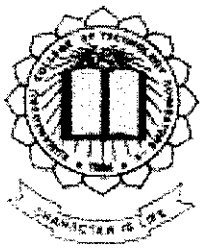

A STUDY ON PRODUCTION PLANNING AND SCHEDULING IN PRICOL LIMITED WITH SPECIAL REFERENCE TO BUSINESS DEVELOPMENT EXPORT

By

A.ABILASH
Reg. No.71205631001

of

Department of Management Studies
Kumaraguru College of technology
Coimbatore

PROJECT REPORT
Submitted to the

FACULTY OF MANAGEMENT SCIENCES

In partial fulfillment of the requirement
for the award of the degree

of

MASTER OF BUSINESS ADMINISTRATION
June, 2007

DEPARTMENT OF MANAGEMENT STUDIES
KUMARAGURU COLLEGE OF TECHNOLOGY
COIMBATORE

BONAFIDE CERTIFICATE

Certified that this project titled '**A STUDY ON PRODUCTION PLANNING AND SCHEDULING WITH SPECIAL REFERENCE TO BUSINESS DEVELOPMENT EXPORTS**' is the bona-fide work of **Mr.A.ABILASH (71205631001)** who carried out this research under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Prof. K. R. Ayyaswamy
Faculty Guide

Director

Evaluated and viva-voce conducted on....2/06/07.....

2/06/07

INTERNAL EXAMINER

EXTERNAL EXAMINER

DECLARATION

I, hereby declare that this project report entitled as "A study on Production Planning and Scheduling With Special Reference to business development Exports ". has undertaken for academic purpose submitted to Anna University in partial fulfillment of requirement for the award of the degree of Master of Business Administration. The project report is the record of the original work done by me under the guidance of Prof. K.R.Ayyaswamy during the academic year 2006-2007.

I, also declare hereby, that the information given in this report is correct to best of my knowledge and belief.

Place: Coimbatore

A.Abilash

(A.Abilash)

formerly premier instruments & controls limited

pricol limited

plant 1 perianaickenpalayam coimbatore 641 020 india
phone +91 422 4331492 fax +91 422 4331122
e mail factory@pricol.co.in website www.pricol.com

PL/TRG/PROJ/2007
29-May-2007

PROJECT COMPLETION CERTIFICATE
To Whomsoever It May Concern

We are pleased to issue this certificate in the process of operationalising our "Industry- Institute Interaction Synergy" drive.

Name	:	A. ABILASH [Reg# 71205631001]
Institution	:	Kumaraguru College of Technology Coimbatore-641 006
Qualification	:	M B A
Project Title	:	"A Study on Production Planning And Scheduling "
Project Duration	:	Jan'07 to April'07
Department	:	Business Development
Performance/ Conduct	:	Good

For Pricol Limited,

Chhaya 29/5.

Chhaya
Sr. Officer - HR

ACKNOWLEDGEMENT

It is inevitable that thoughts and ideas of other people tend to drift into the subconscious when one feels to acknowledge helping derived from others. I acknowledge to all those who have helped me in the preparation of this project work.

I wish to express my deep gratitude to the principal Prof. Joseph V. Thanikal for his guidance and encouragement to complete my project work.

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EXECUTIVE SUMMARY

The study an "A study on Production planning and Scheduling with Special Reference to business development Exports" is carried to identify the causes for mismatches between the ordering quantity and the produced quantity by the factory. It also aims at suggesting certain corrective courses of action.

Production is a process of creating goods (Viz) conversation of raw materials in to the usable finished goods. The objective of the production planning is to design a system and plan by which production will meet the promised delivery quantity on the scheduled date of requirement by purchasers / stockiest.

In this project the manufacturing process and production planning presently followed by Pricol limited is studied in detail and data were are collected for a period of 11 months in the respect of – number of products. The data collected were also collected for past eleven months related to the quantity ordered by two customers viz Tata motors and Mahindra & Mahindra. The data related to production and supply were analyzed using statistical tools viz- standard deviation, Range, ABC analysis, co-efficient of variation, graphical analysis and use of normal distribution theory.

Using ABC analysis – number of products under study was classified in to 3 categories based on the value of production. This is useful to monitor the demand - supply gap by different level of managerial executives. Range and standard deviation were used to measure the extended gap between the demand and supply .These gaps plotted on the graphs to locate the lead/lag in production/ supply. Normal distribution theory has been applied to plan the production quantity based on the demand (order quantity) with a certain pre- determined risk.

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CHAPTER: 1

1.1 BACK GROUND:

Production is the process of creating goods (i.e.) conversion of raw materials into needed finished goods. The objective of production planning is to design a system and plan by which production may be processed with a view to meet a promised delivery date with minimum cost and quality standard.

In this project, the manufacturing process and production planning presently followed by Pricol Industries is studied in detail and data were collected. They are analyzed and interpreted. On the basis of analysis, the various bottlenecks that are prevailing in the company are sorted out and certain suggestions are recommended to overcome these bottlenecks.

Production is a process of creating goods (ie) conversion of raw materials in to needed finished goods. The objective of production planning is to design a system and plan by which production may proceed with a view to meet a promised delivery date with minimum cost and quality standard. This outlines the requirement and states when and where and by when the job is to be done.

The process of production is broadly classified in to two viz.

(i) Finished good stock to meet the future instant demand

(ii) Production against order received

The first type of production refers to such products production which are in continued demand through out. To some extent, these products can be stocked and as this type of production sales forecast forms the primary basis of planning. Sales forecast indicate approximately the quantity of each items and products that could be sold in future periods. In this system of planning, sales forecasts are subsequently adjusted according to the but long have of order and quality held in stock at the production end. Sales forecasts are thus transformed in to master production schedule, taking into account all the factors.

The second type of production refers to such products where there is no certainty of a continued demand for the specific item. In this case goods can be produced for definite customer order, for there may or may not be a repeat for the same item. These are high value, specified quality and quantity items required generally by individual goods demand by OEM.

1.2 REVIEW OF THE LITERATURE

Abstract intelligent solutions based on expert systems, to solve the problems in the field of production planning and scheduling are becoming more and more widespread nowadays, especially the last decade has witnessed a growing number of manufacturing companies, including, glasses, oil, computers, electronics metal and chemical industries.-to name just a few interested in the application of expert system in manufacturing. This paper is a state of the art view of the use of ESs in the field of production planning and scheduling. Te paper present famous expert system known in the literature and current applications, analysis the benefit and concludes by sharing thoughts and estimation on ESs future prospects in this area.

Planning and scheduling problem for efficient use of an FMS and presents an integrated decision support system for dealing these problems. The decision support system, FMSDS flexible manufacturing system decision support system) includes several module, load adjusting module, scheduling module and simulation mudule.his paper suggests the solution methodology of each sub problem. Also integrated interface scheme between the sub problems is presented the interface scheme considers the relationship between the sub problems and generates the solution using hierarchical and looping approaches.FMSDS is made up of six alteranative models considering three loading objectives and two production order processing strategies. Performance compression among the six alternatives is shown using the non terminating simulation technique.

There are three level hierarchical production planning and scheduling approach for multi product and identical parallel machines in a batch process environment. The hierarchical approach extends the existing formulation and determine the optimal number of monthly batches that need to be schedule a process known in this industry as 'batching of orders'

1.3 OBJECTIVES OF THE STUDY:

- To study the present practice of production planning and scheduling followed at Pricol Industries Limited.
- To study the stage production process/ sub contracting system.
- To identify the bottlenecks in the present production planning that causes the gap between demand and supply.

1.4 STAMENT OF THE PROBLEM:

The main objective of the present project is to study the gap between order placed by customers and production made by the company. The problems identified hear is production Planning made by the company was not matching with the orders given by customers. The gap Identification and the causes there of need to be studied. With a view to improve the production planning certain suggestions have been made.

1.5 SCOPE OF THE STUDY:

The present study makes an attempt and analysis of production planning process which was maintained in Pricol. In this project the manufacturing process and production planning presently followed by Pricol limited is studied in detail and data were collected related to highly demand and /supply gaps. The data collected in respect of past eleven months for two customers, viz Tata motors and Mahindra & Mahindra. The data relates to demand raised by customers, quantity produced in company, supply made by company. There is analyzed and interpreted standard deviation, range, ABC analysis, co-efficient of variation, graphical representation and normal distribution.

1.6 METHODOLOGY

Research Methodology:

Research Methodology is a way to systematically solve a research problem. It is the sciences of studying how a research is done. The researcher has to explain the methods and steps adopted for achieving the purpose of the study and to arrive at a meaningful conclusion.

1.6.1 Type of study:

Research design

The type of study is Descriptive in nature.

Population:

The population of the study comprised customers of PRICOL (Tata Motors & Mahindra & Mahindra)

Sample size

11 respondents of the total population of the customers were taken for research.

1.6.3 METHOD OF DATA COLLECTION

Primary Data

Collection of primary data:

The primary data are those which are collected fresh and for the first time and thus happen to be original in character.

Methods of primary data:

- Observation methods
- Interview method

Secondary data:

Collection of secondary data:

The data which are already available that is they refer to the data which have already been collected and analyzed by some one else.

Methods of secondary data:

- Reports connected with banks and industries
- Reports prepared by universities.

1.6.4 Tools of analysis:

For the purpose of data analysis the following statistical tools were used.

- Range
- Standard Deviation
- Normal Distribution Theory
- ABC Analysis.
- Co-efficient of variation.
- Analysis Of Variance(ANOVA)

1.7 LIMITATIONS:

- Due to time constraints the study is not extend to raw materials analysis.
- The study is restricted to 11 months period. Results are limited by period of study.
- The lack of time availability is another major limitation.
- The study restricted to BD exports.

1.8 CHAPTER SCHEME

The report is organized in to five chapters. The constant of the chapters are briefly described under.

Chapter 1: Introduction

The first chapter deals with the background, objectives, scope of the study, methodology used in data collection, limitations of the study, and brief introduction of all the chapters.

Chapter 2: Organization Profile

Organization profile includes details on the history of the organization, management and organization structure, product profile and market potential, competitive strength of the company and a brief description on various functional areas of the organization.

Chapter 3: Macro –Micro Economic Analysis

Macro-Micro analysis deals with the prevailing scenario of the organization with respect to its respective industry and to perform the various analysis of the company.

Chapter 4: Data Analysis and Interpretation

The Chapter mainly deals with performing of various mismatches between demand and supply and related to production planning and scheduling in order to analyze.

Chapter 5: Conclusion

Conclusion includes the results and the discussions regarding the performance of the company and the considered recommendations to improve the production planning of the company.

CHAPTER: II

ORGANISATION PROFILE:

CHAPTER: 2

ORGANISATION PROFILE

2.1 HISTORY OF THE ORGANIZATION

PRICOL was incorporated 1972 at Coimbatore, Tamil Nadu, India, and commenced manufacturing operations in 1975 in the precision engineering field of Automotive Instruments. It has commanded a market share of more than 50% in the automobile components industry. The company is having some of the leading customers in India like Ashok Leyland, Bajaj, Denso, Tata motors etc.

The human resource system has been functioning in the industry only in the recent days, early it was personnel department. The department has extended its functioning from recruitment and selection, pay roll execution.

The company has four plants.

Plant I which is in periyanayakanpalayam at Coimbatore India, was the first to be established. Plant II at Gurgaon near New Delhi, India, was established in 1988 to cater to the needs of the customers in North India. Plant III and Plant IV were established at Coimbatore, Tamil Nadu, India, in 1999 for rationalizing Pricol's manufacturing activities.

In 1997, PRICOL joined hands with DENSO Corporation, Japan, a US $ 17.7 billion Auto Ancillary company to chalk out its growth and future.

In 1997, Pricol joined hands with DENSO Corporation, Japan, a US $ 17.7 billion Auto Ancillary component company to promote high growth.

