulting in underutilization of capacity and lower sales. The objectives of inventory management is, therefore, to determine and maintain the optimum level of investment in inventories which help in achieving the following objectives-

1. Keeping investment in inventories at the optimum level.
2. Minimizing the carrying costs.
3. Ensuring a continuous supply of materials to production department facilitating uninterrupted production.
4. Maintaining sufficient stock of finished goods for smooth sales operations.
5. Maintaining sufficient stock of raw material in periods of short supply.

At Mawana Sugars Limited, the inventories can be classified into four main categories-

1.STORES, SPARE PARTS, TOOLS & APPLIANCES: Stores and spares is a term which commonly covers all kinds of supply necessary to keep production equipment operating to turnout production to the desired quantity and quality at the desired time.

2.RAW MATERIALS: These are goods which have not yet been committed to production in a manufacturing firm. They may consist of basic raw materials or finished components. Raw material that is consumed in the manufacturing process, is physically incorporated in the finished product, and can be traced to products conveniently is called ***direct material***. In other words, this includes inventory of all materials before they are placed into production.

3.WORK IN PROCESS: This includes those materials which have been committed to production process but have not yet been completed. This includes all materials before they are placed into production.

4.FINISHED GOODS: These are completed products awaiting sale. These are the final output of the production process in a manufacturing firm. This includes manufactured goods that are complete and ready for sale.

The levels of the above stated four kinds of inventories differ depending upon the nature of the business. For example, a manufacturing firm will have levels of all the four kind of inventories, while a retailer or a wholesaler will have a high level of inventories of finished goods but will have no level of raw materials or work in process. And relatively lower level of stores, spare parts etc. Furthermore, inventories may be durable or non-durable, perishable or non-perishable etc. depending upon the nature of the business concerned.

BENEFITS OF KEEPING INVENTORIES AT MAWANA SUGARS LIMITED

Keeping inventories helps a company in separating the process of purchasing, producing and selling various goods. In case a company does not hold sufficient stock of raw materials, finished goods etc., the purchasing would take place only at the time of receiving order from the customer. It could result in delay in executing their valuable orders because of difficulties in obtaining / procuring raw materials, finished goods etc. Thus, inventories provide cushion so that the purchasing, production and sales functions can proceed at optimum speed.

The specific benefits of keeping sufficient inventories can be put as follows-

(I) **AVOIDING LOSSES IN SALES**: If a company maintains adequate inventories, it can easily avoid losses on account of losing the customers for non-supply of goods in time.

(II) **EFFICIENT PRODUCTION RUNS**: Maintenance of large inventories helps a manufacturing company in reducing its set-up costs associated with each production run.

(III) **REDUCTION IN ORDERING COSTS**: The variable cost associated with individual orders (like checking, approving, typing, mailing the order etc.) can be reduced if a company places a few large orders than numerous small orders.

Thus, inventories assist the company in making sufficiently high runs resulting in lowering down the set-up costs. Moreover, adequate inventories protect against shortage that may delay or halt production.

5.1 Management of Inventory in Mawana Sugars Limited

As stated earlier, the researcher was not able to get the desired & detailed information regarding the inventory policy, techniques etc. from the management of both the sugar mills; as such the researcher has to rely on the

secondary data / information available at the internet and websites of both these companies.

Even then the analysis was conducted and results were drawn and interpreted with the help of data available, as under-

5.1 (A) STORES & SPARES: The absolute and relative changes (i.e. *changes in percentage*) that took place in the stock level of stores and spares, ***as per the actual published data of MSL***, can be enumerated with the help of following table –

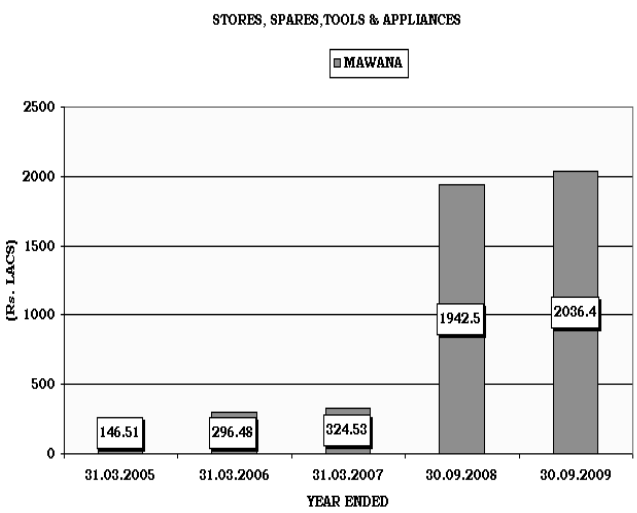
TABLE NO. 5.1

SHOWING ABSOLUTE AND RELATIVE CHANGES IN THE STOCK OF STORES & SPARES

YEAR ENDED	STOCK –STORES & SPARES	CHANGE	
	(Rs.Lacs)	(Rs.Lacs)	(%)
31.03.2005	146.51		
31.03.2006	296.48	149.97	102
31.03.2007	324.53	28.05	9
30.09.2008	1942.50	1617.97	499
30.09.2009	2036.40	93.90	5
Source : *Annual Reports of Mawana Sugars Limited*			

It is clear from the above table that there is a wide fluctuation in the level of stores & spares being maintained by Mawana Sugars Limited which varied from a minimum 5% to the maximum 499% (approx. 5 times) during the study period. The whole of the situation can

be reflected at a glance with the help of the following graph –



As the Mawana Sugars Limited (MSL) has changed its financial year from March end to September end in the financial year 2007-08, because of this its financial year 2007-08 comprises of 18 months instead of usual period of 12 months. Thus, in order to be comparable, the published data is proportionately changed & modified to 12 months period, which bring altogether different picture of business operations, and has affected several items, viz., cost of goods sold, raw material consumed, inventory turnover ratio, inventory holding period etc., especially inventories at the end of not only this financial year 2007-08 but also the next financial year 2008-09. The year of change and the corresponding modified data are shown in the following tables with yellow background and the affected succeeding & preceding years' data with green

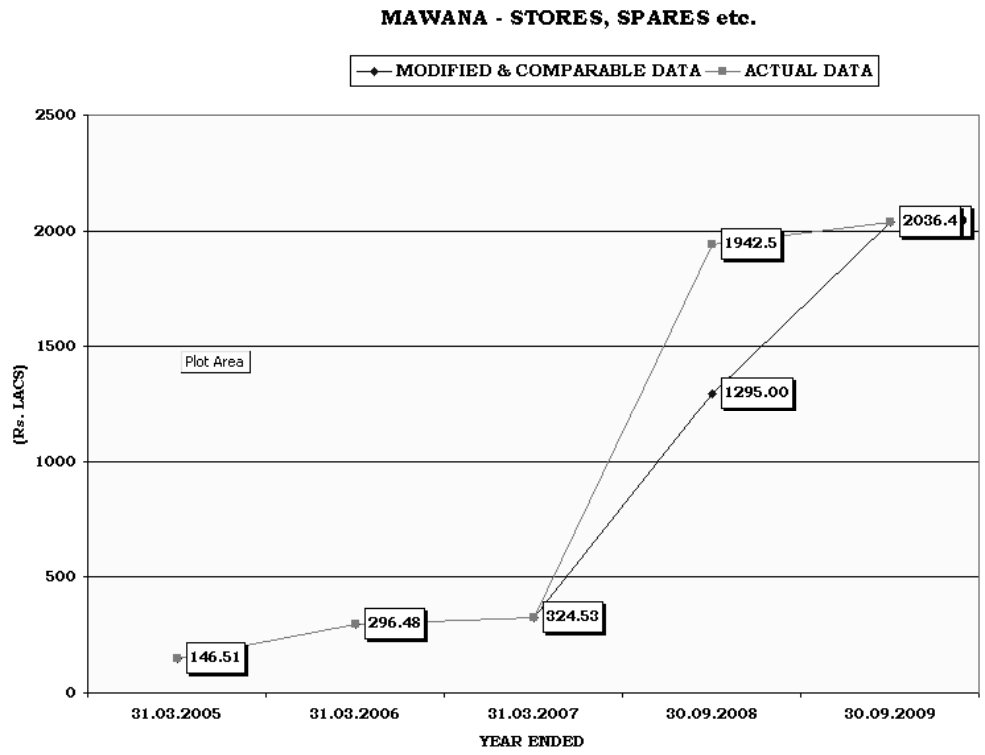
background, in order to make them easily identifiable. Accordingly, the results obtained are as under-

TABLE NO. 5.2

SHOWING ABSOLUTE AND RELATIVE CHANGES IN THE STOCK OF STORES & SPARES / TOOLS & APPLIANCES

STORES & SPARES / TOOLS & APPLIANCES (*MODIFIED & COMPARABLE*)			
YEAR ENDED	STOCK	CHANGE	
	(Rs.Lacs)	(Rs.Lacs)	(%)
31.03.2005	146.51		
31.03.2006	296.48	149.97	102
31.03.2007	324.53	28.05	9
30.09.2008	1295.00	970.47	299
30.09.2009	2036.40	741.40	57

This has resulted in changes in the absolute figure from Rs.1617.97 lacs to Rs.970.47 lacs resulting into 299% increase instead of 499% increase, as shown earlier. This has also affected the next year 2008-09 figures and has resulted in 57% increase instead of earlier recorded increase of 5% only Thus, it seems that the change of financial year from 12 months to 18 months has helped MSL to portray a better & different picture of its financial results, which itself is evidenced from the changes noted above. This can be shown with the help of graph also -



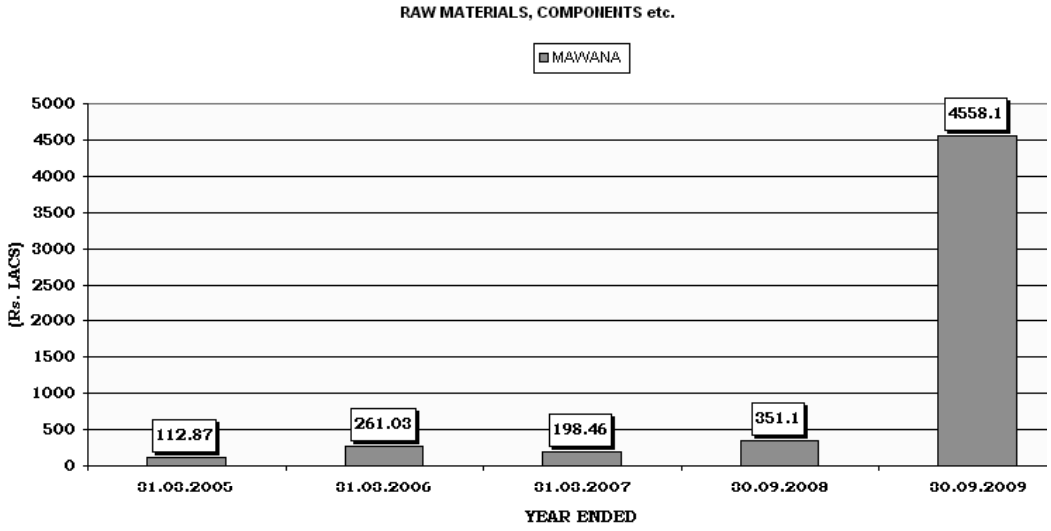
5.1 (B) RAW MATERIALS: Similarly, the absolute changes and changes in percentage in the stock level of raw materials, components etc. can also be described with the help of following table –

TABLE NO. 5.3

SHOWING ABSOLUTE AND RELATIVE CHANGES IN THE STOCK OF RAW MATERIAL, COMPONENTS etc.

