"DISTRIBUTION TRANSPORT MODELING FOR CASTROL INDIA LTD WITH SPECIAL REFERENCE TO CHENNAI PLANT"

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for the award of the degree

of

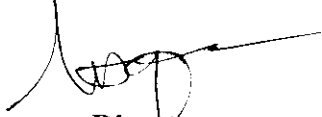**MASTER OF BUSINESS ADMINISTRATION**

AUGUST, 2007

Department of Management Studies

Kumaraguru College of Technology

Coimbatore

BONAFIDE CERTIFICATE

Certified that this project report titled "Distribution Transport Modeling for Castrol India Ltd with Special Reference to Chennai Plant" is the bonafide work of Mr. S. Anand (71206631002) who carried out the 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.

Project Guide

R. Hemanalini

Director

S.Devanathan

Evaluated and vice-voce conducted on ...30./10./07.........................

Examiner I

Examiner II

Date: 05/09/2007

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mr. Anand. S (Roll No 06MBA02) a student of KCT Business School, Kumaraguru College of Technology, has undergone a project from 25-06-2007 to 27-07-2007 entitled "Distribution Transport Modeling for Castrol India Ltd with special reference to Chennai (Tondiarpet) Plant."

During this tenure his performance and conduct was good.

S. Surendran

Manager (Sales & Distribution)

Declaration

I, Anand. **S (Reg. No.71206631002),** 2nd year MBA student of Department of Management Studies, Kumaraguru College of Technology, hereby declare that the project entitled "**Distribution Transport Modeling for Castrol India Ltd with Special Reference to Chennai Plant**" has done by me under the guidance of Lecturer Ms. R. Hemanalini submitted in partial fulfillment for the award of the degree of Master of Business Administration of Anna University, during the academic year 2006-2008.

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

Place: Coimbatore

Date: $2C - C9 - 20C7$

Signature of the Candidate

(S. ANAND)

ACKNOWLEDGEMENT

EXECUTIVE SUMMARY

The primary purpose of the study is to enhance the understanding on the non optimized distribution network and its cost efficiency which has hit thereto received a better attention in the distribution channel literature due to the higher rate of growth through out the world economies. The importance of transportation was highly evaluated from the period of Dow Jones who created the basis for the technical analysis through industrial average and transportation average. The existence of theoretical models for optimization of the transportation networks by the technique of transportation model of operations research have not benefited the industrial houses and logistics concerns due to their less adherence to the practical conditions

Distribution channel research has been viewed from the perspectives such as economic institutional managerial and social school. This research focuses only on the functional perspective. This study has been conducted with special reference to Castrol India's Chennai plant and the areas covering under its distribution, the states of Tamil Nadu, Kerala, Andhra Pradesh and Karnataka. The research was conducted to Study the cost effectiveness of the existing distribution network of the Castrol India ltd and to find out the deviations of the existing network with the optimized network using transportation model. The study has its own limitations due to the limited scope, assumptions made for calculations and restrictions in accessing data.

The organization has a historical importance in lube industry of India due its entry into market in early in 1910's itself and its world class technology in manufacturing lubricants which suits the Indian conditions of road, weather and the customer expectations. The company's market share is very small comparing to big players like Indian Oil, BPCL etc. but still company manages to increase its share in the lube market. As business grows, the role of logistics also increases; this study has enabled to know the emergence of logistics in the future of corporate houses in delivering products at right time and more than that is the cost efficiency in dealing the logistics.

The research has thrown light on the inefficiency of the distribution policy, which act as loop hole for the organization's hard earned profit. The research has helped to find out the non optimized routes in Palakkad and Hyderabad zone. The study recommends for the amendment in the company's distribution policy in decentralized order processing and centralized dispatch from the plant.

This study has helped to understand the various issues related to logistics and the Indian view of the logistics. The infrastructure of the country determines its growth, of which logistics plays a very vital role. The importance of optimization of distribution, in broader term the "Supply Chain" will have a vital effect in the Financial statements of the company and the ultimate aim of share holder's wealth maximization.

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CHAPTER 1

INTRODUCTION

1.1 Background

Distribution is one of the 4 aspects of marketing. A distributor is the middleman between the manufacturer and retailer. After a product is manufactured it is typically shipped (and usually sold) to a distributor. The distributor then sells the product to retailers or customers. Frequently there may be a chain of intermediaries; each passing the product down the chain to the next organization, before it finally reaches the consumer or end-user. This process is known as the 'distribution chain' or the 'channel.' Each of the elements in these chains will have their own specific needs, which the producer must take into account, along with those of the all-important end-user.

In the wake of increasingly complicated supply chains, distribution network design plays a key role in controlling the cost of doing business. An optimal distribution network is intelligently designed to minimize costs by providing the customer the right goods, in the right quantity, at the right place, and at right time.