Denso Corporation, Japan is the Joint Venture Partner with Pricol and has invested 12.5% in the equity capital of Pricol.

RESEARCH AND DEVELOPEMENT

Pricol spends, on an average, 3% of its turnover on research and development.

Pricol is an ISO 9001 company since 1993 and certified for TS 16949 since August 2004.

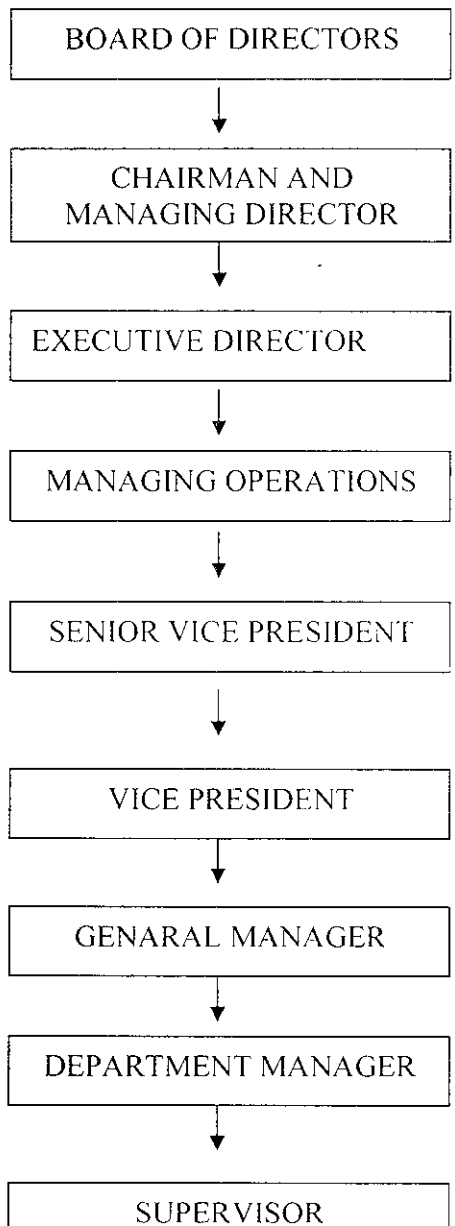
Pricol has initiated Total Quality Management (TQM), Total Productive Manufacturing (TPM), Supply Chain Management (SCM), Enterprise Resource Planning (SAP R3 ERP), and Collaborative Product Commerce (CPC - Wind-chill) to render faster and efficient service to customers.

EXPORTS

Pricol exports about 12% of its turnover to the USA, Canada, Mexico, South America, Europe, Turkey, Egypt, Middle East, Asia, Australia, New Zealand, etc.

2.3 ORGANIZATION STRUCTURE

The company is managed by the board at the apex level, chair and managing director being the chief operating officer used with executive powers. The organizational structure of the company is given below.



2.4 PRODUCTS PROFILE AND MARKET POTENTIAL

PRODUCTS PROFILE

The companies manufacture a variety of automobile auxiliary parts. They include such as automotive dashboard instruments for two wheelers, three wheelers, four wheelers, commercial vehicles, tractors, earth moving equipments and industrial applications.

Special instruments are:

- Instrument Clusters, Electronic Speedometers, Pressure Gauges, Temperature Gauges, Indicators, Fuel Gauges, Oil level Gauges, Clocks, Warning Lamps, etc
- Speedometer Cables.
- Switches and Sensors such as Speed Sensors, Pressure Sensors, Temperature Sensors, Fuel level Sensors, Oil level Switches.
- Four wheeler parts
- High moderate Switches.

MARKET POTENTIAL

Pricol is the market leader enjoying 53% of the Automotive Instruments market Share. The company serves leading automobile producers of the country. The customer profile includes.

CUSTOMERS

CUSTOMERS MANUFACTURED	FRREIGN COLLOBORATORS	PRODUCT
Ashok Leyland Ltd.	IVECO FIAT SPA, Italy	Commercial Vehicles & Engines
aj Auto Ltd.	Kawasaki Heavy Industries Ltd., Japan	Motorcycles, Scooters, Mopeds & Three-Wheeler
Denso Haryana Pvt. Ltd.	Denso Corporation, Japan (Parent Company)	Multi Point Fuel Injection Systems
Eicher Motors Ltd.	--	HCVs & LCVs
General Motors India Pvt. Ltd.	General Motors Corporation, USA	Cars & MUVs
Hero Honda Motors Ltd.	Honda Motor Co. Ltd., Japan	Motorcycles
Honda Motorcycle & Scooter India (Pvt.) Ltd.	Honda Motor Co. Ltd., Japan (Parent Company)	Motorcycles & Scooters
LML Ltd.	Daelim Motor Company,	Motorcycles &

	South Korea	Scooters
Maruti Udyog Ltd.	Suzuki Motor Corporation, Japan	Passenger Cars, MUVs & MPVs
Mahindra & Mahindra Ltd. (Automotive Division)	--	LCVs, MPVs, MUVs, MPVs, Jeeps, LCVs & Three-Wheelers
Mahindra & Mahindra Ltd. (Tractor Division)	--	Tractors
Tata Motors Ltd.	--	HCVs, MCVs, LCVs, MPVs, MUVs, SUVs & Passenger Cars
Toyota Kirloskar Motor Pvt. Ltd.	Toyota Motor Corporation, Japan	MPVs
TVS Motor Company Ltd.	--	Motorcycles, Scooters & Mopeds
Visteon Automotive Systems India Pvt. Ltd.	Visteon Corporation, USA (Parent Company)	Air Conditioning Systems, Powertrain Controls &

2.5 COMPARITIVE STRENGTHS OF THE COMPANY

CORPORATE VISSION

Strive for excellence in all we do through socially and environmentally acceptable means

CORPORATE MISSION

We will have market leadership through customer delight. We will be a responsible corporate citizen and share the benefits with society. We will make our customers, employees, suppliers and share-holders feel proud of our association and want a long-term relationship with us from all of
Them who are all the part of the the company

CORPORATE CORE VALUES

- Respect and concern for individuals
- Customers, Employees and Suppliers - Partners in the Value Chain
- Encourage innovation and improvement; accept noble failures
- Continuous Learning

QUALITY POLICY

Pricol will provide value and satisfaction to customers on products and services. This will be achieved through systematic training.

QUALITY SYSTEM

Quality System in Pricol proposes the organization structure, responsibilities, procedures, guidelines and resources for implementing Quality Management.

Pricol is one of the first few auto ancillaries in India to be awarded the ISO 9001 certification. Since then on continues basis, Pricol upgraded its quality system to TS 16949 and then to ISO/TS 16949 since August 2004. In addition Pricol is also certified for ISO 14001 since July 2003.

Pricol's Quality System ensures quality consistency through proper procedures and practices in

- Design
- Procurement
- Process
- Product and service

2.6 FUNCTIONAL AREAS

PURCHASE DEPARTMENT

- Report
- Internal audit
- Customer feedback

STORES DEPARTMENT

- Receiving the material
- Inspecting the material
- Safe guarding of material
- Issuing the correct material

HUMAN RESOURCES DEPARTMENT:

- Safety of employees & health
- HRD
- Industrial relations

A/C'S & FINANCE DEPARTMENT

- Preparation of financial a/c
- Accounting statements

CHAPTER: III

MACRO-MICRO ANALYSIS:

CHAPTER: 3

MACRO MICRO ANALYSIS

POSITION OF AUTOMOBILE COMPONENTS INDUSTRY

The automobile components industry has started gaining importance only in the recent years earlier, there was no much market and also there was some struggle in the automobile component industry due to less importance for vehicles the great strength attained for the automobile industry was only after 2000.

The main reason was due to

1) Easy financial process
2) Bank giving loan for Vehicles
3) Various varieties that are getting launched

India is among the few fastest growing markets for automobiles so the position of many of the automobile components industry will be also growing simultaneously.

The GDP growth has declined from 8.5% to 6.9%, the industrial production in India has increased from 6.6% in 2003 to 7.8% in 2004. During the year 2004-05, all segments of automotive industry in India has a reasonable growth.

After a long period, the tractor segment has also made a significant growth of around 31%during the fiscal 2004-05. in fiscal 2004-05, the companies domestic turn over, in line with the general performance of the automobile industry, grew from rs.3295 million to 3891 million registering a growth of 18% over the previous year. The export sales and service income has increased substantially from Rs 409 million to Rs 598 million registering a growth of 46%. The trends in export of automobile products are encouraging and the company will continue to pursue its efforts to increase its export turn over during the current year.

The profit before interest and depreciation for the year 2004-05 has increased by 14% over the previous year. Due to continuous pressure by OEMs for reduction of prices, the company could not pass on the significant rise in price of steel, plastic materials and other input to the customers. The companies focused efforts on improving internal efficiencies; rationalization of product mix and various cost savings measures has enabled the company to the impact of increase in input cost to the certain extent.

OUTLOOK

Current indications are India's GDP will grow around 7 to 7.5% during fiscal 2005-06. the automotive industry is expected to grow around 15%. Your company being primarily an auto component industry is also expected to make a god progress during the current year. Further, the companies foray in to the accessories market will also contribute to the growth.

OPPORTUNITIES, CHALLENGES, RISKS & CON CERNS

The continuing healthy growth of sales of automotive vehicles in the domestic market. Vehicles manufacturers ambitious export programmers and outsourcing of the global players in the automotive industry will provide ample opportunities for the growth of the Indian auto component industry. Hardening oil prices, strengthening of steel & other input costs, disintegration of global barriers, competitive pricing pressure, frequent changes in models and design, low volumes, ever- changing technologies are challenges thrown open to the industry. Hearing force with innovative skills specialized in design, new product development, Value engineering, capable of adopting new technologies, the company is confident of making the challenges in to opportunities.

Any economic slow down and recession in the automotive industry can adversely influence the demand supply dynamics and probability. By continuously monitoring the market trend, other external factors and adjusting itself to the situation, the company will minimize the impact.

Micro- Analysis:

PRICOL Ltd, manufactures a range of automobile components has recorded an all time high net sales during 2005-2006.The company's board has recommended a dividend of 100% .The total income reached to Rs.4,504 million, which was an all time high. The net profit for the company reached to 425 million which again was a new mile stone for the company

India and many other Asian countries are amongst the few fastest growing markets for automobiles particularly in two and three-wheeler segment. The automobile sales volumes during FY 2005-06 have grown by 13% to 89, 10,224 vehicles. Two-wheelers, which account for 79% of the market, has grown by 13.63% to 70, 56,317 units. Growth in the automobiles segment has never been better with the Indian automobile industry growing consistently at a CAGR of 14.3% over the last four years. Considering the huge potential for two wheelers in domestic and overseas markets, the Indian automobile industry is to grow higher than the other industries.

Better product innovation, penetration into different class of segments and upgraded technology augurs well for the company to strengthen its presence in domestic and export markets. Market share of the company has improved
To a great extend for the past two years.

The company has adequate internal control systems to monitor internal business process, financial reporting and compliance with applicable laws. the company periodically reviews the adequate and effectiveness of the internal control systems. The audit committee at their meetings regularly reviews the significant observations of the compliance and audit reports. The head of various monitoring cells, statutory auditors are invited to attend the audit committee meetings.

Your company continuous to hold high rating of FFA from CRISIL for fixed deposits. The total amount of deposits with the company was 129.048 million include 53

deposits of Rs 1.174 million unclaimed. 20 deposits amounting to Rs .0.542 million have since been rewarded. Remainders have been sent to unclimbed deposit holders for suitable instruction. The company has substituted low cost funds for high cost early borrowings there by achieving lower cost. Your company continuous to hold highest rating of A+1 for commercial paper from ICRA.

During the year, as approved by the shareholders in the 32nd annul general meeting, the company has voluntarily delisted its equity shares from Coimbatore stock exchange and madras stock exange.