YEAR ENDED	STOCK - RAW MATERIAL, COMPONENTS etc.	CHANGE	
	(Rs.Lacs)	(Rs.Lacs)	(%)
31.03.2005	112.87		
31.03.2006	261.03	148.16	131
31.03.2007	198.46	-62.57	-24
30.09.2008	351.10	152.64	77
30.09.2009	4558.10	4207.00	1198
Source : *Annual Reports of Mawana Sugars Limited*			

It is clear from the above table that there is a wide fluctuation in the level of raw materials also which turned negative in the year 2006-2007 on one hand and rose to extreme positive in the year 2008-2009. This situation can also be reflected with the help of the following graph-



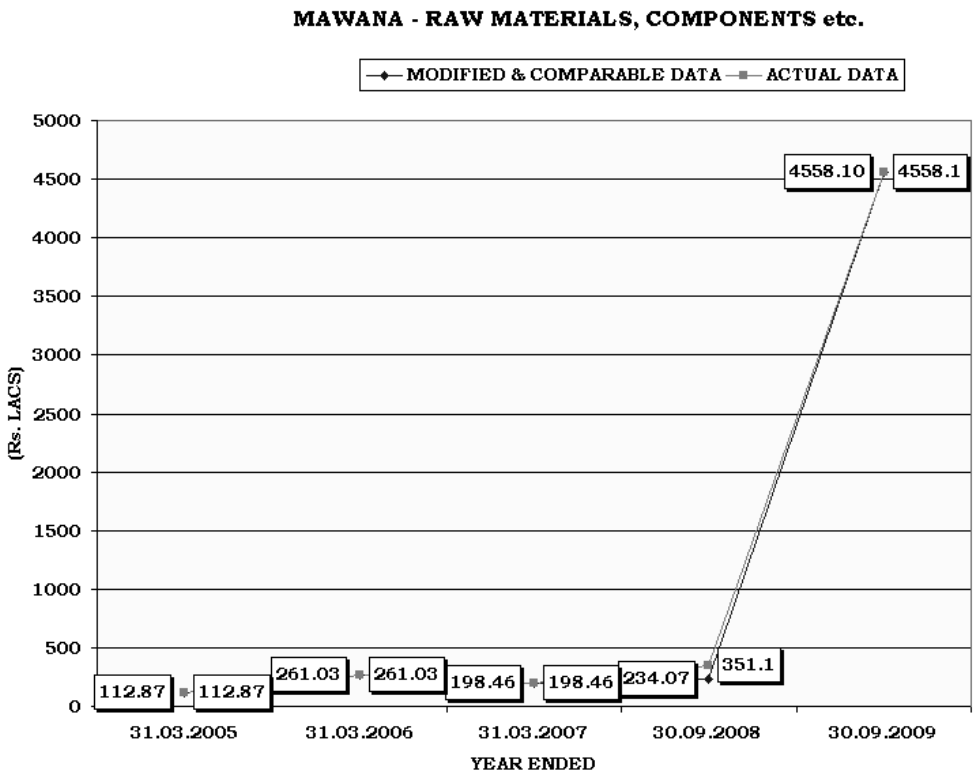
But, the picture portrayed by the **modified and comparable data** can be enumerated as under-

TABLE NO. 5.4

SHOWING ABSOLUTE AND RELATIVE CHANGES IN THE STOCK OF RAW MATERIAL, COMPONENTS etc.

RAW MATERIALS, COMPONENTS etc. (*MODIFIED & COMPARABLE*)			
YEAR ENDED	STOCK	CHANGE	
	(Rs.Lacs)	(Rs.Lacs)	(%)
31.03.2005	112.87		
31.03.2006	261.03	148.16	131
31.03.2007	198.46	-62.57	-24
30.09.2008	234.07	35.61	18
30.09.2009	4558.10	4324.03	1847

This is clear that earlier the change that was recorded as 77% and 1198% during the years 2007-08 & 2008-09 respectively now becomes 18% and 1847%, showing a decrease of 59% in 2007-08 on one hand and an increase of 649% in 2008-09, on the other. This can be seen very clearly with the help of graph also –



5.1 (C) <u>WORK IN PROGRESS</u>: Likewise, the absolute and relative changes in the stock level of work in progress can also be analysed with the help of following table-

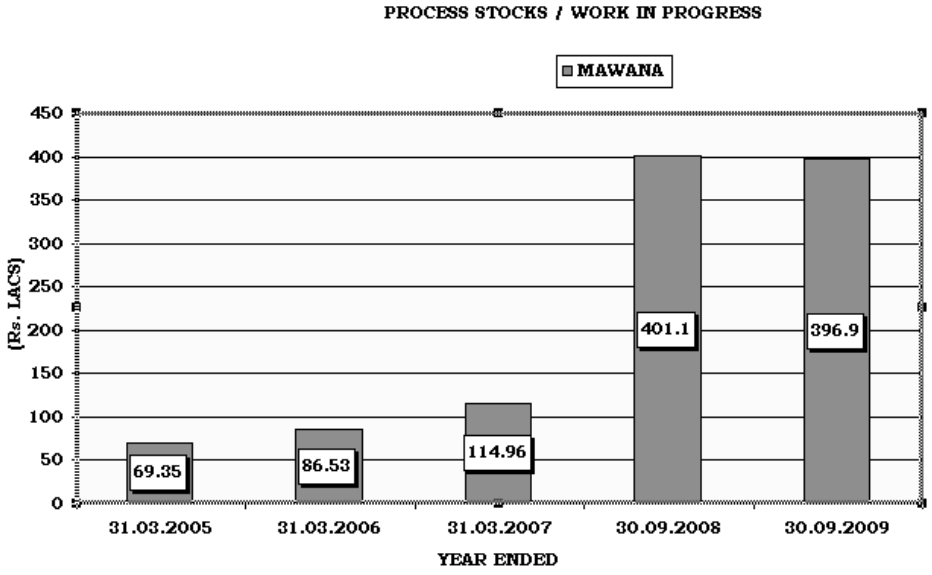
TABLE NO. 5.5

SHOWING ABSOLUTE AND RELATIVE CHANGES IN THE STOCK OF WORK IN PROGRESS

YEAR ENDED	STOCK – WORK IN PROGRESS	CHANGE	
	(Rs.Lacs)	(Rs.Lacs)	(%)
31.03.2005	69.35		
31.03.2006	86.53	17.18	25
31.03.2007	114.96	28.43	33
30.09.2008	401.10	286.14	249
30.09.2009	396.90	-4.20	-1

Source : *Annual Reports of Mawana Sugars Limited*

It is evident from the above table that there is a positive change in the first three years especially a sudden increase of 249% in the year 2007-2008 followed by a sudden decrease / downfall of 1% in the last financial year (2008-2009) so far as the level of work in progress of Mawana Sugars Limited is concerned. This picture can also be portrayed with the help of following graph –



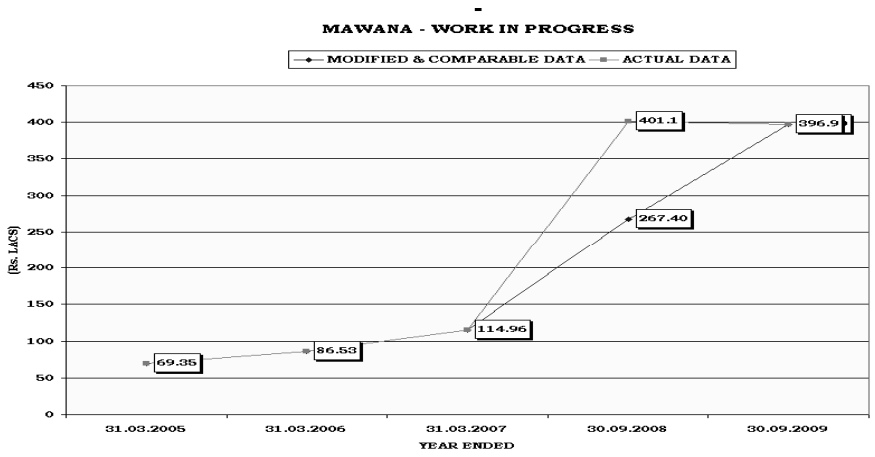
But, the modified and comparable data can be shown with the help of following table –

TABLE NO. 5.6

SHOWING ABSOLUTE AND RELATIVE CHANGES IN THE STOCK OF WORK IN PROGRESS

PROCESS STOCKS / WORK IN PROGRESS (*MODIFIED & COMPARABLE*)			
YEAR ENDED	STOCK	CHANGE	
	(Rs.Lacs)	(Rs.Lacs)	(%)
31.03.2005	69.35		
31.03.2006	86.53	17.18	25
31.03.2007	114.96	28.43	33
30.09.2008	267.40	152.44	133
30.09.2009	396.90	129.50	48

This also brings the drastic changes in the figures of 2007-08 and 2008-09. Earlier, in 2007-08, there was an increase of 249% in comparison to the figures of 2006-07, which now stands reduced to 133%. The next year also witnessed these changes and the decrement of 1% suddenly changed to an increase of 48% in the stock levels of work in progress in the year 2008-09. A graphical presentation of the above can be easily understood as under –



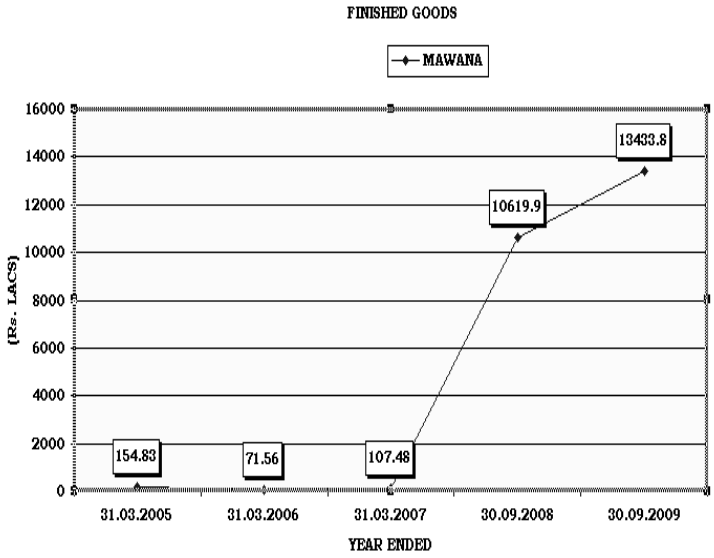
5.1 (D) FINISHED GOODS: Last but not the least, the absolute and relative changes in the finished goods' stock level can be analysed with the help of following table-

TABLE NO. 5.7

SHOWING ABSOLUTE AND RELATIVE CHANGES IN THE STOCK OF FINISHED GOODS

YEAR ENDED	STOCK – FINISHED GOODS	CHANGE	
	(Rs.Lacs)	(Rs.Lacs)	(%)
31.03.2005	154.83		
31.03.2006	71.56	-83.27	-54
31.03.2007	107.48	35.92	50
30.09.2008	10619.90	10512.42	9781
30.09.2009	13433.80	2813.90	26
Source : *Annual Reports of Mawana Sugars Limited*			

It is clear from the above table that after negative changes in the year 2005-2006, the finished goods stock position improved to a certain extent but again in the year 2007-2008 it rose manifolds and touched an abnormal height of 9781% followed by a comparatively normal increase of 26% in the last year. This situation can also be easily reflected with the help of the following graph –



Here too, the changes due to modified and comparable data, can be seen quite prominently, which is evident from the following data –

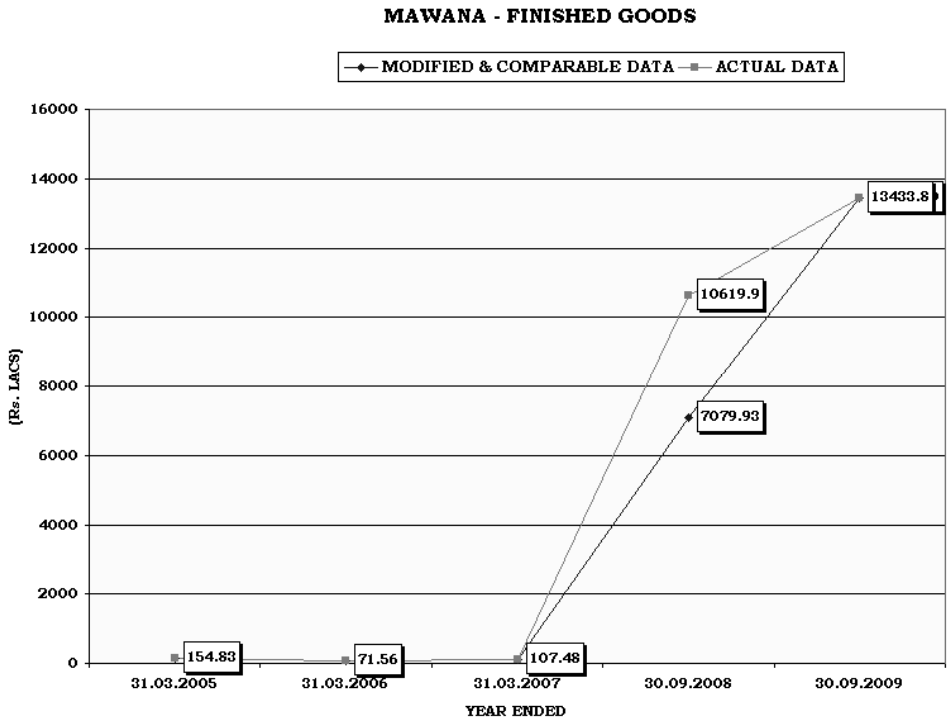
TABLE NO. 5.8

SHOWING ABSOLUTE AND RELATIVE CHANGES IN THE STOCK OF FINISHED GOODS

FINISHED GOODS (*MODIFIED & COMPARABLE*)			
YEAR ENDED	STOCK	CHANGE	
	(Rs.Lacs)	(Rs.Lacs)	(%)
31.03.2005	154.83		
31.03.2006	71.56	-83.27	-54
31.03.2007	107.48	35.92	50
30.09.2008	7079.93	6972.45	6487
30.09.2009	13433.80	6353.87	90

Thus the earlier growth of 9781% of 2007-08 stands reduced to only 6487% but the earlier increase of 26%

(pertaining to the financial year 2008-09) increased to the level of 90%. The following graph would clear these changes quite easily –



These changes are self-evident and self-explanatory of what sort of picture was tried to be portrayed by Mawana Sugars Limited and what actually it should have been, if comparability with previous and forthcoming years' data is to be taken into account.