1.1.1 Understanding Distribution Network

Because the volatile forces at play in the market today can cause a company's momentum to vanish into thin air, we design into the distribution network the flexibility to adjust to changing market conditions, including:

- Geographic shifts in production and consumption
- Market segmentation, new markets and new customer service requirements
- Cost increases in energy, plant and equipment maintenance, and labor
- Government regulation or deregulation
- Product proliferation and product life cycle
- Competitor adjustments
- Events in the economy

1.1.2 Optimization Distribution Network

In mathematics, the term optimization, or mathematical programming, refers to the study of problems in which one seeks to minimize or maximize a real function by

systematically choosing the values of real or integer variables from within an allowed set. This problem can be represented in the following way

Given: a function $f: A \longrightarrow R$ from some set A to the real numbers

Sought: an element x_0 in A such that $f(x_0) \leq f(x)$ for all x in A ("minimization") or such that $f(x_0) \geq f(x)$ for all x in A ("maximization").

Supply chain management

Emergence of idea of optimization lead to new interdisciplinary subject named as "Supply chain management" Supply chain management (SCM) is the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Supply chain management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption. The term supply chain management was coined by consultant Keith Oliver, of strategy consulting firm Booz Allen Hamilton in 1982.

Supply chain event management (abbreviated as SCEM) is a consideration of all possible occurring events and factors that can cause a disruption in a supply chain. With SCEM possible scenarios can be created and solutions can be planned. Supply chain management problems

Supply chain management must address the following problems:

• Distribution Network Configuration: Number and location of suppliers, production facilities, distribution centers, warehouses and customers.

• Distribution Strategy: Centralized versus decentralized, direct shipment, Cross docking, pull or push strategies, third party logistics.

• Information: Integrate systems and processes through the supply chain to share valuable information, including demand signals, forecasts, inventory and transportation etc.

• Inventory Management: Quantity and location of inventory including raw materials, work-in-process and finished goods.

Organizations increasingly find that they must rely on effective supply chains, or networks, to successfully compete in the global market and networked economy. In Peter Drucker's (1998) management's new paradigms, this concept of business relationships extends beyond traditional enterprise boundaries and seeks to organize entire business processes throughout a value chain of multiple companies.

1.1.4 Warehousing and Distribution

Improved service, reduced costs and enhanced performance are the goals of all warehousing and distribution operations. Using these areas for competitive advantage requires real focus on proper planning and continuous improvement.

1. 2. Review of literature

1.2.1   Manoj Anand(2005). "Castrol India Limited :Managing in Challenging Times" VIKALPA • VOLUME 30 • NO 1 • JANUARY - MARCH 2005 page 103-117

1.2.2   Poorzahedy, Hossain. "Hybrid meta-heuristic algorithms for solving network design problem." European Journal of Operational Research; Oct2007, Vol. 182 Issue 2, p578-596, 19p

1.2.3   Humphrey, Anthony S.; Taylor, G. Don; Usher, John S.; Whicker, Gary L.. "Evaluating the efficiency of trucking operations with weekend freight leveling". International Journal of Physical *Distribution & Logistics* Management, 2007, Vol. 37 Issue 5, p360-374, 15p.

1.2.4   *G Raghuram and Janat Shah* **"Roadmap for Logistics Excellence: Need to Break the Unholy Equilibrium"** CII Logistics Convention, Chennai, October 2003, and AIMS International Conference on Management, Bangalore, December 2003.

1.2.5   N.Ravichandran, "World Class Logistics Operations, The Case Of Bombay Dhabawallas", www.iimahd.ernet.in, Indian Institute of Management, Ahmadabad

1.2.6   Pankaj Chandra and Nimit Jain, "The Logistics Sector in India: Overview and challenges", W.P series No: 2007.03.07. www.iimahd.ernet.in, Indian Institute of Management, Ahmadabad.

1. 4. Statement of the Problem

"Suboptimal Utilization of Transport Resources"

1. 3. Objectives of the Study

Primary objectives

1.3.1.1 To Study the cost effectiveness of the existing distribution network of the Castrol India ltd.

1.3.1.2 To find out the deviations of the existing network with the optimized network using transportation model.

1.3.2 Secondary Objectives

1.3.2.1 To know about the organizational general functioning and its structure.

1.3.2.2 To know the present industrial performance of lubricant sector in Indian economy and performance of Castrol India ltd.

1. 5. Scope of the Study

The Study is restricted to the southern zone of Castrol India's distribution network covering the states of Kerala, Tamil Nadu, Karnataka and Andhra Pradesh only. The locations used for study are with in effect up to July 2007.

1.6 Research Methodology

1.6.1 Type of study

The method of study used in research report is case study method

1.6.2 Method of Data collection

The data used in the research is completely secondary data which is collected from websites, books and industry reports and through telephonic conversation

1.6.3 Tools for Analysis

The tools used for analysis is Transportation model using least cost method, Indian Atlas and Microsoft Encarta Distance Measurement Tool.

1.7 Limitations

The limitations of study are as follows:

1.7.1 The distance matrix used for transportation is the resistance free distances between the locations assuming the good condition of the road network.