Human resource is the company's very valuable asset and performance of the company is largely depending on the creativity, motivation and efforts of the individuals in the organization. The company gives more emphasis of training and development of personnel with major thrust on motivation and skill Upgradition. The Company provides systematic training to all its employees to cope up with latest development in technology in the industry.

The company reaffirms citizen, the company actively involves in various rural development programmers in and around Coimbatore for the economic development of the rural people.

During the year the company has contributed Rs.10 million to KARAM (kovai aid for rehabilitation and motivation) towards tsunami relief fund for the rehabilitation of the affected people. Through our company is not a power intensive industry, the company is committed for adoption of various energy saving method for conservation of energy.

During the year the company's foreign exchange earnings were Rs. 602.23 million. The expenditure in foreign currency on account of revenue was Rs.882.91 million and the capital expenditure was Rs.78.30 million.

As required by section 212 of the companies act, 1956 a statement showing the company's interest in the subsidiary along with audited accounts is enclosed to the balance sheet of the company. The statement showing the particulars of technology absorption pursuant to section 217(1) (e) of the companies act.1956, read with companies rules, 1988, is given in the annexure forming part of the report.

Pursuant to clause 49 of the listing agreement with the stock exchanges, corporate governance report and auditors certificate regarding compliance of the same are made a part. Management discussion and analysis forming part of this report is in compliance with corporate governance standards incorporated in the listing agreement with stock exchanges and such statements may be forward – looking with in the meaning of applicable securities laws and regulations. Actual results could defer materially from those expressed or implied, important factors that could make a difference to the companies operation include economic condition effecting demand / supply and price condition in the domestic and overseas markets in which the company operates, changes in the government regulations, tax laws and other statutes and other incidental factor.

Company's philosophy on corporate governance envisages striving for excellence in all its operations through socially and environmentally acceptable means. The company wants to be a responsible corporate citizen and share the benefits with society and also will make its customers employee, suppliers and share holders feel proud of their associations with the through highest level of transparency in its dealings.

The company is being managed and controlled by the board of directors more then 50% of the board is comprised of independent directors

CHAPTER: IV

DATA ANLYSIS

CHAPTER 4

Using the collected data following table can be formed the variation of customer order for every month.

4.1 MEAN:

The mean and the Standard deviation are calculated as described below:

FORMULA: MEAN = $\overline{X} = \sum xi / n$

4.1 STANDARD DEEVIATION:

The standard deviation enables us to determine, with a great deal of accuracy, where the values of a frequency distribution are located in relation to mean. Chebyshev's theorem says that no matter what the shape of distribution , at least 75 percentage of the values will fall with in ± 2 standard deviation from the mean of the distribution, and at least 89 percentage of the values will lie within $\pm$ 3 standard deviation from the mean.

It helps us to find out how the customer order is deviated from mean.

There is lot of deviations in the stock from one quarter to another. So, to measure the deviations of quarterly stocks is calculated as follows:

Standard deviation: $\sigma = \sqrt{\sum (xi - \bar{x})2}$

The standard deviation enables us to determine, with a great deal of accuracy, where the value of frequency distribution are related to mean. It helps to find out how the customer order is deviated from mean.

Table No:1 Table Showing Mean, standard Deviation, Range & Cumulative Value% for Mahindra & Mahindra

830114		830845		817431		818030		825106		825363	
	CUSTOMER ORDER		CUSTOMER ORDER		CUSTOMER ORDER		CUSTOMER ORDER				
	1000		2500		96		400		1632		0
	400		1500		120		300		960		0
	500		1000		120		400		1920		100
	624		1752		200		1200		3000		132
	1800		2600		96		300		3500		200
	1400		5000		300		1600		3500		0
	1300		2100		0		900		2000		400
	2000		3000		0		600		800		500
	1400		2200		72		1600		800		800
	600		1800		650		1600		1900		800
	0		0		192		1200		1525		900
AL	**11024**		**23452**		**1846**		**10100**		**21537**		**3832**
N	**1002.181818**		**2132**		**167.8181818**		**918.1818182**		**1957.909091**		**348.3636364**
	629.3904699		**1257.769454**		**180.354113**		**543.7245292**		**990.9369763**		**351.0690168**
GE	**2000**		**5000**		**650**		**1300**		**2700**		**900**
%	**159.23**		**161.56**		**93.04**		**168.87**		**197.58**		**83.69**

Table No:2 Table Showing Mean, standard Deviation, Range & Cumulative Value% for Tata Motors

824842		826672		829351		829737		821520	
	1200		1200		1000		2600		9400
	1700		1300		1000		2000		8000
	2150		2000		1300		5500		10000
	2200		2300		1440		4900		9200
	2000		2205		1700		4900		12100
	1600		1800		1700		2900		11000
	1400		2000		2000		2400		9700
	1200		2600		1200		2900		12100
	1800		1600		2000		2100		7000
	2300		2500		2200		100		15400
	2600		1800		2500		500		15100
TOTAL	**20150**		**21305**		**18040**		30800		**119000**
MEAN	**1831.818**		**1936.818**		**1640**		**2800**		**10818.18**
S.D	**461.6669**		**454.7652**		**498.7986**		**1733.205**		**2677.991**
RANGE	**1400**		**1400**		**1500**		**5400**		**8400**
CV%	**396.76**		**425.86**		**328.79**		**161.55**		**403.97**

4.2 ABC Analysis:

A-B-C or Pareto analysis is a systematic and structured approach to distinguishing between the 'vital' few and 'trivial' many. Based on the values of orders placed, the products demands are grouped in to A, B and C items. The A item has been described as 70%, the B item has been described as 20% and the C items has been described as 10%.

Based on the ABC classification for Mahindra and Mahindra and Tata Motors have been obtained and given in the following tables.

Table No:3 Table showing ABC Analysis of Mahindra & Mahindra

830114			830845			817431		
CUSTOMER ORDER	PRICE		CUSTOMER ORDER	PRICE		CUSTOMER ORDER	PRICE	
1000	1360	1360000	2500	1360	3400000	96	686	65856
400	1360	544000	1500	1360	2040000	120	686	82320
500	1360	680000	1000	1360	1360000	120	686	82320
624	1360	848640	1752	1360	2382720	200	686	137200
1800	1360	2448000	2600	1360	3536000	96	686	65856
1400	1360	1904000	5000	1360	6800000	300	686	205800
1300	1360	1768000	2100	1360	2856000	0	686	0
2000	1360	2720000	3000	1360	4080000	0	686	0
1400	1360	1904000	2200	1360	2992000	72	686	49392
600	1360	816000	1800	1360	2448000	650	686	445900
0	1360	0	0	1360	0	192	686	131712
TOTAL		**14992640**			**31894720**			**1266356**
818030			**825106**			**825363**		

Table No:3 Table Showing ABC Analysis of Mahindra & Mahindra

818030			825106			825363		
CUSTOMER ORDER	PRICE		CUSTOMER ORDER	PRICE		CUSTOMER ORDER	PRICE	
400	686	274400	1632	686	1119552	0	1150	0
300	686	205800	960	686	658560	0	1150	0
400	686	274400	1920	686	1317120	100	1150	115000
1200	686	823200	3000	686	2058000	132	1150	151800
300	686	205800	3500	686	2401000	200	1150	230000
1600	686	1097600	3500	686	2401000	0	1150	0
900	686	617400	2000	686	1372000	400	1150	460000
600	686	411600	800	686	548800	500	1150	575000
1600	686	1097600	800	686	548800	800	1150	920000
1600	686	1097600	1900	686	1303400	800	1150	920000
1200	686	823200	1525	686	1046150	900	1150	1035000
TOTAL		**6928600**			**14774382**			**4406800**

Table No:4 Table showing ABC Analysis for Tata Motors

824842			826672			829351		
TOMER RDER	PRICE		CUSTOMER ORDER	PRICE		CUSTOMER ORDER	PRICE	
200	1200	1440000	1200	880	1056000	1000	2035	2035000
700	1200	2040000	1300	880	1144000	1000	2035	2035000
150	1200	2580000	2000	880	1760000	1300	2035	2645500
200	1200	2640000	2300	880	2024000	1440	2035	2930400
000	1200	2400000	2205	880	1940400	1700	2035	3459500
600	1200	1920000	1800	880	1584000	1700	2035	3459500
400	1200	1680000	2000	880	1760000	2000	2035	4070000
200	1200	1440000	2600	880	2288000	1200	2035	2442000
800	1200	2160000	1600	880	1408000	2000	2035	4070000
300	1200	2760000	2500	880	2200000	2200	2035	4477000
600	1200	3120000	1800	880	1584000	2500	2035	5087500
OTAL		**24180000**			**18748400**			**36711400**

Table No:4 Table Showing ABC Analysis of Tata Motors

829737			821520		
CUSTOMER ORDER	**PRICE**		**CUSTOMER ORDER**	**PRICE**	
2600	1360	3536000	9400	145	1363000
2000	1360	2720000	8000	145	1160000
5500	1360	7480000	10000	145	1450000
4900	1360	6664000	9200	145	1334000
4900	1360	6664000	12100	145	1754500
2900	1360	3944000	11000	145	1595000
2400	1360	3264000	9700	145	1406500
2900	1360	3944000	12100	145	1754500
2100	1360	2856000	7000	145	1015000
100	1360	136000	15400	145	2233000
500	1360	680000	15100	145	2189500
TOTAL		**41888000**			**17255000**

Table No:5 Table Showing Results of ABC Analysis

NUMBER	CLUSTER	DESCENDING	CUMULATIVE	CLASS
10	829737	41888000	41888000	A
9	829351	36711400	78599400	A
2	830845	31894720	110494120	A
7	824842	24180000	134674120	A
8	826672	18748400	153422520	B
11	821520	17255000	170677520	B
1	830114	14992640	185670160	C
5	825106	14774382	200444542	C
4	818030	6928600	207373142	C
6	825363	4406800	211779942	C
3	817431	1266356	213046298	C
	TOTAL	213046298		

The above table classifies the components under three classes of categories namely A, B & C. These components refer to Mahindra & Mahindra and Tata Motors .The table shows the summary of table 3 & table 4 which lead to classify these components as classes A, B & C respectively.

4.3 GRAPH:

Graphs are used to represent data a two dimensional picture. One is horizontal axis; we can show the values of the variable, such as the carpet out put in yards. On the vertical axis, we mark the frequencies of the classes shown on the horizontal axis. Graphs of frequency distributions are useful because they emphasize and clarify patterns that are not so readily discernible in tables. They attract a reader's attention to patterns in the data. Graph can also help us do problems concerning frequency distributions. They will enable us to estimate some values at a glance and will provide us with a pictorial check on the accuracy of our solutions.

There are different types of graph available. They are

- Column graph
- Line graph
- Bar graph
- Pie chart
- Area chart. Etc

The graphs were drawn to identify the gap between customer order and supply values. From the graphs we can identify customer order and supply by the differ almost every order. Customer order is more and supplies made to the customers are less.