5.2 Inventory Turnover Ratios of Mawana Sugars Limited

INVENTORY TURNOVER RATIO: *In accounting, the Inventory turnover is an equation that measures the number of times inventory is sold or used over in a period such as a year. Inventory turnover is also known as inventory turns, stock turn, stock turns, turns, and stock turnover.*

APPLICATION IN BUSINESS

A low turnover rate may point to overstocking, obsolescence, or deficiencies in the product line or marketing effort. However, in some instances a low rate may be appropriate, such as where higher inventory levels occur in anticipation of rapidly rising prices or shortages. A high turnover rate may indicate inadequate inventory levels, which may lead to a loss in business.

Cost of sales yields a more realistic turnover ratio, but it is often necessary to use sales for purposes of comparative analysis. Cost of sales is considered to be more realistic because of the difference in which sales and the cost of sales are recorded. Sales are generally recorded at market value, i.e. the value at which the marketplace paid for the good or service provided by the firm. In the event that the firm had an exceptional year and the market paid a premium for the firm's goods and services then the numerator may be an inaccurate measure. However, cost of

sales is recorded by the firm at what the firm actually paid for the materials available for sale. Additionally, firms may reduce prices to generate sales in an effort to cycle inventory.

An item whose inventory is sold (turns over) once a year has higher holding cost than one that turns over twice, or three times, or more in that time. Stock turnover also indicates the briskness of the business. The purpose of increasing inventory turns is to reduce inventory for *three* reasons.

Increasing inventory turns reduces holding cost. The organization spends less money on rent, utilities, insurance, theft and other costs of maintaining a stock of good to be sold.

- Reducing holding cost increases net income and profitability as long as the revenue from selling the item remains constant.

Items that turn over more quickly increase responsiveness to changes in customer requirements while allowing the replacement of obsolete items. This is a major concern in fashion industries.

However, high turns may indicate that the inventory is too low. This often can result in stock shortages.

- When making comparison between firms, it's important to take note of the industry, or the

comparison will be distorted. Making comparison between a supermarket and a car dealer, will not be appropriate, as supermarket sells fast moving goods such as sweets, chocolates, soft drinks so the stock turnover will be higher. However, a car dealer such as Honda will have a low turnover due to the item being a slow moving item. As such only intra-industry comparison will be appropriate.

Thus, the researcher has used the following formulae for the purpose of calculating **Finished Goods Turnover Ratio** as well as **Work-in-Progress Turnover Ratio**

INVENTORY TURN OVER RATIO (also known as ***inventory turns***)

= **COST OF GOODS SOLD ÷ AVERAGE INVENTORY**

or

= **COST OF GOODS SOLD ÷ [(BEGINNING INVENTORY + ENDING INVENTORY) ÷ 2]**

However, Raw Material Turnover Ratio is calculated by applying the following formula –

INVENTORY TURN OVER RATIO

= **RAW MATERIAL CONSUMED ÷ AVERAGE INVENTORY**

or say,

= **RAW MATERIAL CONSUMED ÷ [(BEGINNING INVENTORY +**

ENDING INVENTORY) ÷ 2]

The Mawana Sugars Limited has changed its financial year from April – March to October – September from the financial year 2007-08 and in a similar manner, the Simbhaoli Sugars Limited has also changed its financial year w.e.f. 2006-07. Therefore, in order to make their data comparable with that provided in the preceding and succeeding years, the researcher has modified and converted the available data of both these sugar mills to twelve months (12) from the eighteen (18) months' data. It includes not only the figures of raw material consumed and cost of goods sold but the inventories of stores & spares, raw materials, work in progress and finished goods too. This has also resulted in the changes to the average stock figures of all these inventory items not only of the year of change in financial year but also the succeeding year. This modification helped researcher to make data comparable & authenticated in order to give better & reliable results of his various tests viz., inventory turnover ratios, inventory holding period, trend analysis etc.

5.2 (A) RAW MATERIAL TURNOVER RATIO:

Accordingly, based on the annual reports published by MSL, the Raw Material Turnover ratio of the study period can be described with the help of following table -

TABLE NO. 5.9

SHOWING THE FIGURES OF RAW MATERIAL TURNOVER RATIO

RAW MATERIAL TURNOVER RATIO	
YEAR ENDED	**TIMES**
31.03.2006	10.69
31.03.2007	10.09
30.09.2008	191.66
30.09.2009	16.12
Source: *Annual Reports of Mawana Sugars Limited*	

It is clear from the above table that there is a wide fluctuation in the level of raw materials turnover ratio which reduced to 10.09 times in the year 2006-2007 from 10.69 times of 2005-2006 but reached abnormal height of 191.66 times in the year 2007-2008 followed by a sudden downfall to 16.12 times in the last year 2008-2009.

But, the incorporation of comparability into the data concerned will change these figures as under –

TABLE NO. 5.10

SHOWING THE FIGURES OF RAW MATERIAL TURNOVER RATIO

RAW MATERIAL TURNOVER RATIO (*MODIFIED & COMPARABLE*)	
YEAR ENDED	**TIMES**
31.03.2006	10.69
31.03.2007	10.09
30.09.2008	162.34
30.09.2009	16.51

Here, the raw material turnover ratio of 2007-08 dipped to 162.34 in comparison to the earlier ratio of 191.66 times. But, last year 2008-09 turn over has shown an upward trend and it increased to 16.51 times instead of 16.12 times, calculated earlier.

5.2 (B) WORK IN PROGRESS TURNOVER RATIO: The Work in Progress Turnover ratio of the study period can be described with the help of following table -

TABLE NO. 5.11

SHOWING THE FIGURES OF WORK IN PROGRESS TURNOVER RATIO

WORK IN PROGRESS TURNOVER RATIO	
YEAR ENDED	**TIMES**
31.03.2006	261.44
31.03.2007	152.37
30.09.2008	407.78
30.09.2009	157.05
Source: *Annual Reports of Mawana Sugars Limited*	

This ratio shows alternative downward & upward changes. In 2006-2007 it came down to 152.37 times from the level of 261.44 times in the previous year 2005-2006. Again, in 2007-2008 it rose to 407.78 times, which is the highest value of the study period under consideration, followed by a sudden dip to 157.05 times in the last financial year 2008-2009.

The modified details can be re-stated as under –

TABLE NO. 5.12

SHOWING THE FIGURES OF WORK IN PROGRESS TURNOVER RATIO

WORK IN PROGRESS TURNOVER RATIO (*MODIFIED & COMPARABLE*)	
YEAR ENDED	**TIMES**
31.03.2006	261.44
31.03.2007	152.37
30.09.2008	366.91
30.09.2009	188.66

As can be seen from the above, 2007-08 work in progress turnover ratio dipped to 366.91 times in comparison to the earlier calculated figure of 407.78 times. And last year's ratio has shown changes in opposite direction and increased to 188.66 times in comparison to 157.05 times, as calculated earlier.

5.2 (C) FINISHED GOODS TURNOVER RATIO: The Finished Goods Turnover ratio of the study period can be analyzed with the help of following table -

TABLE NO. 5.13

SHOWING THE FIGURES OF FINISHED GOODS TURNOVER RATIO

FINISHED GOODS TURNOVER RATIO	
YEAR ENDED	**TIMES**
31.03.2006	180.01
31.03.2007	171.48
30.09.2008	19.62
30.09.2009	5.21
Source: *Annual Reports of Mawana Sugars Limited*	

This ratio clearly shows constant downward trend. It started with the highest value of the study period (i.e. 180.01 times) in the year 2005-06 and then reduced to 171.48 times in the year 2006-07. Then it moved downwards to 19.62 in 2007-08, followed by the lowest value of study period (i.e. 5.21 times) in 2008-09.

But, if we took the modified data, the table emerges somewhat like as under –

TABLE NO. 5.14

SHOWING THE FIGURES OF FINISHED GOODS TURNOVER RATIO

FINISHED GOODS TURNOVER RATIO (*MODIFIED & COMPARABLE*)	
YEAR ENDED	**TIMES**
31.03.2006	180.01
31.03.2007	171.48
30.09.2008	19.52
30.09.2009	6.11

In the year of change i.e. 2007-08, the finished goods turnover ratio changed slightly and reduced to 19.52 times in place of 19.62 times recorded earlier. The next year 2008-

09 also got affected by this change and it became 6.11 times instead of 5.21 times calculated earlier.

5.3 Inventory Holding Period of Mawana Sugars Limited

The average inventory period is also referred to as ***Days Inventory*** and ***Inventory Holding Period***. This ratio calculates the average time that inventory is held.

Individual inventories should be looked at to find areas where the inventory, and inventory holding period, can be reduced. The *average inventory period* should be compared to competitors.

Thus, the inverse of Inventory Turnover ratio is used in order to calculate inventory holding period or say,

AVERAGE MONTHS TO SELL INVENTORY

= Number of months a Year ÷ Inventory Turn Over Ratio

= 12 months a year ÷ Inventory Turn over Ratio

Alternatively, this could also be calculated on the basis of total number of weeks or days in a year, as under-

AVERAGE WEEKS TO SELL INVENTORY

= Number of Weeks a Year ÷ Inventory Turn over Ratio

= 52 weeks a year ÷ Inventory Turn over Ratio

OR,

AVERAGE DAYS TO SELL INVENTORY

= Number of Days a Year ÷ Inventory Turn over Ratio

= 365 days a year ÷ Inventory Turn over Ratio

5.3 (A) RAW MATERIAL INVENTORY HOLDING PERIOD:

The Raw Material Inventory Holding Period of the study period can be analyzed with the help of following table –

TABLE NO. 5.15

SHOWING THE FIGURES OF RAW MATERIAL INVENTORY HOLDING PERIOD

RAW MATERIAL INVENTORY HOLDING PERIOD i.e. AVERAGE AGE OF INVENTORY (*IN MONTHS*)	
YEAR ENDED	**MONTHS**
31.03.2006	1.12
31.03.2007	1.19
30.09.2008	0.09
30.09.2009	0.74
Source: *Annual Reports of Mawana Sugars Limited*	

The above table shows that there is a fluctuation throughout the study period. The holding period which was 1.12 in 2005-06, increased to 1.19 months in the year 2006-07. But it touched the lowest of study period in 2007-08 and became 0.09 months. But the last year 2008-09, showed an improvement to certain extent by touching a figure of 0.74 months in that year.

But when we consider the modified & comparable data, it brings the following picture of raw material inventory holding period –

TABLE NO. 5.16

SHOWING THE FIGURES OF RAW MATERIAL INVENTORY HOLDING PERIOD

RAW MATERIAL INVENTORY HOLDING PERIOD i.e. AVERAGE AGE OF INVENTORY (*IN MONTHS*) (*MODIFIED & COMPARABLE*)	
YEAR ENDED	**MONTHS**
31.03.2006	1.12
31.03.2007	1.19
30.09.2008	0.07
30.09.2009	0.73

A change is noted, as 2007-08 figures stand reduced to 0.07 months instead of 0.09 months (as calculated earlier with the help of published data) though next year showed a slight change from 0.74 months to 0.73 months.

5.3 (B) WORK IN PROGRESS INVENTORY HOLDING PERIOD:

The Work in Progress Inventory Holding Period of Mawana Sugars Limited for the study period can be analyzed with the help of following table –

TABLE NO. 5.17

SHOWING THE FIGURES OF WORK IN PROGRESS INVENTORY HOLDING PERIOD

WORK IN PROGRESS INVENTORY HOLDING PERIOD i.e. AVERAGE AGE OF INVENTORY (*IN MONTHS*)	
YEAR ENDED	**MONTHS**
31.03.2006	**0.05**
31.03.2007	**0.08**
30.09.2008	**0.04**
30.09.2009	**0.08**
Source: *Annual Reports of Mawana Sugars Limited*	

The average inventory holding period of work in progress seems to be less variable as it stays around 0.08 months in both the years 2006-2007 and 2008-2009 with an exception in the year 2007-2008, where it reduced to 0.04 months. But, when we recalculate this ratio with the help of modified data, it brings following changes to the figures calculated earlier –

TABLE NO. 5.18

SHOWING THE FIGURES OF WORK IN PROGRESS INVENTORY HOLDING PERIOD

WORK IN PROGRESS INVENTORY HOLDING PERIOD

i.e. AVERAGE AGE OF INVENTORY (*IN MONTHS*) (*MODIFIED & COMPARABLE*)	
YEAR ENDED	**MONTHS**
31.03.2006	0.05
31.03.2007	0.08
30.09.2008	0.03
30.09.2009	0.06

Both the years, showed a decreasing trend. Year 2007-08 figures reduced to 0.03 months from 0.04 months and year 2008-09 inventory holding period reduced to 0.06 months from 0.08 months.

5.3 (C) FINISHED GOODS INVENTORY HOLDING PERIOD:

The Finished Goods Inventory Holding Period for the study period can be tabulated as under –

TABLE NO. 5.19

SHOWING THE FIGURES OF FINISHED GOODS INVENTORY HOLDING PERIOD

FINISHED GOODS INVENTORY HOLDING PERIOD i.e. AVERAGE AGE OF INVENTORY (*IN MONTHS*)	
YEAR ENDED	**MONTHS**
31.03.2006	0.07
31.03.2007	0.07
30.09.2008	0.92
30.09.2009	2.30
Source: *Annual Reports of Mawana Sugars Limited*	

The above table shows that for the first two years finished goods inventory holding period remains almost stable but it registered an extraordinary increase and reached a level of 0.92 months in 2007-2008. In the last year 2008-2009 it increased further and reached the highest figure of study period i.e. 2.30 months.

The incorporation of modified & comparable figures, have its effect on this ratio too, which can be evidenced from the following table –

TABLE NO. 5.20

SHOWING THE FIGURES OF FINISHED GOODS INVENTORY HOLDING PERIOD

FINISHED GOODS INVENTORY HOLDING PERIOD i.e. AVERAGE AGE OF INVENTORY (*IN MONTHS*) (*MODIFIED & COMPARABLE*)	
YEAR ENDED	**MONTHS**
31.03.2006	0.07
31.03.2007	0.07
30.09.2008	0.61
30.09.2009	1.96

There is a tremendous amount of change in the inventory holding period of finished goods. In the year 2007-08, this figure reduced to 0.61 months from 0.92 months and in the next year it dipped to 1.96 months from the earlier calculated figure of 2.30 months.

5.4 Trend Analysis of Inventory Management in Mawana Sugars Limited

Due to paucity of data and other related information pertaining to the various inventory items of Mawana Sugars Limited (*as shown in the tables & graphs above*), the researcher believes that one cannot judge the real trend of various inventory items, especially when it is based on annual changes only. It altogether seems necessary to analyse the long-term movements of all these inventory items. For this very purpose, the researcher has used the ***least square method*** in order to portray a better future picture of various inventory items of Mawana Sugars Limited.

INVENTORY ANALYSIS USING *TREND*

Trend analysis is often used to analyze inventory figures to identify significant changes in the company's operations. When using trend analysis, we may use various sources of information from the business, its competitors, and peer companies, industry averages, and other relevant information such as industry benchmarks. This includes benchmarking ratio of purchase orders to payables and trend analysis in production inventory management. Trends could also vary depending on the nature and principal activity of the business venture, such as an e-commerce outlet or a high-tech biotechnology venture.

Inventory analysis using trend analysis over a period of time provides information that is useful in evaluating operating performance and assessing the current year's

expected condition of a company's inventory. This can be done either over a two year or five year period, depending on the extent of information required for the analysis.

Here, the researcher has spread the inventory analysis over a time-period of five years using trend analysis in order to get proper picture of company's future inventory position.

5.4 (A) STORES, SPARES etc.: The trend analysis of stores, spares etc. of Mawana Sugars Limited can be tabulated as under -

TABLE NO. 5.21

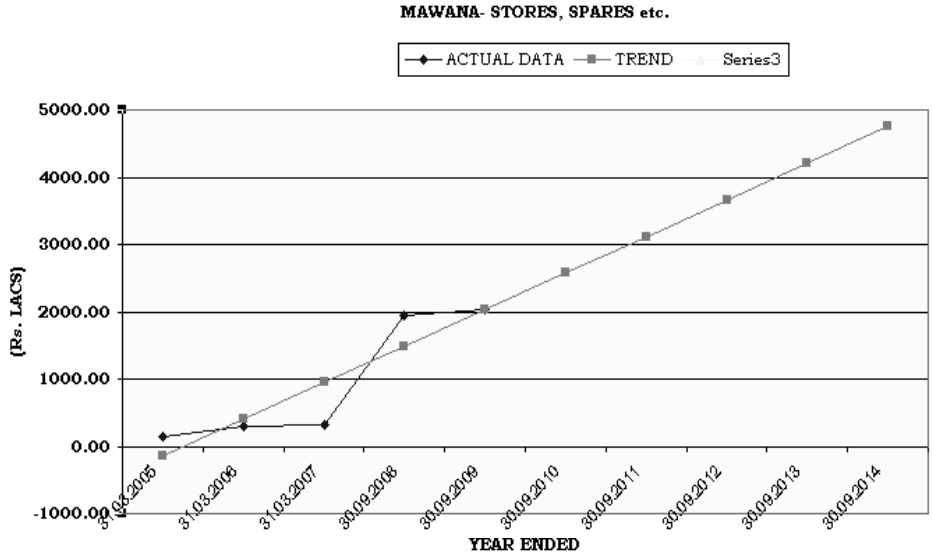
SHOWING TREND VALUES OF STORES, SPARES etc.

YEAR ENDED	STORES, SPARES etc. (Rs. LACS)	TREND VALUES $Y_c=a + bx$
	(Y)	$Y_c = 949.28 + 542.58\ x$
31.03.2005	146.51	-135.88
31.03.2006	296.48	406.70
31.03.2007	324.53	949.28
30.09.2008	1942.50	1491.86
30.09.2009	2036.40	2034.44
30.09.2010	----------	2577.02
30.09.2011	----------	3119.60
30.09.2012	----------	3662.18
30.09.2013	----------	4204.76
30.09.2014	----------	4747.34

The above table shows that there is an increasing trend of Rs. 542.58 lacs per year in the closing stock of stores, spares etc. which is subject to change in the prices of stores & spares items concerned due to fluctuations in purchasing power of rupee in the future and also imposition

or withdrawal of tax, levy, cess etc. pertaining to these items.

The same can also be shown with the help of graph, as under-



But the *modified & comparable data* brings altogether somewhat different picture of trend values of stores, spares etc. –

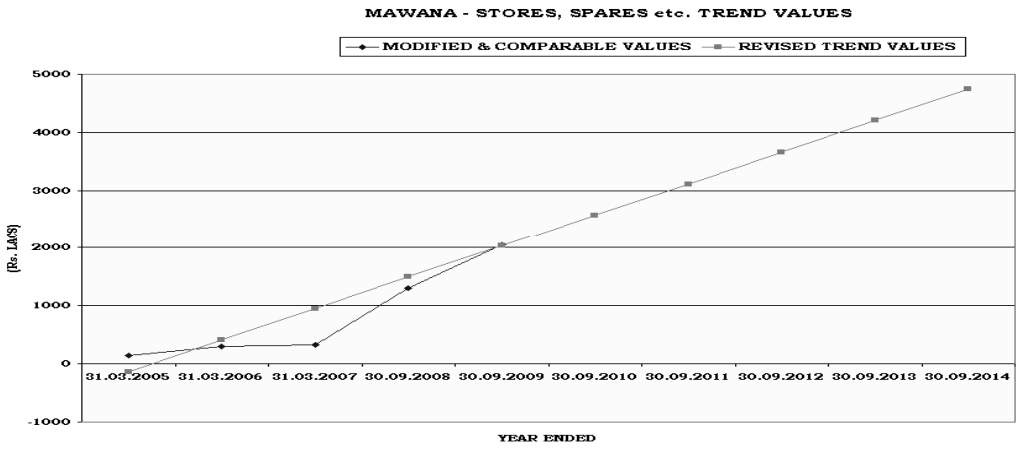
TABLE NO. 5.22

SHOWING *REVISED* TREND VALUES OF STORES, SPARES etc.

MODIFIED & COMPARABLE DATA

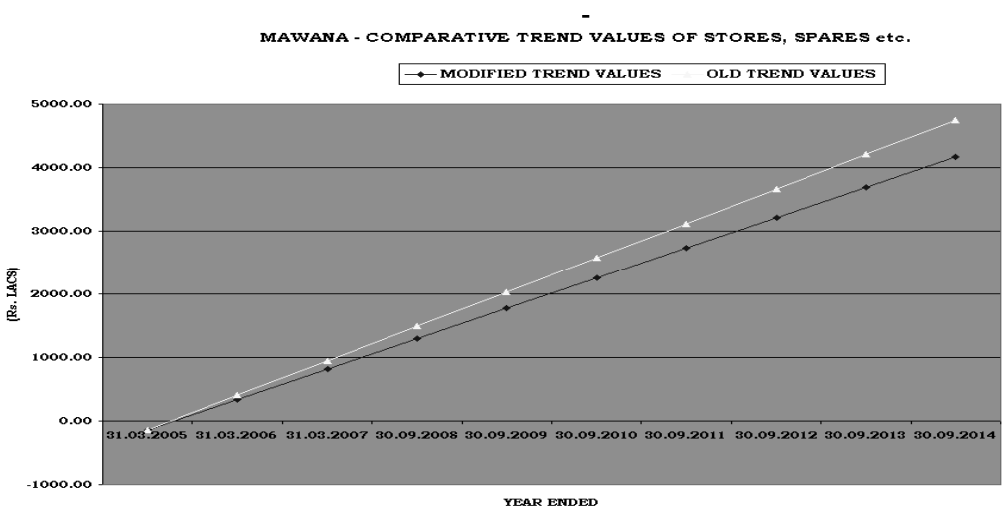
YEAR ENDED	STORES, SPARES etc. (Rs. LACS)	TREND VALUES $Y_c = a + bx$
	(Y)	$Y_c = 819.78 + 477.83\ x$
31.03.2005	146.51	-135.88
31.03.2006	296.48	341.95
31.03.2007	324.53	819.78
30.09.2008	1295.00	1297.61
30.09.2009	2036.40	1775.44
30.09.2010	----------	2253.27
30.09.2011	----------	2731.10
30.09.2012	----------	3208.93
30.09.2013	----------	3686.76
30.09.2014	----------	4164.59

In comparison to the earlier calculated yearly increase of Rs.542.58 lacs it now stands reduced to Rs.477.83 lacs per annum and this has changed all the trend values from the second year 2005-06 onwards. The comparison between these two can be easily portrayed with the help of a graph as under –



And when we compare these two trend values (based upon actual data & modified data) simultaneously

with each other, the picture which comes in front of us would be somewhat like as under –



5.4 (B) <u>RAW MATERIALS, COMPONENTS etc.:</u> The trend analyses of Raw Materials, Components etc. of Mawana Sugars Limited can easily be assessed from the following table no. 5.23 -

TABLE NO. 5.23

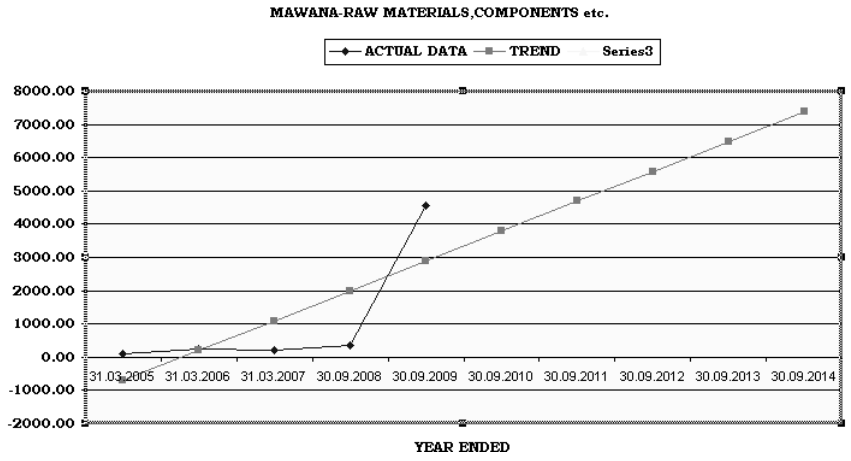
SHOWING TREND VALUES OF RAW MATERIAL, COMPONENTS etc.