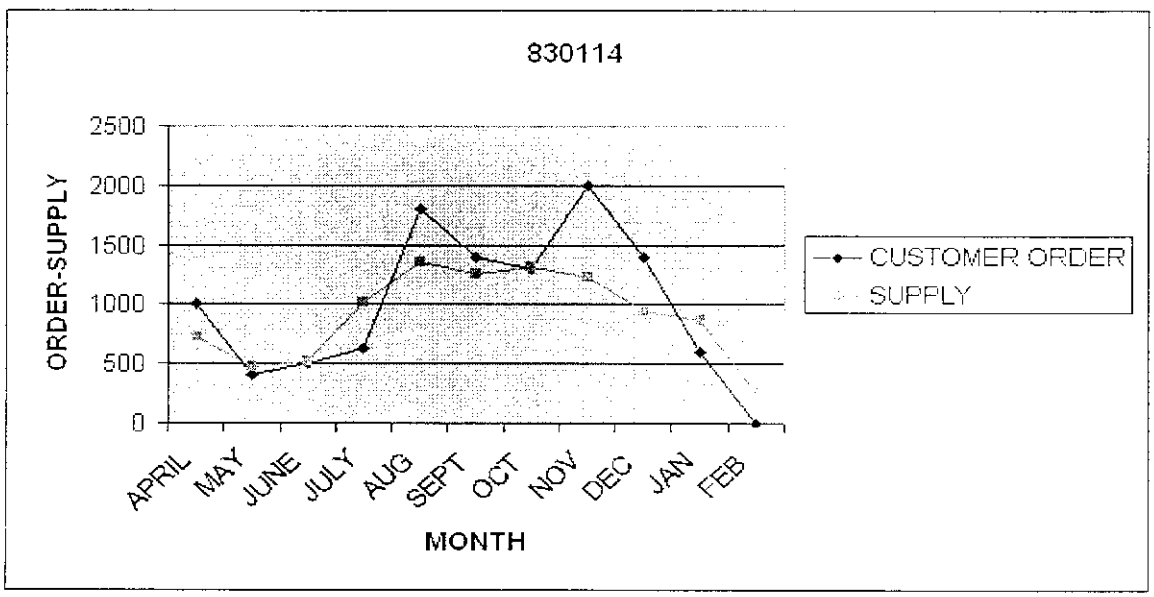
For example: For the table 2.2 the cluster 826672 which identified that customer order for the month April is 1200 and supply made on the month is only 20. So the production has to be increased.

Table No:6 Table Showing Customer Order And Supply For Mahindra & Mahindra

830114-Scorpio –w- Blw

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	1000	720
MAY	400	480
JUNE	500	516
JULY	624	1017
AUG	1800	1354
SEPT	1400	1260
OCT	1300	1308
NOV	2000	1236
DEC	1400	954
JAN	600	862
FEB	0	260

GRAPH NO:1 Customer Order And Supply for Scorpio-w-blw



From the above table which indicates that for all 11 months the supply does not meeting the demand of the customers. From the above graph we can identify the gap between customer order and supply. From the analysis we can conclude that production is not much sufficient to satisfy the customer.

Table No:7 Table Showing Customer Order And Supply For Mahindra & Mahindra

830845- Scorpio-T

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	2500	1464
MAY	1500	1656
JUNE	1000	1804
JULY	1752	1572
AUG	2600	1981
SEPT	5000	3408
OCT	2100	2196
NOV	3000	2796
DEC	2200	2664
JAN	1800	1678
FEB	0	639

GRAPH NO:2 Customer Order And Supply for Scorpio – T

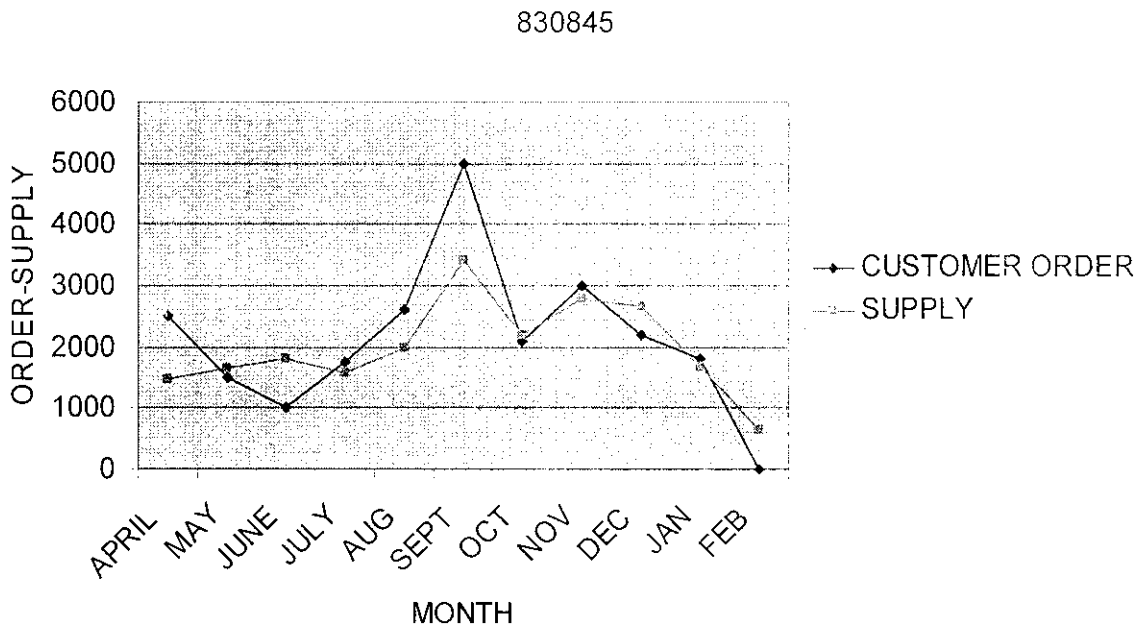


Table No:8 Table Showing Customer Order And Supply For Mahindra & Mahindra

817431- Instant- M& M – Scorpio 8 seats

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	96	120
MAY	120	88
JUNE	120	152
JULY	200	192
AUG	96	144
SEPT	300	96
OCT	0	72
NOV	0	0
DEC	72	128
JAN	650	680
FEB	192	168

GRAPH NO :3 Customer Order And Supply for Bolero 8 Seats

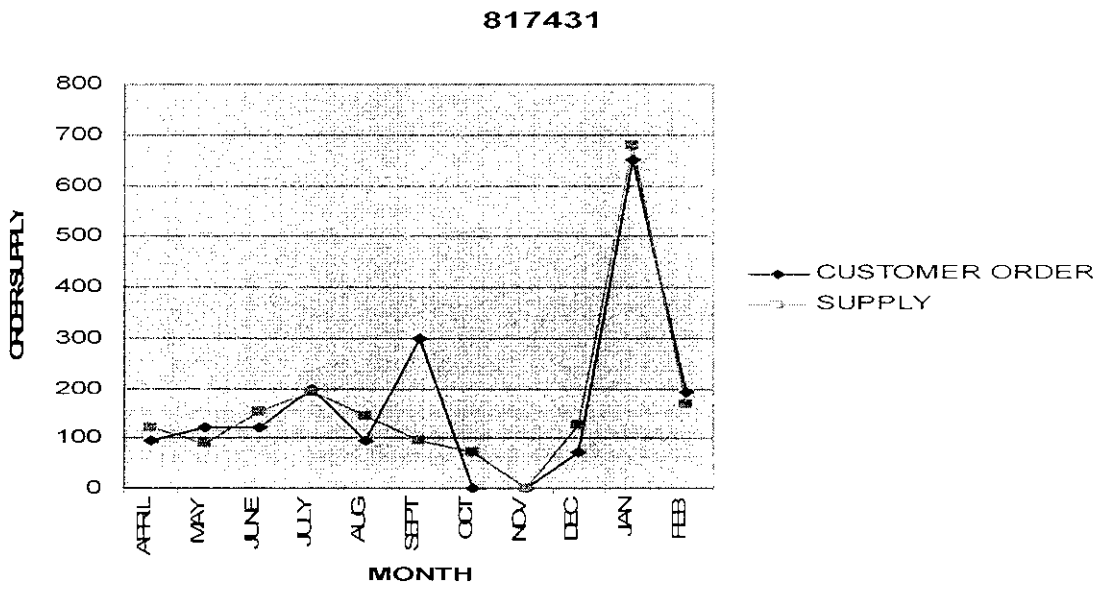


Table No:9 Table Showing Customer Order And Supply For Mahindra & Mahindra

818030- camper- Dx

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	400	448
MAY	300	536
JUNE	400	400
JULY	1200	1200
AUG	300	336
SEPT	1600	1312
OCT	900	600
NOV	600	696
DEC	1600	1240
JAN	1600	1312
FEB	1200	1008

GRAPH NO 4: Customer Order And Supply for Cluster – Camper Dx

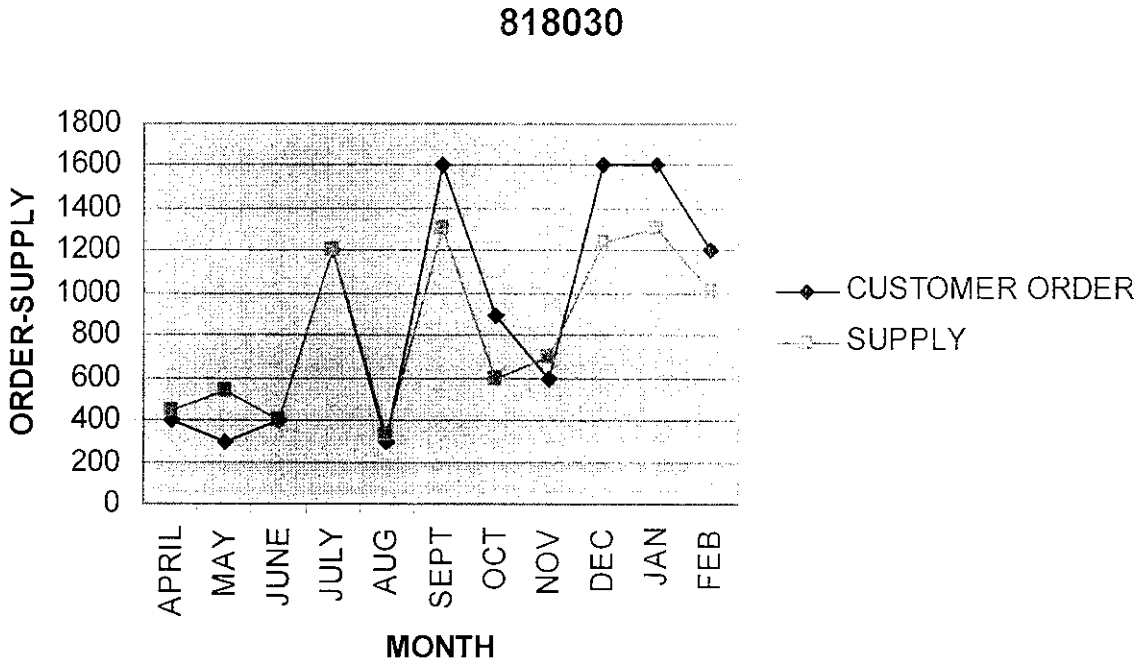


Table No:10 Table Showing Customer Order And Supply For Mahindra & Mahindra

825106-Bolero 8 seats

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	1632	2152
MAY	960	1728
JUNE	1920	1568
JULY	3000	2720
AUG	3500	3480
SEPT	3500	3552
OCT	2000	1776
NOV	800	1344
DEC	800	504
JAN	1900	1896
FEB	1525	800