YEAR ENDED	RAW MATERIAL, COMPONENTS etc. (Rs. LACS)	TREND VALUES $Y_c = a + bx$
	(Y)	$Y_c = 1{,}096.31 + 898.05\ x$
31.03.2005	112.87	-699.79
31.03.2006	261.03	198.26
31.03.2007	198.46	1096.31
30.09.2008	351.10	1994.37
30.09.2009	4558.10	2892.42
30.09.2010	----------	3790.47
30.09.2011	----------	4688.52

30.09.2012	----------	**5586.58**
30.09.2013	----------	**6484.63**
30.09.2014	----------	**7382.68**

The above table shows that there is an increasing trend of Rs. 898.05 lacs per year in the closing stock of raw materials, components etc. which is also subject to change in their prices due to fluctuations in the value of rupee in times to come and also imposition or withdrawal of tax, levy, cess etc. pertaining to these items.

The same can also be shown with the help of graph, as under-



On the other hand, when we take into account the *modified & comparable data*, the picture that emerges of raw materials, components etc. will be somewhat as under –

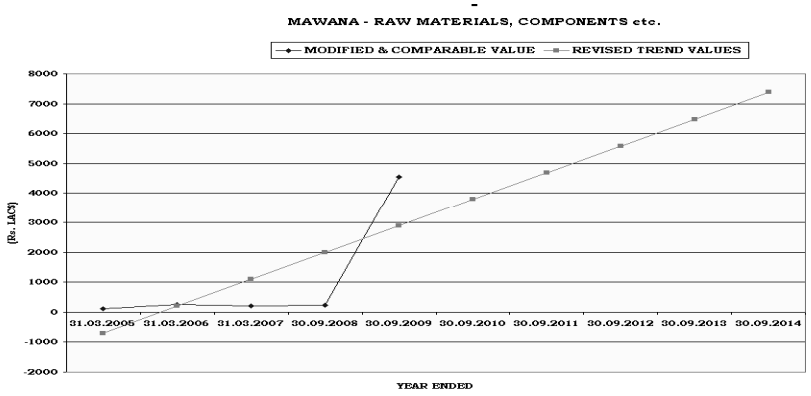
TABLE NO. 5.24

SHOWING *REVISED* TREND VALUES OF RAW MATERIAL, COMPONENTS etc.

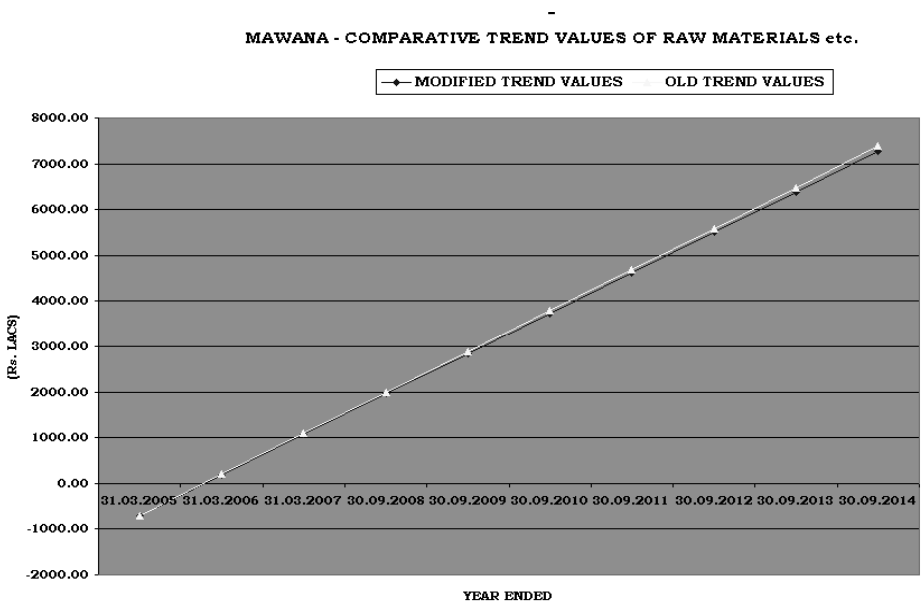
MODIFIED & COMPARABLE DATA

YEAR ENDED	RAW MATERIAL, COMPONENTS etc. (Rs. LACS)	TREND VALUES $Y_c = a + bx$
	(Y)	$Y_c = 1072.91 + 886.35\ x$
31.03.2005	112.87	-699.79
31.03.2006	261.03	186.56
31.03.2007	198.46	1072.91
30.09.2008	234.07	1959.26
30.09.2009	4558.10	2845.60
30.09.2010	----------	3731.95
30.09.2011	----------	4618.30
30.09.2012	----------	5504.65
30.09.2013	----------	6391.00
30.09.2014	----------	7277.35

The revised data brings a yearly increase of Rs. 886.35 lacs instead of Rs.898.05, calculated earlier. This change can be understood with the help of following graph –



These two trend values (*based upon actual data & modified data*) when compared with each other, the picture which comes in front of us would be somewhat like as under –



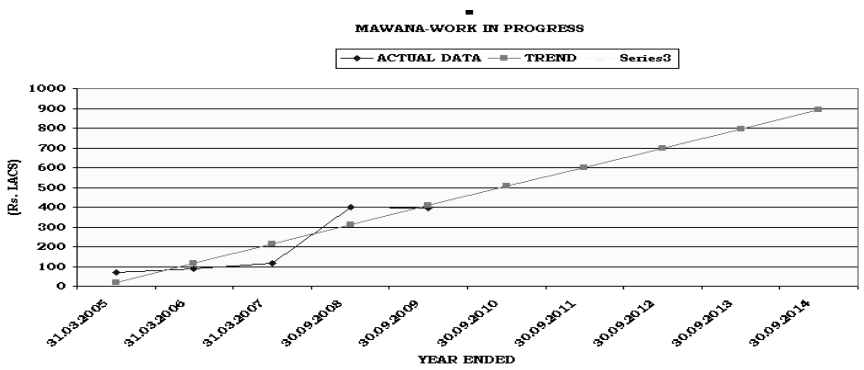
5.4 (C) <u>WORK IN PROGRESS</u>: The trend analyses of work in progress of Mawana Sugars Limited can be judged from the following table-

TABLE NO. 5.25

SHOWING TREND VALUES OF WORK IN PROGRESS etc.

YEAR ENDED	WORK IN PROGRESS (Rs. LACS) (Y)	TREND VALUES $Y_c = a + bx$ $Y_c = 213.77 + 96.97\ x$
31.03.2005	69.35	19.83
31.03.2006	86.53	116.80
31.03.2007	114.96	213.77
30.09.2008	401.10	310.74
30.09.2009	396.90	407.70
30.09.2010	----------	504.67
30.09.2011	----------	601.64
30.09.2012	----------	698.60
30.09.2013	----------	795.57
30.09.2014	----------	892.54

The above table shows that there is an increasing trend of Rs. 96.97 lacs per year in the closing stock of work in progress which is too subject to change in the prices of various items of work in progress (viz., raw material, labour, overheads etc.) due to future fluctuations in the value of rupee and also further increase / new imposition of tax, levy, cess etc. pertaining to these items or withdrawal thereof. The same can also be shown with the help of graph, as under-



The *modified* data brings into limelight the following changes in the trend values -

TABLE NO. 5.26

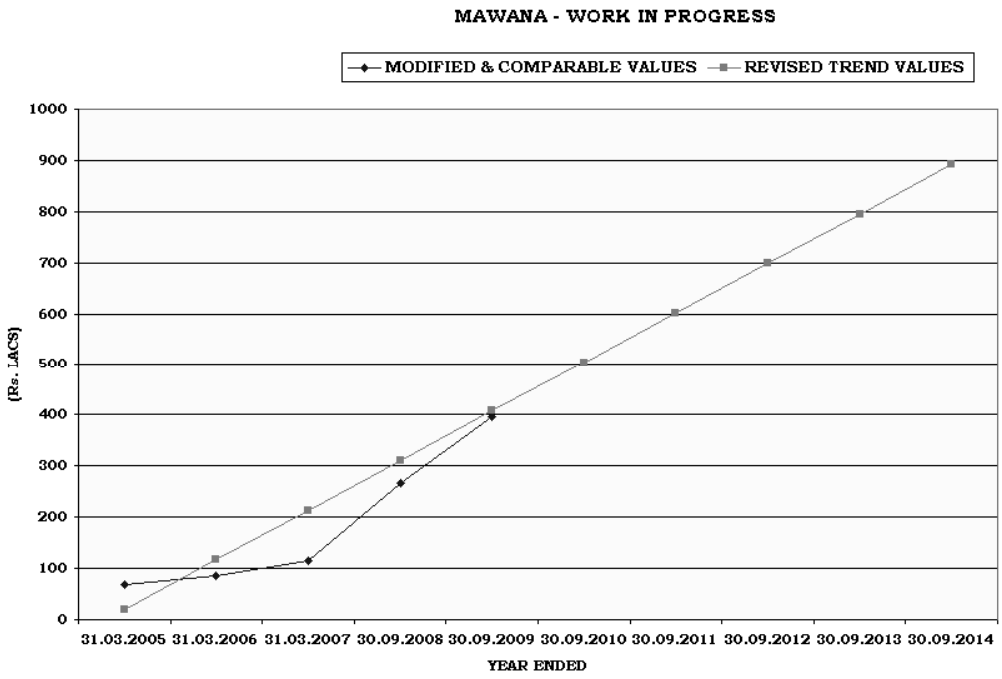
SHOWING *REVISED* TREND VALUES OF WORK IN PROGRESS etc.

MODIFIED & COMPARABLE DATA

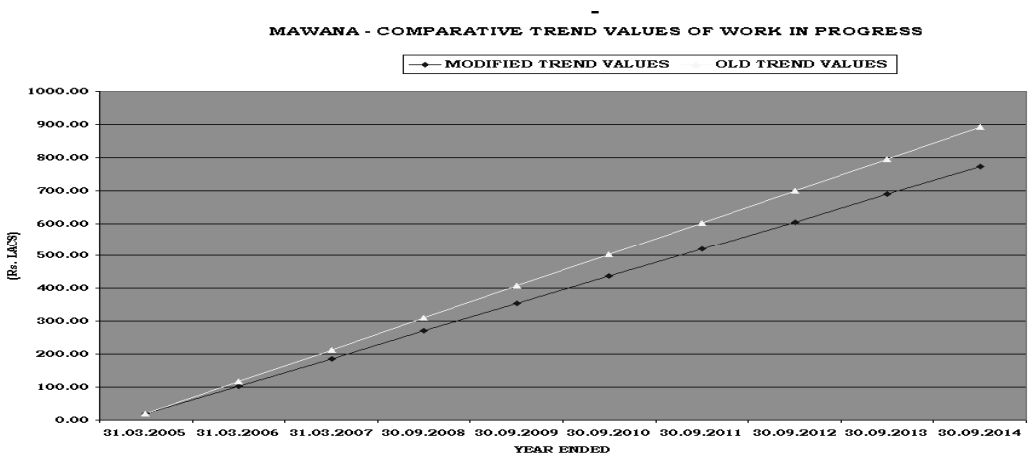
YEAR ENDED	WORK IN PROGRESS (Rs. LACS)	TREND VALUES $Y_c = a + bx$
	(Y)	$Y_c = 187.03 + 83.60\ x$
31.03.2005	69.35	19.83
31.03.2006	86.53	103.43

31.03.2007	**114.96**	**187.03**
30.09.2008	**267.40**	**270.63**
30.09.2009	**396.90**	**354.22**
30.09.2010	----------	**437.82**
30.09.2011	----------	**521.42**
30.09.2012	----------	**605.01**
30.09.2013	----------	**688.61**
30.09.2014	----------	**772.21**

Accordingly, the yearly increase stands reduced to Rs. 83.60 lacs per annum in comparison to Rs.96.97 lacs per year, calculated earlier. This revised data and its impact can be observed with the help of following graph also –



A comparison of these two trend values (*based upon actual data & modified data*) brings to surface the following picture –



5.4 (D) <u>FINISHED GOODS:</u> The trend analyses of finished goods of Mawana Sugars Limited can be tabulated as under:

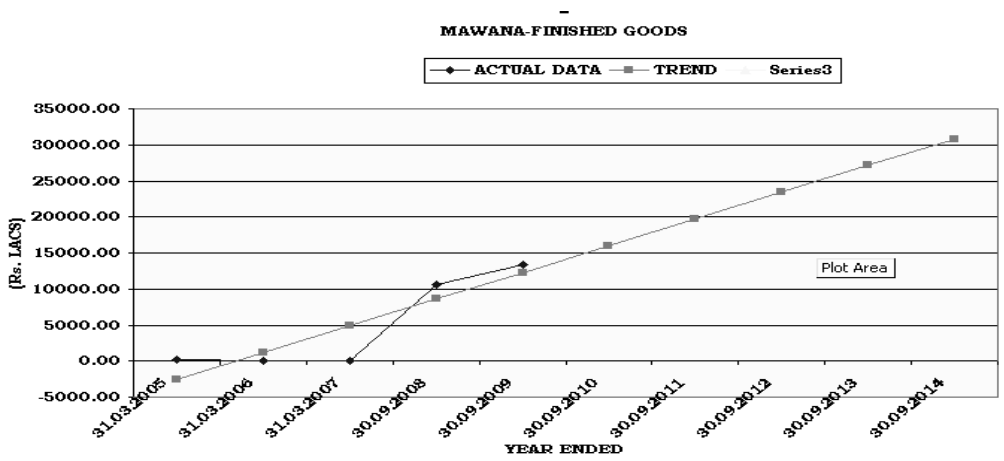
TABLE NO. 5.27

SHOWING TREND VALUES OF FINISHED GOODS etc.

YEAR ENDED	FINISHED GOODS (Rs. LACS) (Y)	TREND VALUES $Y_c = a + bx$ $Y_c = 4,877.51 + 3,710.63\ x$
31.03.2005	154.83	-2543.74
31.03.2006	71.56	1166.89
31.03.2007	107.48	4877.51
30.09.2008	10619.90	8588.14
30.09.2009	13433.80	12298.77
30.09.2010	----------	16009.40
30.09.2011	----------	19720.03
30.09.2012	----------	23430.65
30.09.2013	----------	27141.28
30.09.2014	----------	30851.91

The above table shows that there is an increase of Rs. 3710.63 lacs per year in the closing stock of finished goods which is also subject to change in the prices of various items of raw materials, work in progress etc. due to

fluctuations in future in the rupee-value and also further changes i.e. increase / fresh imposition of tax, levy, cess etc. pertaining to these items or withdrawal thereof by the government. The same can also be shown with the help of graph, as under-



The modified & comparable figures of finished goods have brought following changes to the trend values –

TABLE NO. 5.28

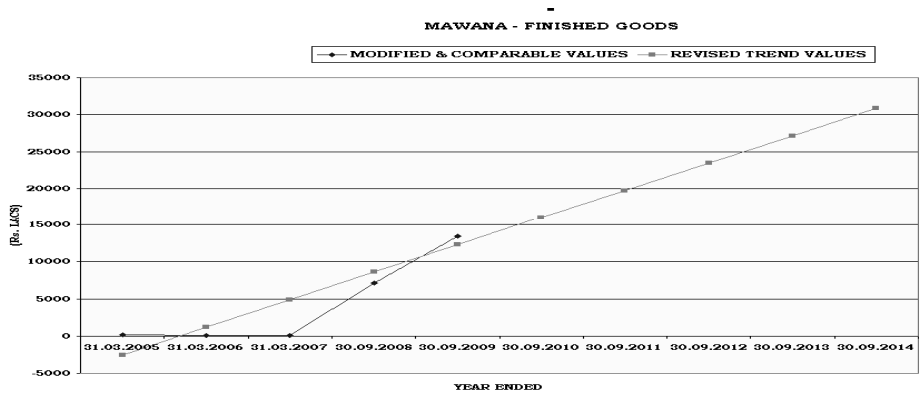
SHOWING *REVISED* TREND VALUES OF FINISHED GOODS etc.

MODIFIED & COMPARABLE DATA

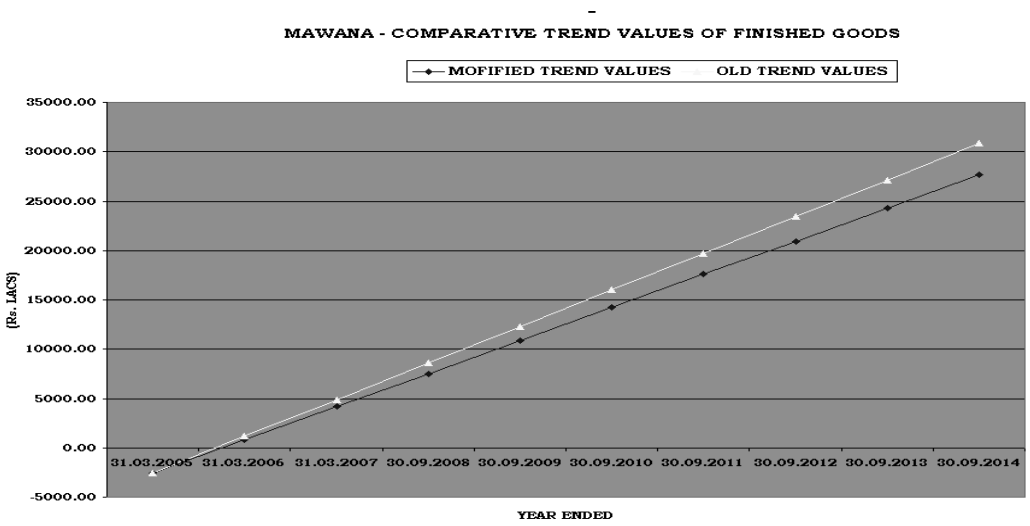
YEAR ENDED	FINISHED GOODS (Rs. LACS)	TREND VALUES $Y_c = a + bx$
	(Y)	Y_c =4169.52 + 3356.63 x
31.03.2005	154.83	-2543.74
31.03.2006	71.56	812.89
31.03.2007	107.48	4169.52
30.09.2008	7079.93	7526.15
30.09.2009	13433.80	10882.78
30.09.2010	----------	14239.41

30.09.2011	----------	**17596.05**
30.09.2012	----------	**20952.68**
30.09.2013	----------	**24309.31**
30.09.2014	----------	**27665.94**

Here also, the yearly increase of Rs. 3710.63 lacs per year reduced to Rs.3356.63 lacs per year, which can be seen with the help of following graph also –



A comparative analysis of trend values (*modified & old*) can be made clear with the help of following graph also –



5.5 Quantitative Trend Value Analysis

In addition to above, it seems necessary for the researcher to throw light on those items which directly or indirectly affects inventories. This includes chiefly quantitative details pertaining to production, sales, and raw material consumed along with, of course, the closing figures of inventories. As monetary values are subject to fluctuations in the exchange rates, the purchasing power of rupee also not remain unaffected by all these changes. Hence, it becomes necessary to conduct a quantitative analysis of trend values.

5.5 (A) <u>PRODUCTION</u>: The production data available for the study period helped researcher to get an insight of trend values for the years to come, which is tabulated as under -

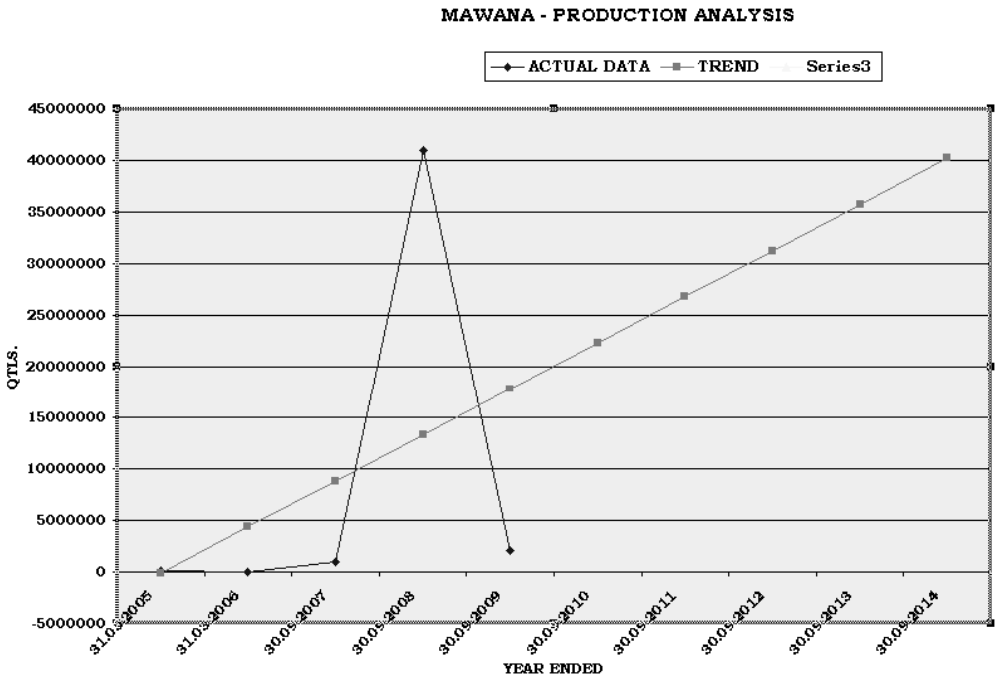
<u>TABLE NO. 5.29</u>

<u>SHOWING TREND VALUES OF PRODUCTION</u>

YEAR ENDED	PRODUCTION (QTLS.) (Y)	TREND VALUES $Y_c = a + bx$ $Y_c = 8{,}828{,}970 + 4{,}488{,}271\ x$
31.03.2005	62630	-147572
31.03.2006	45547	4340699
31.03.2007	1021215	8828970
30.09.2008	40977400	13317242
30.09.2009	2038060	17805513

30.09.2010	----------	**22293784**
30.09.2011	----------	**26782056**
30.09.2012	----------	**31270327**
30.09.2013	----------	**35758598**
30.09.2014	----------	**40246870**

The above table shows an increase of 44,88,271 quintals per year which has a possibility of increasing further due to adoption of advanced techniques of productions, use of more sophisticated equipments, more efficient management of wastages, changes in production schedules, increase in the demand of finished goods, timely arrival of monsoon & sufficient rainy season etc. which could swing the other way also. The same can also be shown with the help of graph, as under-



But, the modified & comparative data reflects a different picture, when eighteen months data of financial year 2007-08 is proportionately reduced to twelve months figures –