GRAPH NO:5 : Customer Order And Supply for Bolero 8 Seats

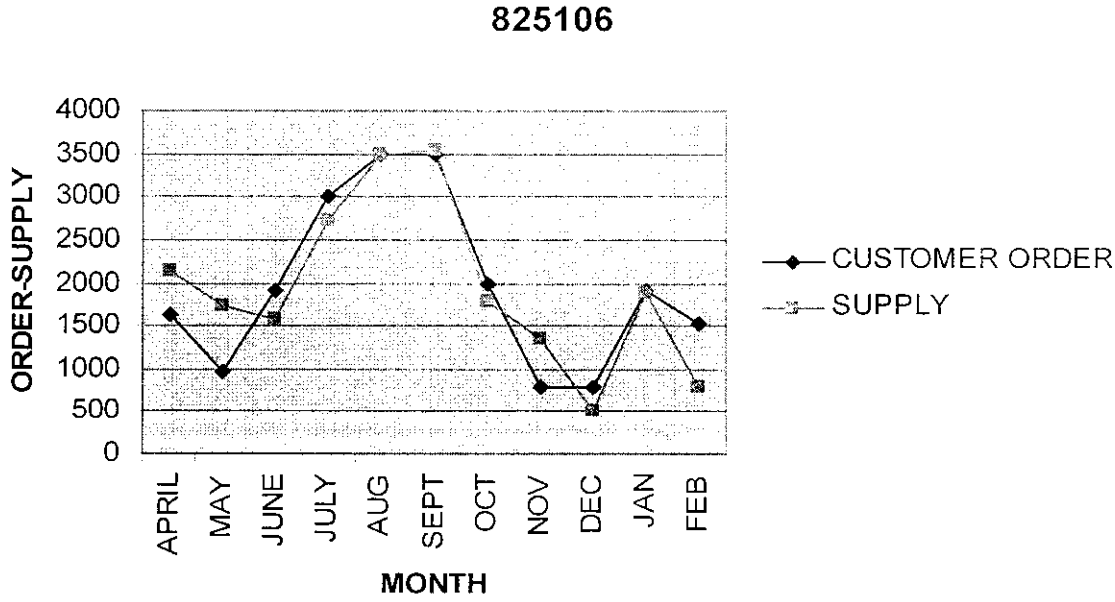


Table No:11 Table Showing Customer Order And Supply For Mahindra & Mahindra

825363- Cluster Bolero 8 Seats

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	0	0
MAY	0	0
JUNE	100	60
JULY	132	22
AUG	200	12
SEPT	0	0
OCT	400	228
NOV	500	369
DEC	800	168
JAN	800	887
FEB	900	984

GRAPH NO:6: : Customer Order And Supply for M& M Bolero 8 Seats

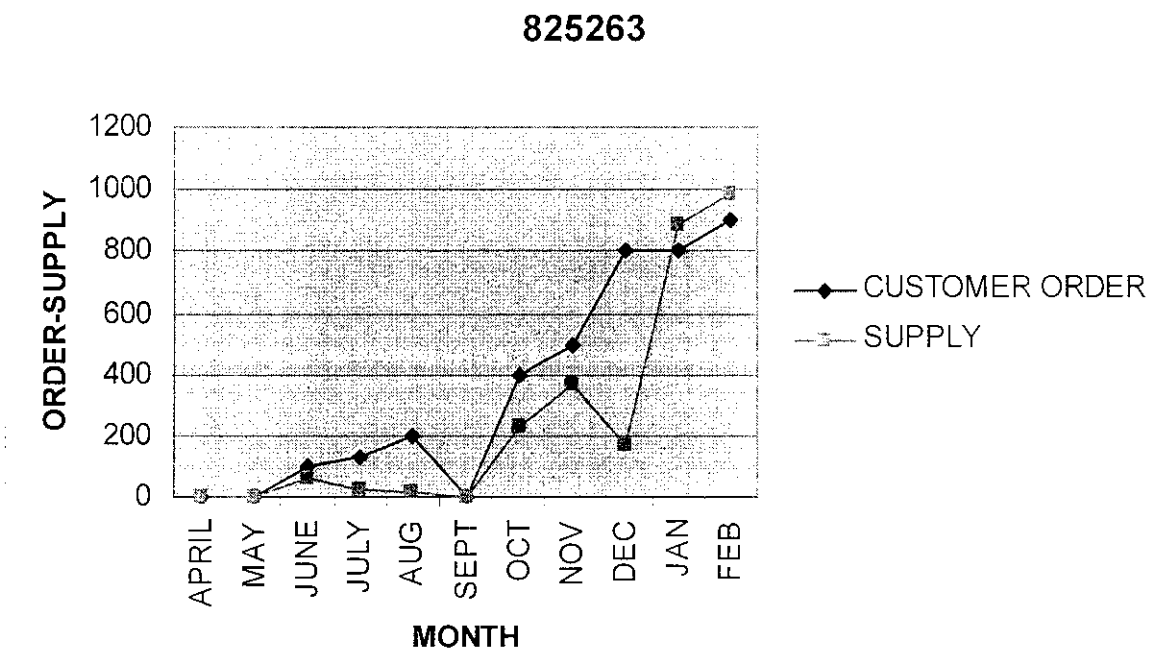


Table No:12 Table Showing Customer Order And Supply For Tata Motors

825842-207 Cluster

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	1200	700
MAY	1700	1500
JUNE	2150	2650
JULY	2200	2375
AUG	2000	1750
SEPT	1600	1210
OCT	1400	830
NOV	1200	1970
DEC	1800	1960
JAN	2300	2330
FEB	2600	1300

GRAPH NO:7: **Customer Order And Supply for 207 cluster**

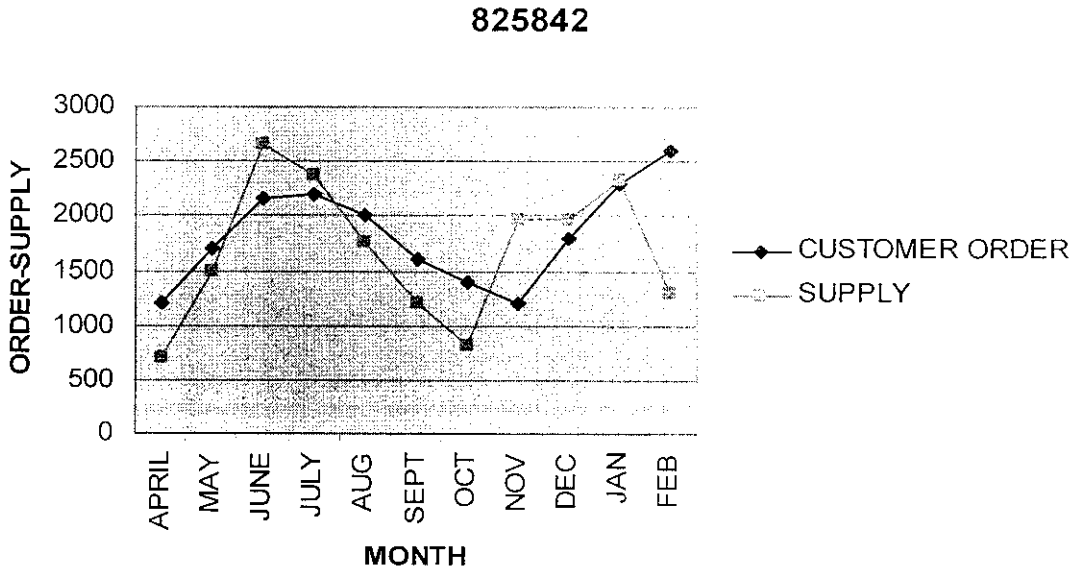


Table No:13 Table Showing Customer Order And Supply For Tata Motors

826672-Indica Taxi Cluster

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	1200	20
MAY	1300	410
JUNE	2000	1800
JULY	2300	2080
AUG	2205	1710
SEPT	1800	1490
OCT	2000	1530
NOV	2600	2120
DEC	1600	1500
JAN	2500	1255
FEB	1800	1570

GRAPH NO:8: Customer Order And Supply for Indicia Taxi Cluster

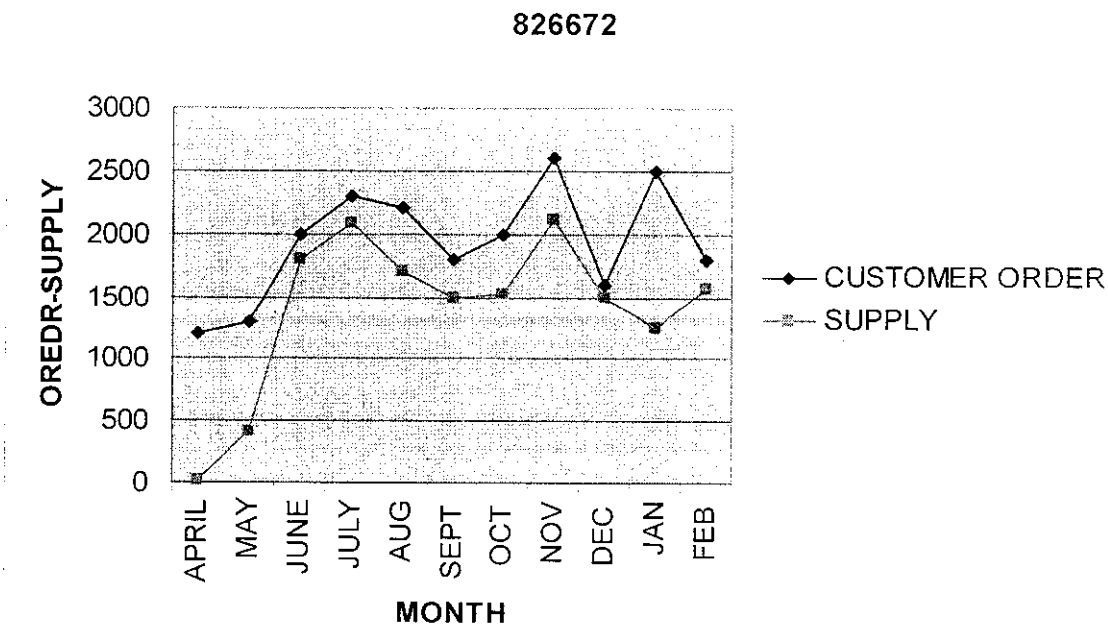


Table No:14 Table Showing Customer Order And Supply For Tata Motors

829351- Safari Cluster

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	1000	934
MAY	1000	666
JUNE	1300	984
JULY	1440	1312
AUG	1700	1790
SEPT	1700	1792
OCT	2000	1888
NOV	1200	1264
DEC	2000	984
JAN	2200	1328
FEB	2500	1872

GRAPH NO:9: Customer Order And Supply for Safari Cluster

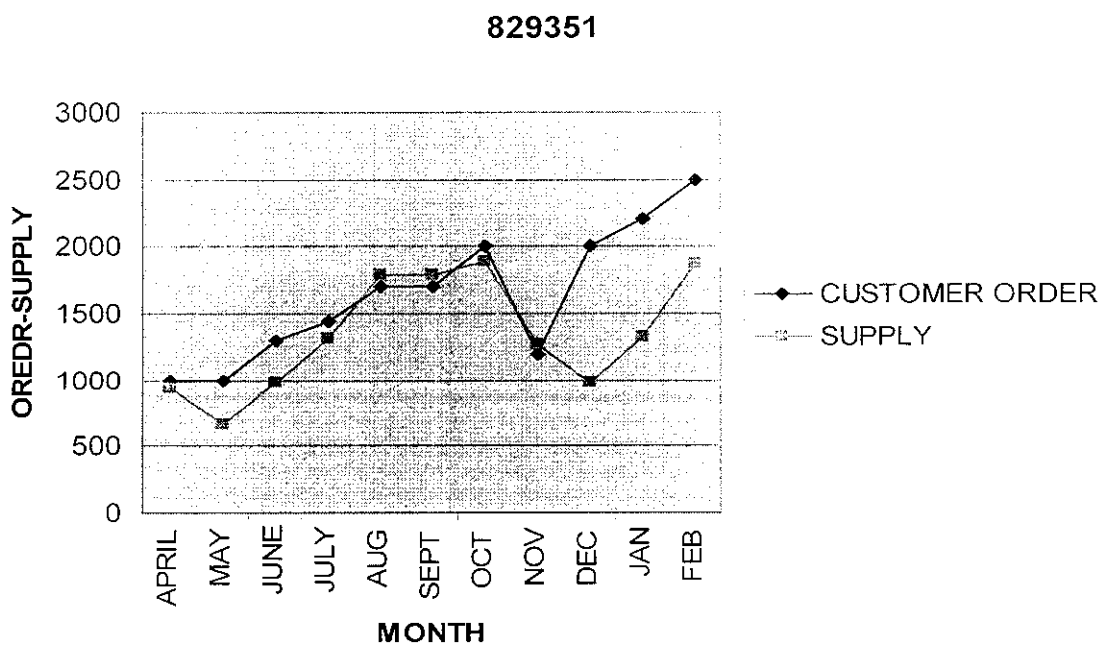


Table No:15 Table Showing Customer Order And Supply For Tata Motors

829737-Indica DND Cluster

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	2600	3000
MAY	2000	920
JUNE	5500	5200
JULY	4900	3540
AUG	4900	2299
SEPT	2900	1430
OCT	2400	2090
NOV	2900	3680
DEC	2100	2000
JAN	100	250
FEB	500	340