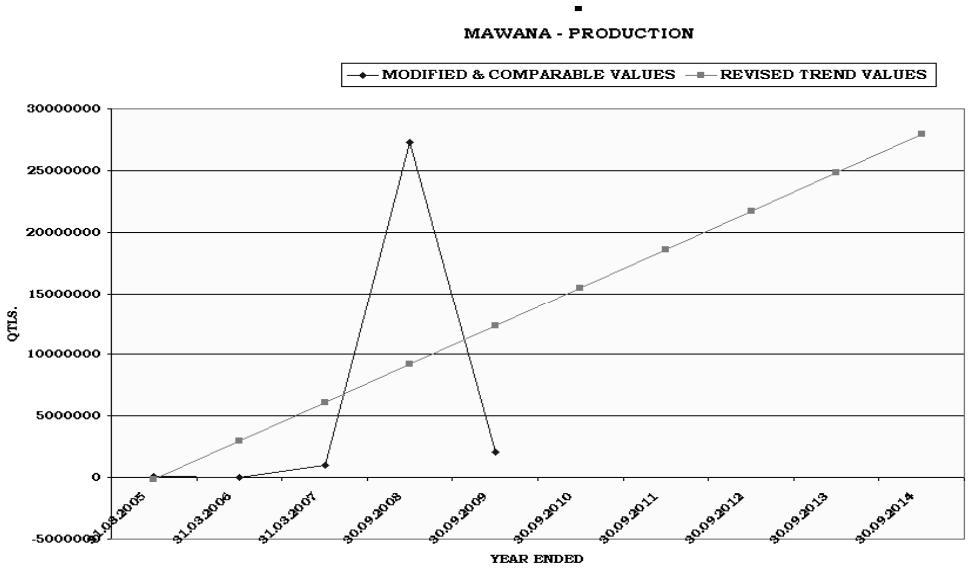
TABLE NO. 5.30

SHOWING *REVISED* TREND VALUES OF PRODUCTION

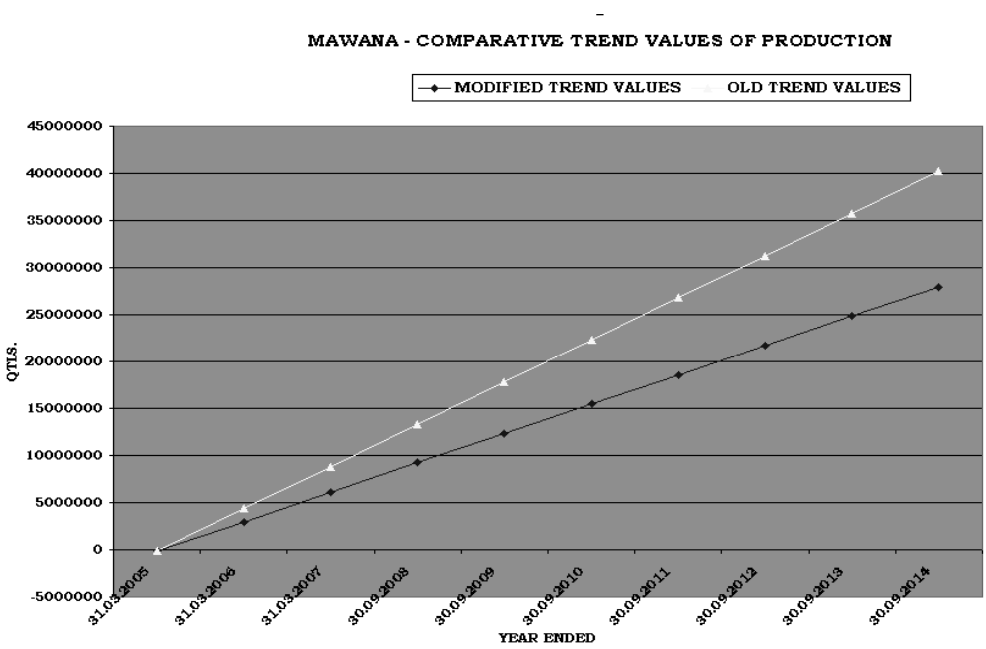
MODIFIED & COMPARABLE DATA

YEAR ENDED	PRODUCTION (QTLS.) (Y)	TREND VALUES $Y_c = a + bx$ $Y_c = 6097144 + 3122358x$
31.03.2005	62630	-147572
31.03.2006	45547	2974786
31.03.2007	1021215	6097144
30.09.2008	27318267	9219502
30.09.2009	2038060	12341860
30.09.2010	----------	15464218
30.09.2011	----------	18586576
30.09.2012	----------	21708934
30.09.2013	----------	24831292
30.09.2014	----------	27953650

This has brought change in the yearly increase and thus reduced it to 31,22,358 quintals per annum in place of 44,88,271 quintals per year (calculated earlier with the help of 18 months data provided for the financial year 2007-08). The change can be easily viewed with the help of following graph also –



A comparative analysis of trend values (*modified & old*) can also be made quite clear with the help of following graph –



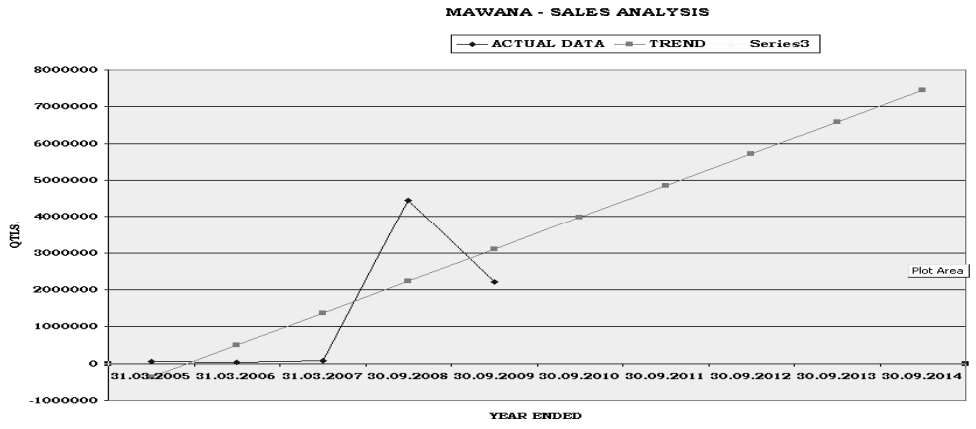
5.5 (B) SALES: Similarly, the sales data is also used to get a much clear picture of future trend values, which is tabulated as under -

TABLE NO. 5.31

SHOWING TREND VALUES OF SALES

YEAR ENDED	SALES (QTLS.)	TREND VALUES $Y_c = a + bx$
	(Y)	Y_c = 1,367,779 + 870,237 x
31.03.2005	62740	-372694
31.03.2006	44781	497543
31.03.2007	70363	1367779
30.09.2008	4449400	2238016
30.09.2009	2211613	3108252
30.09.2010	----------	3978489
30.09.2011	----------	4848725
30.09.2012	----------	5718962
30.09.2013	----------	6589198
30.09.2014	----------	7459435

The above table shows an increase of 8,70,237 quintals per year which can also be portrayed with the help of graph as under –



The modified & comparative data, when incorporated, brought a different picture of sales analysis –

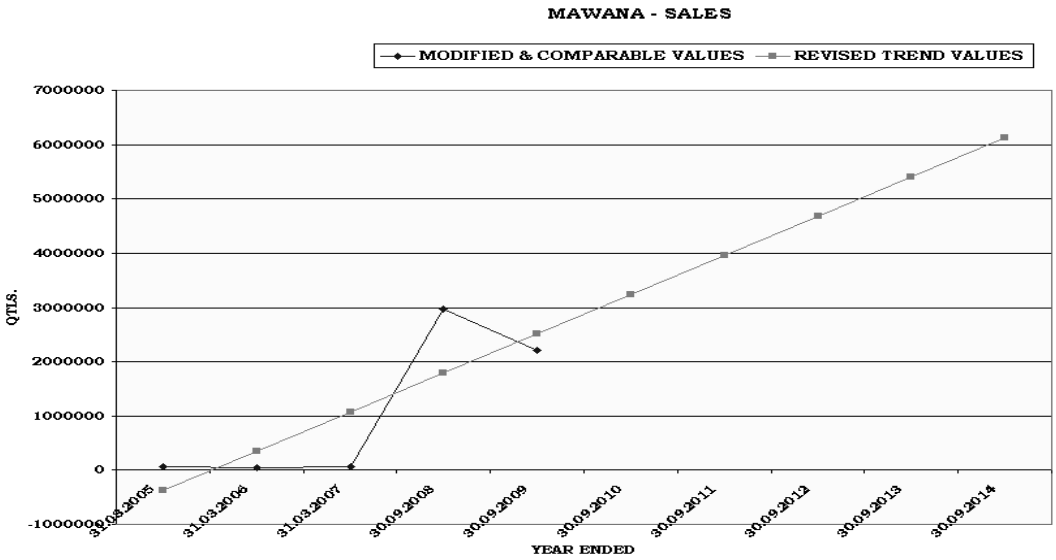
TABLE NO. 5.32

SHOWING *REVISED* TREND VALUES OF SALES

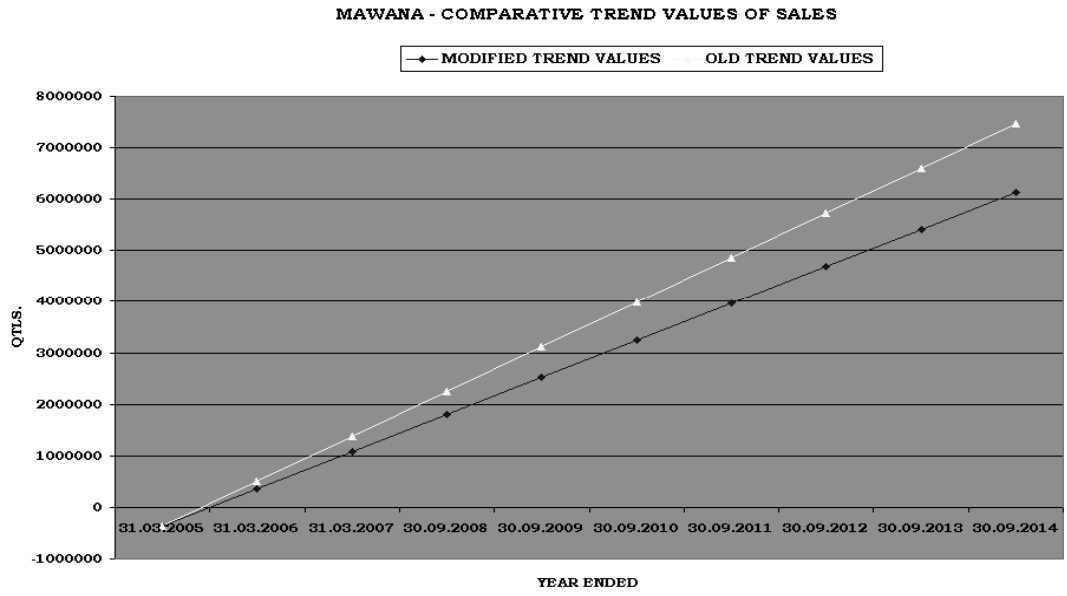
MODIFIED & COMPARABLE DATA

YEAR ENDED	SALES (QTLS.)	TREND VALUES $Y_c = a + bx$
	(Y)	Y_c =1071153 + 721923x
31.03.2005	62740	-372694
31.03.2006	44781	349230
31.03.2007	70363	1071153
30.09.2008	2966267	1793076
30.09.2009	2211613	2514999
30.09.2010	----------	3236922
30.09.2011	----------	3958845
30.09.2012	----------	4680769
30.09.2013	----------	5402692
30.09.2014	----------	6124615

Thus, the incorporation of modified & comparable data has brought change in the yearly increase and thus reduced it to 7,21,923 quintals per annum in place of 8,70,237 quintals per year calculated earlier. The change can be easily viewed with the help of following graph also –



A comparative analysis of trend values of production (*modified & old*) can be seen with the help of following graph:



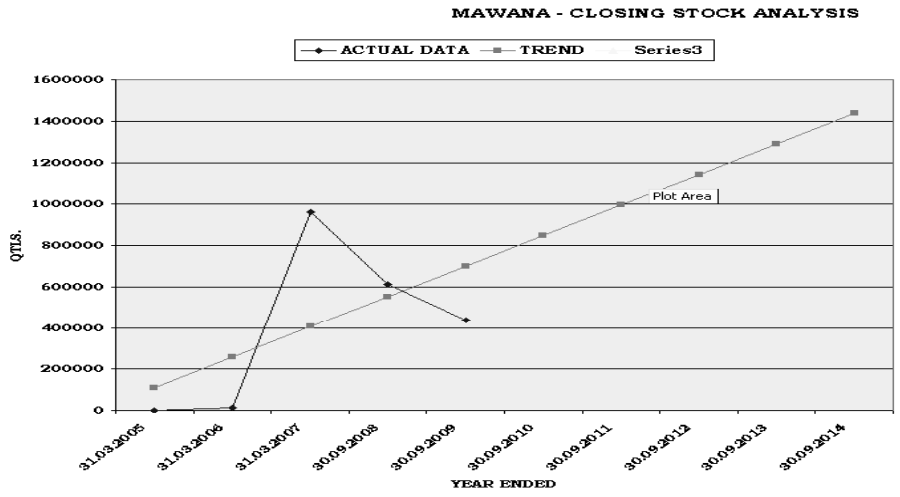
5.5 (C) <u>CLOSING STOCK</u>: Likewise, closing stock data of study period is being used to assess the future position of ending inventories, which can be tabulated as under -

TABLE NO. 5.33

SHOWING TREND VALUES OF CLOSING STOCK

YEAR ENDED	CLOSING STOCK (QTLS.) (Y)	TREND VALUES $Y_c = a + bx$ $Y_c = 405{,}033 + 147{,}405\ x$
31.03.2005	460	110223
31.03.2006	12258	257628
31.03.2007	963110	405033
30.09.2008	611450	552438
30.09.2009	437889	699843
30.09.2010	----------	847248
30.09.2011	----------	994653
30.09.2012	----------	1142058
30.09.2013	----------	1289463
30.09.2014	----------	1436868

The above table shows an increase of 1,47,405 quintals per year which can also be portrayed with the help of graph as under –



The modified & comparative data, when incorporated, brought the following picture of closing stock analysis –