GRAPH NO:10: **Customer Order And Supply for Indicia DND**

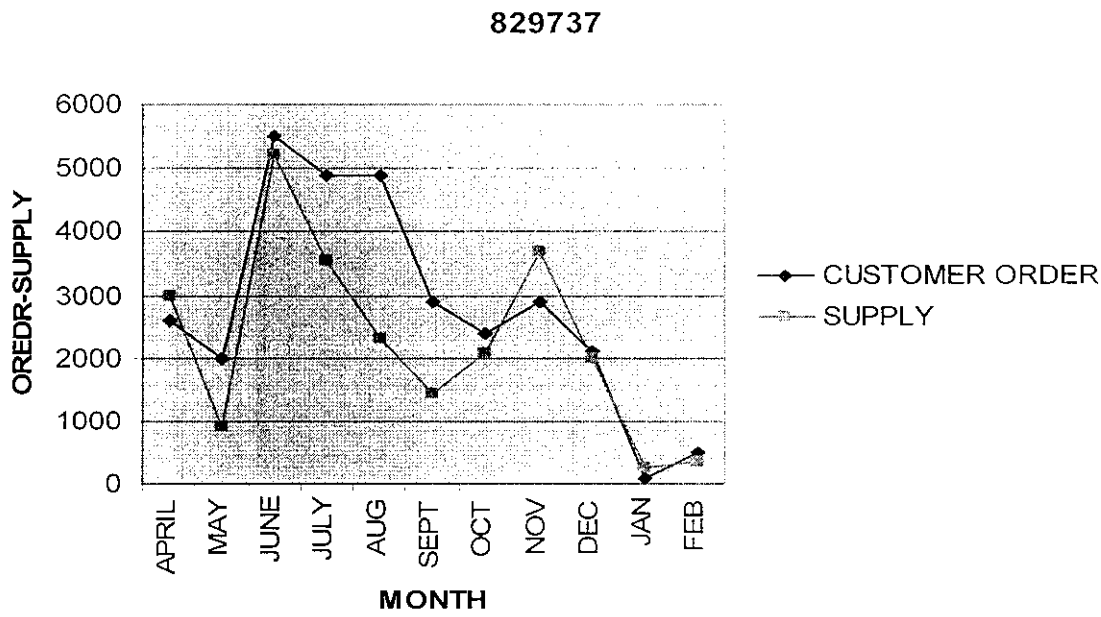
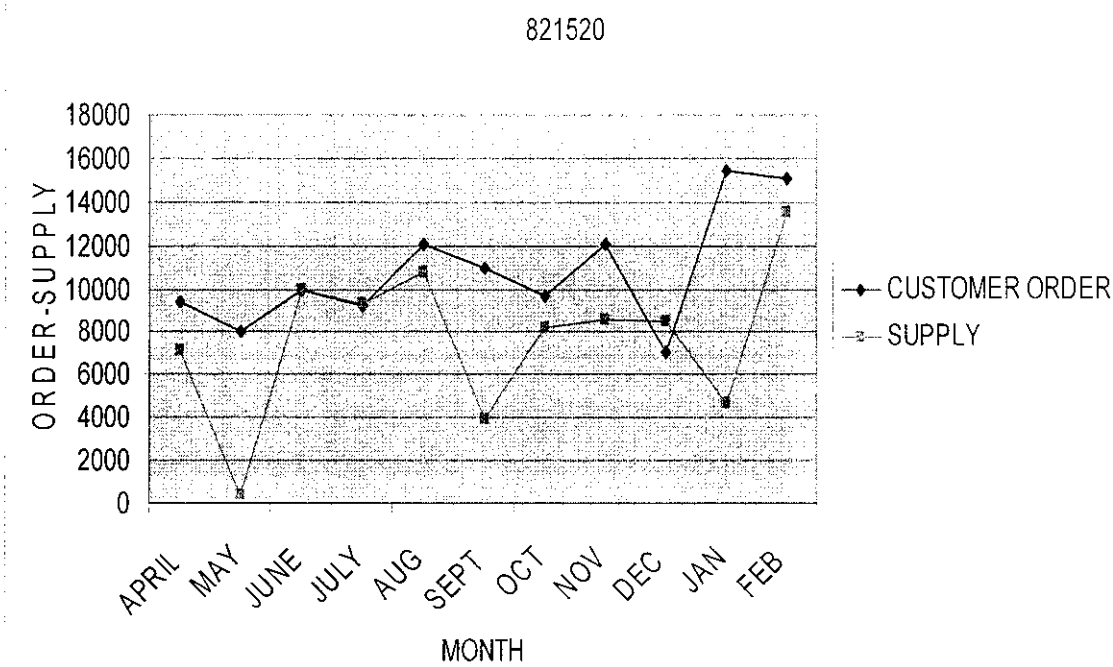


Table No:16 Table Showing Customer Order And Supply For Tata Motors

821520- Speed Sensor

MONTH	CUSTOMER ORDER	SUPPLY
APRIL	9400	7150
MAY	8000	360
JUNE	10000	9982
JULY	9200	9300
AUG	12100	10750
SEPT	11000	3900
OCT	9700	8250
NOV	12100	8600
DEC	7000	8500
JAN	15400	4700
FEB	15100	13500

GRAPH NO:11: Customer Order And Supply for Speed Sensor



4.4 RANGE:

The range is the difference between the highest and the lowest observed values.

RANGE = value of highest observation – value of the lowest observation

It identifies the variation in the set of data given. For example, the tabular column shows the high and low range of customer 830114bearing the number on 0 and 2000. So the range is 2000- 0 = 2000.

The CV% is calculated as (Standard deviation /mean)*100.the mean, standard deviation and range were calculated along with CV% in respect of Mahindra and Mahindra and is given the following table.

Table No:17 Table Showing Range of Mahindra & Mahindra

MAHENDRA&MAHENDRA

CLUSTER NUMBER	RANGE
830114	2000
830845	5000
817431	650
818030	1300
825106	2700
825363	900

GRAPH NO:12 Range of Mahindra & Mahindra

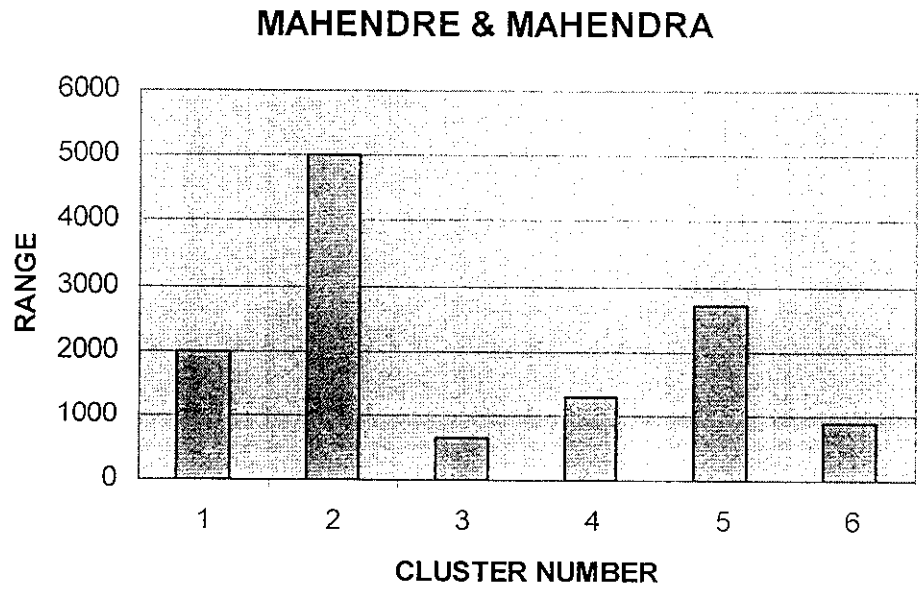
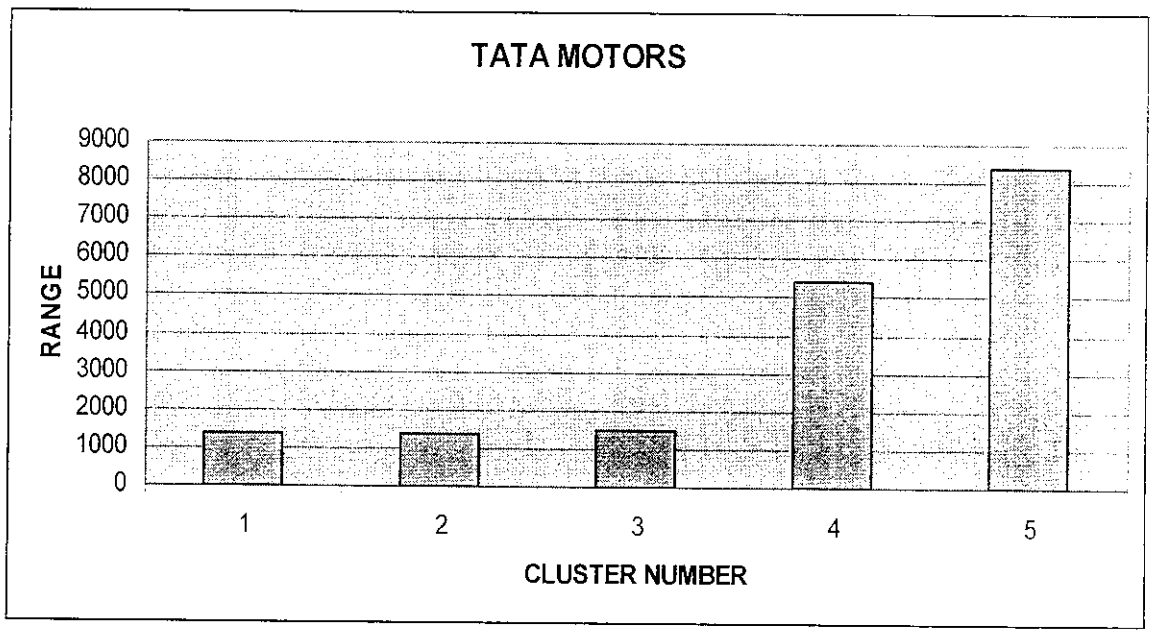


Table No:18 Table Showing Range of Tata Motors

TATA MOTORS

CLUSTER NUMBER	RANGE
824842	1400
826672	1400
829351	1500
829737	5400
821520	8400

GRAPH NO: Range of Tata Motors



4.5 PRODUCTION- SUPPLY GAP:

The produced which identifies the finished goods in the buffer stock. The supply identifies the supply made for particular month. From the production – supply we can easily find out the surplus and deficit production. If it shows the negative figure it helps us to identify the deficit production, if it is in positive sign then deficit production. The standard deviation identifies the production – supply is deviated from mean.

4.6 Analysis of variance

Table No:19 Table Showing Production- Supply

	Mahindra & Mahindra						Tata Motors				
	830114	830845	817431	818030	825106	825363	824842	826672	839737	829351	821520
	312	312	24	0	8	0	0	280	0	58	350
	120	-264	40	8	72	0	0	-267	-19	-72	-360
	-432	-56	-56	-8	-80	-48	0	4	0	8	-750
	-9	30	8	0	0	60	0	0	10	0	550
	2	-37	40	8	16	-12	20	0	-9	74	500
	24	0	208	8	56	0	-10	0	30	-64	3700
	180	108	-72	-16	-62	12	0	-130	-290	56	-3250
	-168	-108	0	0	104	-12	0	140	-10	-64	-400
	498	12	-119	0	-104	0	1	-69	180	40	1
	-12	328	-8	72	8	0	0	-50	-170	-40	5300
	-44	358	0	-72	0	24	0	10	0	0	-5250
TOTAL	471	683	65	0	18	24	11	-82	-278	-4	391
S.D	242.81055	197.2959475	83.22554	32.98485	63.67931	26.19091	7.27178	138.9081	118.2862	53.49257	2853.388

Table No:20Table Showing ANOVA of Production- Supply for Tata Motors

TH	824842	826672	839737	829351	821520	TOTAL	MONTH SQRS
	0	280	0	58	350	**688**	473344
	0	-267	-19	-72	-360	**-718**	515524
	0	4	0	8	-750	**-738**	544644
	0	0	10	0	550	**560**	313600
	20	0	-9	74	500	**585**	342225
	-10	0	30	-64	3700	**3656**	13366336
	0	-130	-290	56	-3250	**-3614**	13060996
	0	140	-10	-64	-400	**-334**	111556
	1	-69	180	40	1	**153**	23409
	0	-50	-170	-40	5300	**5040**	25401600
	0	10	0	0	-5250	**-5240**	27457600
	11	**-82**	**-278**	**-4**	**391**	**38**	**81610834**
UCT SQUARE	**121**	**6724**	**77284**	**16**	**152881**	**237026**	

There is no significant difference in the production-supply from month to month

There is no variation in production due to variation production –supply

RECTION FACTOR	**26.25454545**
L SUM OF SQUARS	**-26.2545455**
THS OF SUMS OF SQUARE	**16322140.55**
UCTS OF SUM OF SQUARES	**21521.56364**

A TABLE(TATA MOTORS)

OURCE OF VARIANCE	DEGRRE OF FREQUENCY	SUM OF SQUARES	MEAN SUM OF SQUARES	Fo	Fe	DECESSION
MONTH	10	16322140.55	1632214.055	0.99741093	2.035	ACCEPT
DUCT-SUPPLY	4	21521.56	5380.39	0.003287841	2.57	ACCEPT
ERROR	40	65458037.64	1636450.941			
TOTAL	**54**	**81801699.75**				

ons do not vary from month to month and as well from product to product. However, it can be observed from the ANOVA table the hs 0.99 which lover than the critical point viz. 2.04. So we can conclude that month's variations also significantly influence the

Table No:21 Table Showing ANOVA of Production- Supply for Mahindra & Mahindra

IS	830114	830845	817431	818030	825106	825363	TOTAL	MONYH SQUARS
								430336
	312	312	24	0	8	0	656	576
	120	-264	40	8	72	0	-24	462400
	-432	-56	-56	-8	-80	-48	-680	7921
	-9	30	8	0	0	60	89	289
	2	-37	40	8	16	-12	17	87616
	24	0	208	8	56	0	296	22500
	180	108	-72	-16	-62	12	150	33856
	-168	-108	0	0	104	-12	-184	82369
	498	12	-119	0	-104	0	287	150544
	-12	328	-8	72	8	0	388	70756
	-44	358	0	-72	0	24	266	**1349163**
	471	**683**	**65**	**0**	**18**	**24**	**1261**	
QUA	**221841**	**466489**	**4225**	**0**	**324**	**576**	**693455**	

ere is no significant difference in the production-supply from month to month
ere is no variation in production due to variation in production –supply

CTION FACTOR	**24092.74242**
SUM OF SQUARS	**1145330.258**
S OF SUMS OF SQUARE	**200767.7576**
CTS OF SUM OF SQUARES	**38948.62121**

VA TABLE

URCE OF RIANCE	DEGRRE OF FREQUENCY	SUM OF SQUARES	MEAN SUM OF SQUARES	Fo	Fe	DECESSION
	10	200767.75	20076.775	1.1084622	2.035	ACCEPT
CT-SUPPLY	5	38948.62	7789.724	0.4300798	2.41	ACCEPT
	50	905613.89	18112.278			
	65	**1145330.26**				

tions do not vary from month to month and as well from product to product. However, it can be observed from the ANOVA table the nths 1.1 which slightly lover than the critical point viz. 2.04. So we can conclude that month's variations also significantly influence ion.

Table No:22 Table Showing ANOVA of Production for Mahindra & Mahindra

ONTHS	830114	830845	817431	818030	825106	825263	TOTAL	MONTH SQRS
APRIL	1032	1776	144	448	2160	0	5560	30913600
MAY	600	1392	128	544	1800	0	4464	19927296
JUNE	84	1748	96	392	1488	82	3890	15132100
JULY	1008	1602	200	1200	2720	12	6742	45454564
AUG	1356	1944	184	344	3496	0	7324	53640976
SEPT	1284	3408	304	1320	3608	0	9924	98485776
OCT	1488	2304	0	584	1714	240	6330	40068900
NOV	1068	2688	0	696	1448	357	6257	39150049
DEC	1452	2676	9	1240	400	168	5945	35343025
JAN	850	2002	672	1384	1904	887	7699	59274601
FEB	216	897	168	936	800	1008	4025	16200625
TOTAL	**10438**	**22437**	**1905**	**9088**	**21538**	**2754**	**68160**	**453591512**
QUARS	**108951844**	**503418969**	**3629025**	**82591744**	**463885444**	**7584516**	**1170061542**	

=There is no significant difference in the production from month to month
=There is no variation in production due to different production

RRECTION FACTOR	**70390691**
AL SUM OF SQUARS	**56430445**
NTHS OF SUMS OF SQUARE	**5207894.4**
DUCTS OF SUM OF SQUARES	**35978540**

VA TABLE

OURCE OF ARIANCE	**DEGRRE OF FREQUENCY**	**SUM OF SQUARES**	**MEAN SUM OF SQUARES**	**Fo**	**Fe**	**DECESSION**
NTH	10	5207894.4	520789	1.7081773	2.035	ACCEPT
DUCT	5	35978540	7195708	23.601755	2.41	REJECT
OR	50	15244010	304880			
AL	65	56430445.09				

roducts that are produced for Mahindra & Mahindra do vary from products to product. Where the production do not vary from month nth for the same product.

Table No:23 Table Showing ANOVA of Production for Tata Motors

NTH	825842	826672	829351	829737	821520	TOTAL	MONTH SQRS
RIL	700	300	992	3000	7500	12492	156050064
Y	1500	143	594	901	0	3138	9847044
IE	2650	1804	992	5200	9232	19878	395134884
Y	2375	2080	1312	3550	9850	19167	367373889
G	1770	1710	1864	2290	10250	17884	319837456
PT	1200	1490	1728	1730	7600	13748	189007504
T	830	1400	1944	1800	5000	10974	120428676
V	1970	2260	1200	3670	8200	17300	299290000
C	1961	1431	1024	2180	8501	15097	227919409
I	2330	1205	1288	80	10000	14903	222099409
3	1300	1580	1872	340	8250	13342	178008964
TAL	18586	15403	14810	24741	84383	157923	2484997299
UARES	3.45E+08	237252409	2.19E+08	612117081	7.12E+09	8534635675	

=There is no significant difference in the production from month to month
=There is no variation in production due to different production

RRECTION FACTOR	**453448616.9**
TAL SUM OF SQUARS	**443063634.1**
NTHS OF SUMS OF SQUARE	**43550842.91**
ODUCTS OF SUM OF SQUARES	**322427353.6**

OVA TABLE

SOURCE OF VARIANCE	DEGRRE OF FREQUENCY	SUM OF SQUARES	MEAN SUM OF SQUARES	Fo	Fe	DECESSION
NTH	10	43550842.91	4355084	2.259873912	2.035	REJECT
ODUCT	4	322427353.6	80606838	41.82727108	2.57	REJECT
ROR	40	77085438.59	1927136			
TAL	**54**	**443063634.1**				

productions vary from month to month and as well from product to product. However, it can be observed from the ANOVA table the or months 2.6in which slightly higher than the critical point viz. 2.04. So we can conclude that month's variations also do not ficantly influence the production.

Table No:24 Table Showing ANOVA of Customer Demand for Mahindra & Mahindra

MONTH	830114	830845	817431	818030	825106	825363	TOTAL	MONYH SQRS
APRIL	1000	2500	96	400	1632	0	5628	31674384
MAY	400	1500	120	300	960	0	3280	10758400
JUNE	500	1000	120	400	1920	100	4040	16321600
JULY	624	1752	200	1200	3000	132	6908	47720464
AUG	1800	2600	96	300	3500	200	8496	72182016
SEPT	1400	5000	300	1600	3500	0	11800	139240000
OCT	1300	2100	0	900	2000	400	6700	44890000
NOV	2000	3000	0	600	800	500	6900	47610000
DEC	1400	2200	72	1600	800	800	6872	47224384
JAN	600	1800	650	1600	1900	800	7350	54022500
FEB	0	0	192	1200	1525	900	3817	14569489
TOTAL	**11024**	**23452**	**1846**	**10100**	**21537**	**3832**	**71791**	
SQUARES	**1.22E+08**	**5.5E+08**	**3407716**	**102010000**	**4.6E+08**	**1.5E+07**	**1255469189**	**526213237**

There is no significant difference in the demand from month to month.
There is no variation in production due to different demand.

RECTION FACTOR	**78090116.4**
AL SUM OF SQUARS	**70165016.6**
THS OF SUMS OF SQUARE	**9612089.79**
DUCTS OF SUM OF SQUARES	**36043446.3**

VA TABLE

SOURCE OF VARIANCE	DEGRRE OF FREQUENCY	SUM OF SQUARES	MEAN SUM OF SQUARES	Fo	Fe	DECESSION
TH	10	9212090	921209	1.84911319	2.035	ACCEPT
AND	5	36043446	7208689	14.4697703	2.41	REJECT
OR	50	24909481	498190			
AL	**65**	**70165017**				

oducts that are produced for Mahindra & Mahindra do vary from products to product. Where the production do not vary from month to for the same product.

Table No:25 Table Showing ANOVA of Customer Demand for Tata Motors

NTH	824842	826672	829351	829737	821520	TOTAL	MONTH SQUARES
IL	1200	1200	1000	2600	9400	15400	237160000
	1700	1300	1000	2000	8000	14000	196000000
E	2150	2000	1300	5500	10000	20950	438902500
Y	2200	2300	1440	4900	9200	20040	401601600
	2000	2205	1700	4900	12100	22905	524639025
T	1600	1800	1700	2900	11000	19000	361000000
	1400	2000	2000	2400	9700	17500	306250000
	1200	2600	1200	2900	12100	20000	400000000
	1800	1600	2000	2100	7000	14500	210250000
	2300	2500	2200	100	15400	22500	506250000
	2600	1800	2500	500	15100	22500	506250000
AL	**20150**	**21305**	**18040**	30800	**119000**	209295	**4088303125**
ARES	**4.06E+08**	**4.54E+08**	**3.3E+08**	**948640000**	**1.416E+10**	**16295007125**	

There is no significant difference in the demand from month to month.
There is no variation in production due to different demand.

RECTION FACTOR	**796443582.3**
AL SUM OF SQUARS	**793364542.7**
THS OF SUMS OF SQUARE	**21217042.73**
DUCTS OF SUM OF SQUARES	**684920701.8**

VA TABLE

URCE OF IANCE	DEGRRE OF FREQUENCY	SUM OF SQUARES	MEAN SUM OF SQUARES	Fo	Fe	DECESSION
TH	10	21217043	2121704	0.972959832	2.035	ACCEPT
AND	4	6.85E+08	1.7E+08	78.52182084	2.57	REJECT
OR	40	87226798	2180670			
AL	54	7.93E+08				

cts that are produced for Mahindra & Mahindra do vary from products to product. Where the production do not vary from month to the same product.