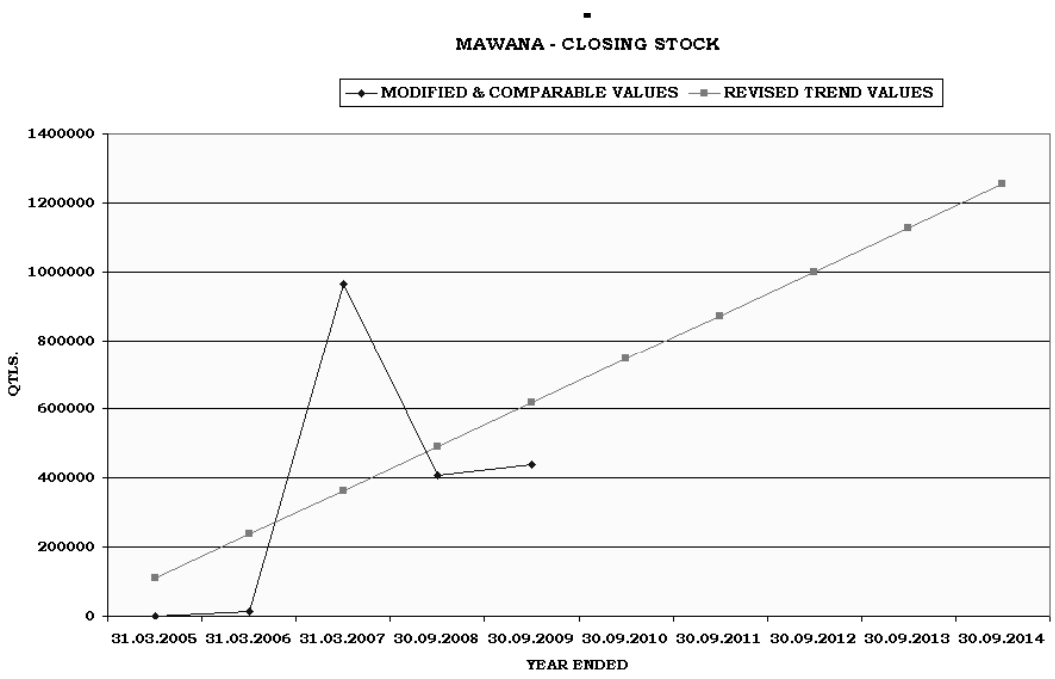
TABLE NO. 5.34

SHOWING *REVISED* TREND VALUES OF CLOSING STOCK

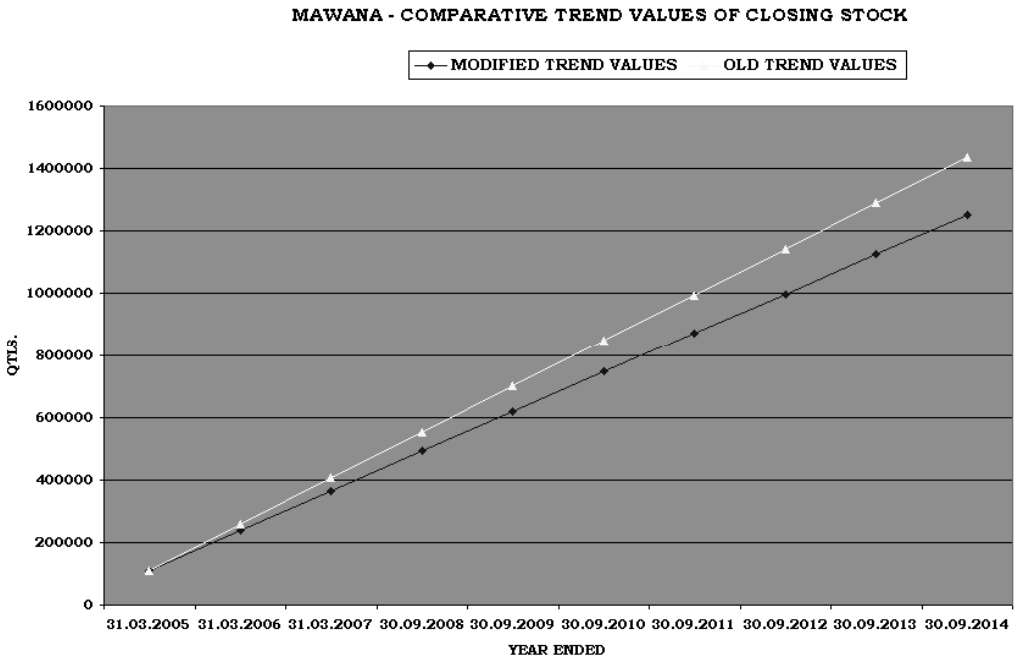
MODIFIED & COMPARABLE DATA

YEAR ENDED	CLOSING STOCK (QTLS.)	TREND VALUES $Y_c = a + bx$
	(Y)	$Y_c = 364270 + 127023x$
31.03.2005	460	110223
31.03.2006	12258	237247
31.03.2007	963110	364270
30.09.2008	407633	491293
30.09.2009	437889	618317
30.09.2010	----------	745340
30.09.2011	----------	872363
30.09.2012	----------	999387
30.09.2013	----------	1126410
30.09.2014	----------	1253433

Thus, the incorporation of modified & comparable data has brought change in the yearly increase and thus reduced it to 1,27,023 quintals per annum in place of 1,47,405 quintals per year calculated earlier. The change can be easily viewed with the help of following graph also –



A comparative analysis of trend values of closing stock (*modified & old*) can be seen with the help of following graph-



5.5 (D) <u>RAW MATERIAL CONSUMED</u>: Nonetheless, raw material consumed figures of study period is being used to assess the future level of raw material consumption, which can be tabulated as under -

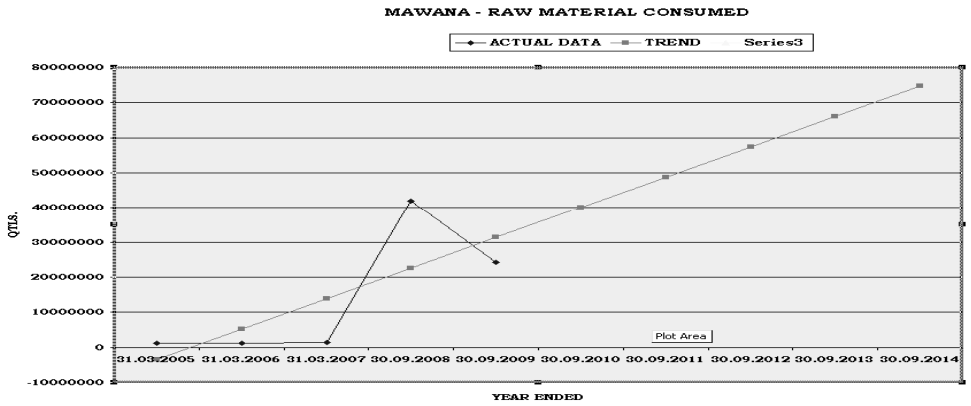
TABLE NO. 5.35

SHOWING TREND VALUES OF RAW MATERIAL CONSUMED

YEAR ENDED	RAW MATERIAL CONSUMED (QTLS.)	TREND VALUES $Y_c = a + bx$
	(Y)	Y_c = 13,966,586 + 8,672,683 x
31.03.2005	1110215	-3378780
31.03.2006	1297992	5293903
31.03.2007	1362695	13966586
30.09.2008	41878801	22639269
30.09.2009	24183225	31311951
30.09.2010	----------	39984634

30.09.2011	----------	48657317
30.09.2012	----------	57330000
30.09.2013	----------	66002683
30.09.2014	----------	74675366

The above table shows an increase of 86,72,683 quintals in raw material consumption per year which can easily be seen with the help of graph as under –



The modified & comparative data, when incorporated, brought the following picture of closing stock analysis –

TABLE NO. 5.36

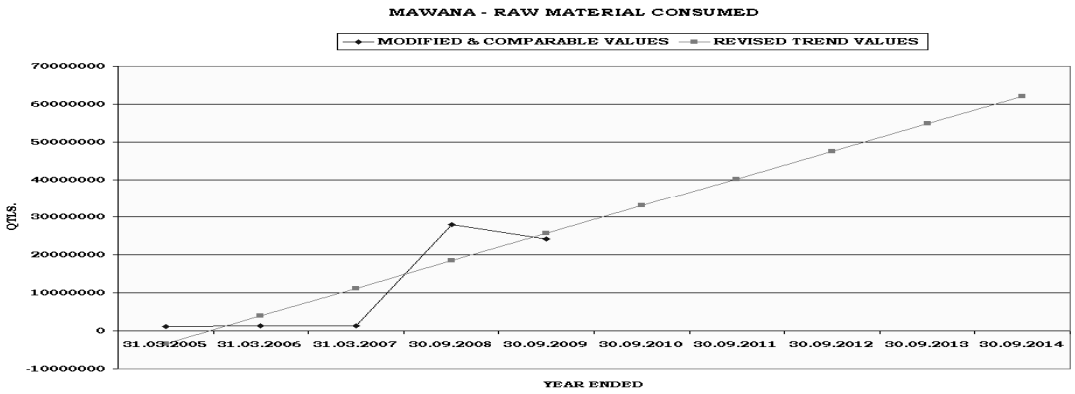
SHOWING *REVISED* TREND VALUES OF RAW MATERIAL CONSUMED

MODIFIED & COMPARABLE DATA

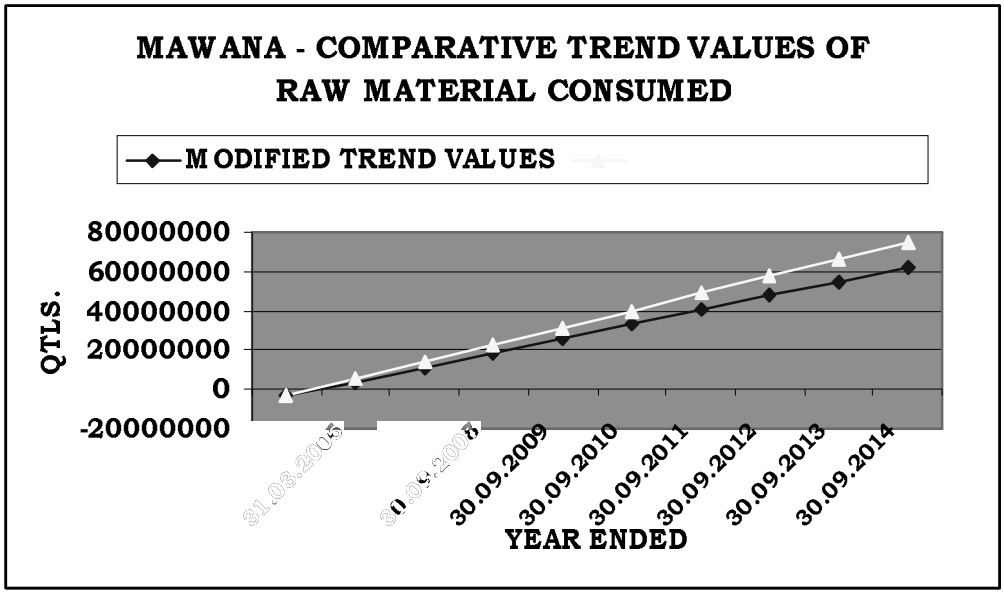
YEAR ENDED	RAW MATERIAL CONSUMED (QTLS.)	TREND VALUES $Y_c = a + bx$
	(Y)	$Y_c = 11174666 + 7276723x$
31.03.2005	1110215	-3378780
31.03.2006	1297992	3897943

31.03.2007	1362695	11174666
30.09.2008	27919201	18451388
30.09.2009	24183225	25728111
30.09.2010	----------	33004834
30.09.2011	----------	40281557
30.09.2012	----------	47558280
30.09.2013	----------	54835003
30.09.2014	----------	62111726

Thus, by incorporating modified & comparable data the yearly increase stands reduced to 72,76,723 quintals per annum in place of 86,72,683 quintals per year calculated earlier. The change can be easily viewed with the help of following graph also –



A comparative analysis of trend values of raw material consumed (*modified & old*) can be seen with the help of following graph –


MAWANA - COMPARATIVE TREND VALUES OF RAW MATERIAL CONSUMED
MODIFIED TREND VALUES
80000000
60000000
40000000
20000000
0
-20000000
QTLS.
31.03.2005
30.09.2008
30.09.2009
30.09.2010
30.09.2011
30.09.2012
30.09.2013
30.09.2014
YEAR ENDED

****