Table No:26 Table Showing ANOVA of Supply for Mahindra & Mahindra

ONTH	830114	830845	817431	818030	825106	825263	TOTAL	MONTH SQRS
PRIL	720	1464	120	448	2152	0	4904	24049216
IAY	480	1656	88	536	1728	0	4488	20142144
UNE	516	1804	152	400	1568	60	4500	20250000
ULY	1017	1572	192	1200	2720	22	6723	45198729
UG	1354	1981	144	336	3480	12	7307	53392249
EPT	1260	3408	96	1312	3552	0	9628	92698384
CT	1308	2196	72	600	1776	228	6180	38192400
OV	1236	2796	0	696	1344	369	6441	41486481
EC	954	2664	128	1240	504	168	5658	32012964
AN	862	1678	680	1312	1896	887	7315	53509225
EB	260	639	168	1008	800	984	3859	14891881
TAL	**9967**	**21858**	**1840**	**9088**	**21520**	**2730**	67003	
DUCTS	**9.9E+07**	**477772164**	**3385600**	**82591744**	**4.6E+08**	**7452900**	**1133653897**	**435823673**

There is no signifance difference in the supply from month to month.
There is no variation in production due to different supply.

RECTION FACTOR	**68021242.56**
AL SUM OF SQUARS	**54811430.44**
THS OF SUMS OF SQUARE	**4616036.273**
DUCTS OF SUM OF SQUARES	**35038202.62**

VA TABLE

URCE OF RIANCE	DEGRRE OF FREQUENCY	SUM OF SQUARES	MEAN SUM OF SQUARES	Fo	Fe	DECESSION
TH	10	4616036.4	461604	1.522721566	2.035	ACCEPT
PLY	5	35038203	7007641	23.11655355	2.41	REJECT
OR	50	15157191	303144			
AL	65	54811430				

oducts that are produced for Mahindra & Mahindra do vary from products to product. Where the production do not vary from month to for the same product.

Table No:27 Table Showing ANOVA of Supply for Tata Motors

MONTH	825842	826672	829351	829737	821520	TOTAL	MONTH SQURS
APRIL	700	20	934	3000	7150	11804	139334416
MAY	1500	410	666	920	360	3856	14868736
JUNE	2650	1800	984	5200	9982	20616	425019456
JULY	2375	2080	1312	3540	9300	18607	346220449
AUG	1750	1710	1790	2299	10750	18299	334853401
SEPT	1210	1490	1792	1430	3900	9822	96471684
OCT	830	1530	1888	2090	8250	14588	212809744
NOV	1970	2120	1264	3680	8600	17634	310957956
DEC	1960	1500	984	2000	8500	14944	223323136
JAN	2330	1255	1328	250	4700	9863	97278769
FEB	1300	1570	1872	340	13500	18582	345290724
	18575	15485	14814	24749	84992	158615	25158718225
TOTAL	**37150**	**30970**	**29628**	**49498**	**169984**	**317230**	
RODUCTION	**1.38E+09**	**959140900**	**877818384**	**2450052004**	**2.89E+10**	**34561694044**	**27705146696**

=There is no significant difference in the supply from month to month.
=There is no variation in production due to different supply.

RRECTION FACTOR	**1829724962**
'AL SUM OF SQUARS	**7759586564**
NTHS OF SUMS OF SQUARE	**3711304377**
)DUCTS OF SUM OF SQUARES	**1312247224**

ANOVA TABLE

SOURCE OF VARIANCE	DEGRRE OF FREQUENCY	SUM OF SQUARES	MEAN SUM OF SQUARES	Fo	Fe	DECESSION
MONTH	10	3711304377	371130438	5.425814256	2.035	REJECT
SUPPLY	4	1312247224	328061806	4.796163944	2.57	REJECT
ERROR	40	2736034963	68400874.1			
TOTAL	54	7759586564				

roductions vary from month to month and as well from product to product. However, it can be observed from the ANOVA table the r months 5.4in which slightly higher than the critical point viz. 2.04. So we can conclude that month's variations also do not ficantly influence the production.

Table No:28 Table Showing ANOVA of Supply- Demand for Mahindra & Mahindra

NTH	830114	830845	817431	818030	825106	825363	TOTAL	MONTH SQUARE
IL	-330	-536	-24	-2	-348	0	**-1240**	1537600
	-450	-80	-56	-14	-172	-10	**-782**	611524
E	-10	-15	-8	0	-132	-63	**-228**	51984
Y	-83	-41	-56	0	-5	-100	**-285**	81225
	-346	-619	-48	-164	-20	-188	**-1385**	1918225
T	-240	-1	-192	12	-58	0	**-479**	229441
	-192	-124	-128	0	-14	-72	**-530**	280900
	-264	-4	0	-4	-106	-81	**-459**	210681
	-546	-12	-172	-360	-206	-332	**-1628**	2650384
	-738	-622	-36	-288	-4	-13	**-1701**	2893401
	-492	-597	-4	-292	0	-24	**-1409**	1985281
AL	**-3691**	**-2651**	**-724**	**-1112**	**-1065**	**-883**	**-10126**	**12450646**
DUCT ARE	**13623481**	**7027801**	**524176**	**1236544**	**1134225**	**779689**	**24325916**	

:There is no signifance difference in the supply-demand from month to month
:There is no variation in production due to different supply-demand

RECTION FACTOR	**1553574**
AL SUM OF SQUARS	**2387444**
ITHS OF SUMS OF SQUARE	**521533.8**
DUCTS OF SUM OF SQUARES	**657873**

VA TABLE

OURCE OF VARIANCE	DEGRRE OF FREQUENCY	SUM OF SQUARES	MEAN SUM OF SQUARES	Fo	Fe	DECESSION
TH	10	521533.78	52153.4	2.1586	2.035	REJECT
PLY-DEM	5	657873.03	131575	5.445801	2.41	REJECT
OR	50	1208037.31	24160.7			
AL	**65**	**2387444.12**				

uctions vary from month to month and as well from product to product. However, it can be observed from the ANOVA table the 'F' ns 2.1 in which slightly higher than the critical point viz. 2.04. So we can conclude that month's variations also do not significantly the production.

Table No:29 Table Showing ANOVA of Supply- Demand for Tata Motors

MONTH	824842	826672	839737	829351	821520	TOTAL	MONTH SQRS
APRIL	0	-280	-82	0	-850	-1212	1468944
MAY	0	-90	-84	-80	335	81	6561
JUNE	-20	0	-16	-800	-18	-854	729316
JULY	-25	280	-38	-60	-700	-543	294849
AUG	-450	-40	-82	-1	-191	-764	583696
SEPT	10	-10	-58	-273	-3700	-4031	16248961
OCT	-3	-281	-325	-10	-633	-1252	1567504
NOV	-23	-1381	-353	-330	-225	-2312	5345344
DEC	-43	-641	-51	-180	-723	-1638	2683044
JAN	-173	-1516	-672	50	-5524	-7835	61387225
FEB	-1503	-651	-633	-10	-271	-3068	9412624
TOTAL	-2230	-4610	-2394	-1694	-12500	-23428	
SQUARES	4972900	2.1E+07	5731236	2869636	1.6E+08	1.91E+08	99728068

Ho1=There is no significant difference in the supply-demand from month to month
Ho2=There is no variation in production due to different supply-demand

CORRECTION FACTOR	**9979476.1**
TOTAL SUM OF SQUARS	**46393930**
MONTHS OF SUMS OF SQUARE	**9966137.5**
PRODUCTS OF SUM OF SQUARES	**7391057.7**

ANOVA TABLE

SOURCE OF VARIANCE	DEGRRE OF FREQUENCY	SUM OF SQUARES	MEAN SUM OF SQUARES	Fo	Fe	DECESSION
MONTH	10	9966138	996614	1.3729006	2.035	ACCEPT
SUPPLY-DEM	4	7391058	1847764	2.5454163	2.41	REJECT
ERROR	40	2.9E+07	725918			
TOTAL	54	4.6E+07				

The products that are produced for Mahindra & Mahindra do vary from products to product. Where the production do not vary from month to month for the same product. However, it can be observed from the ANOVA table the 'F' for months 1.4 in which slightly lower than the critical point viz. 2.04. So we can conclude that month's variations also significantly influence the production.

CHAPTER: V

CONCLUSIONS

CHAPTER 5

5.1 RESULTS AND DISCUSSIONS:

- There exists a gap between demand (customer order) and the actual supply.

- The customer order varies a different time period (i.e.) it has huge variation from month to month.

- The finished goods inventory maintained in the ware house is inadequate, evidenced by the gap identified between order quantity / supply quantity.

- Depending on the basis of cost &inventory level the material that are classified as A, B&C items are under maintained.

The A class items are

829737- Indicia DND cluster

829351- Safari Cluster

830845- Scorpio - T

824842- 207 Cluster

The B class items are

826672- Indicia taxi cluster

821520- Speed sensor

The C class items are

830114- Scorpio –w- Blw

825106- Bolero 8 Seats

818030- Camper Dx

825363- Bolero 8 seats

817431- Cluster Bolero 8 seats

Among the products demanded by the customer (Mahindra & Mahindra) the product 830845- Scorpio – T is found the maximum variation from month to month that was observed during the period of study. So better production and production schedule over this product should be adopted in order to eliminate the gap and enable the company to meet its demand.

Among the products demanded by the customer (Tata Motors) the product 821520- Speed sensor is found the maximum variation from month to month that was observed during the period of study. So better planning and production schedule over this product should be adopted in order to eliminate the gap and enable the company to meet its demand

From the period of study an observed from the Table No: 17 productions – supply show variations. Through the company plans to supply a quantity order from current production, it was not able to meet its demand even with supplementing the stock. . The gap between demand and supply vary about 28% which is high.

From the two way analysis of variance of production product quantity and period it is inferred from the ANOVA table the month production do not vary where as the production vary. This indicates that there is no control over the producing the required type of product to meet the demand for the customer order.

The product 826272-Indica Taxi cluster found to have the maximum demand and supply gap of 1180 units and minimum demand and supply gap of 100 units. Among the 11 months of period of study the company was not able to meet its demand in any of the months. As the maximum demand supply gap (1180 units) is found to be huge the company should plan for better ways of production scheduling the product 826272-Indica Taxi cluster which will enable the company to satisfy the demand.

5.2 CONSIDERED RECOMMENDATIONS:

The A class items should be monitored by senior managers for their production planning and control. The class A items are

829737- Indicia DND cluster

829351- Safari Cluster

830845- Scorpio - T

824842- 207 Cluster

The B class items should be monitored by senior level officers for their production planning and control. The class B items are

826672- Indicia taxi cluster

821520- Speed sensor

The C class items should be monitored by Supervisors for their production planning and control. The class C items are

830114- Scorpio –w- Blw

825106- Bolero 8 Seats

818030- Camper Dx

825363- Bolero 8 seats

817431- Cluster Bolero 8 seats

From the analysis made, the product production varies from month to month not the product varies. From the graphical analysis the months production varies, so that January month production varies maximum from 10700 (821520- speed sensor) to minimum at 280 (830114- Scorpio – w- Blw), the September month production varies maximum of 7100 (821520- speed sensor) and the minimum at 1470 (829737-Indica DND Cluster) and May month production varies from 7400 to 890. So the higher officers should take certain action in increasing the production for the months.

The ANOVA analyses in respect of the products the number produced vary from month to month and as well from product to product. However, it can be observed from the ANOVA table that the 'F' value for the various months 2.26 in which is slightly higher than the critical point viz. 2.04. So we can conclude that month's variations also do not significantly influence the production. From this analysis it is found that lot of gap between customer order and production. Hence it is required to plan the production quantity to meet the demand.

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