1.7.2 The cost of transportation is constant per kilometer without considering the hilly regions.

1.7.3 The locations cover only the areas under direct C&F operations of Chennai plant only.

1.8 Chapter Scheme

The report is classified into five chapters – Introduction, Organization Profile, Macro Micro Analysis, Data Analysis & Interpretation and conclusion.

The first chapter deals with the background of the research, followed by the dimensions of distribution network, importance of supply chain management, review of literature, statement of problem, the objectives of the research, scope of the research, the methodology used in the research, and limitations of the study. The second chapter starts with the history of the organization, followed by its salient points in business, management of the concern; its shareholding pattern, product profile and market potential, its competitive edge in market, functional departments in the organization, production process and a small description on human resource of the organization. The third chapter deals with the Macro-Micro analysis, which covers the areas of logistics overview of the Indian scenario which includes a short report on the transportation infrastructure. The micro analysis covers the areas of Castrol inclusion in the logistics field and its strategic purview of its Indian business.

The major part of the research focuses on the data analysis and interpretation and the conclusion part of the research. The research has carried out based on the operations research tools and techniques which lead to the optimized route finding and the optimized route and the cost savings of the distance. The results and findings have been described in the last chapter. The last chapter concludes the research with its findings and suggestions for the optimization of the organizational resources.

CHAPTER 2

ORGANIZATION PROFILE

2.1 HISTORY OF ORGANIZATION

The history of Castrol in India dates back to 1910 when certain automotive lubricants from C C Wakefield & company made an entry in the Indian market. In 1919, C C Wakefield & company set up its first overseas branch office in India and commenced operations as a trading unit. Today, Castrol India limited is the second largest player in the Indian lubricant industry and is the market leader in the retail automotive lubricant segment. Castrol India is part of the BP group worldwide.

Castrol India Limited is a Public Limited Company with 70.92% of the equity held by Castrol Limited UK (part of BP Group). In 2003 the company's turnover was Rs.1360.51 crores and Profit after Tax was Rs. 137.38 crores. From a minor oil company, with a share of about 6% in 1991, Castrol India has grown to become the second largest lubricant company in India with a market share of around 22%.

Castrol India manufactures and markets a range of automotive and industrial lubricants. It markets its automotive lubricants under two brands - Castrol and BP. The company has leadership positions in most of the segments in which it operates including passenger car engine oils, premium 2-stroke and 4-stroke oils and multi grade diesel engine oils. Castrol India has the largest manufacturing and marketing network amongst the lubricant companies in India. The company has 5 manufacturing Plants across the country, including a state-of-the-art plant in Silvassa. The company reaches its consumers through a distribution network of 270 distributors, servicing over 70,000 retail outlets.

Castrol India has clearly demonstrated its commitment to Indian consumers for over 80 years, by offering its international range of high performance products backed by the highest level of customer service. The company has managed to gain sustainable competitive advantage through:

- Distinctiveness driven by continuous innovation in all areas of business
- Winning culture and a desire to excel Strong meaningful relationships with all stakeholders

The Company has 7 plants, 200 distributors, 1,200 employees and 40,000 dealers.

The strengths of the company Castrol's strengths

- Great brand
- Value added products and services
- Experience of 80 years in India
- Focus on specialized sectors
- Flexibility in procurement of raw materials (since group do not have own refinery)
- Strong international support
- National distribution network.
- Leaders in growing bazaar segment
- World class manufacturing facilities (7 plants in strategic locations).
- First Oil Company in Asia with QS 9000 certification.

The main business streams are CONSUMER (retail); Accounts for 75% of company's sales , Command significant premium price, Enjoy 40% (+) share of growing bazaar segment, Has share in all product segments , Leading player in auto market. The second segment is INDUSTRIAL, Industrial segment accounts for 40% of lube market, Company has 10% market share in this segment, Huge growth opportunities in this specialized segment. The third segment is COMMERCIAL (trucks & transport operators) Focus on industrial customers, Silvassa sales tax benefits (difference between 4 – 16%). The fourth on is MARINE which is very small in share in total business.

SALIENT POINTS ABOUT CASTROL'S BUSINESS

- Lube industry is expected to grow @ 3-4% (market growth)
- Growth in consumption of diesel is expected to grow @ 10%.
- Expect at least 1-2% growth in market share (+) new product launches. So, if market grows @ 3-4%, Castrol's volume growth will be 12-14%. Strategy is to grow volume. This will directly add to bottomline and also get tax benefits due to higher silvassa production.
- Shell is getting out of auto lube business in India. They will concentrate only on industrial. Their auto lube business will be handled by BPEL.

Expect major growth in industrial segment may be more than 20%. For Castrol, industrial sales accounts for 15% of turnover. Margins are more or less same in all segments.

2.2 MANAGEMENT

Castrol India Limited is a Public Limited Company with 70.92% of the equity held by Castrol Limited UK (part of BP Group). The shareholding pattern of the company as on 23rd February 2007 is as following:

Sr. No	Category	No. of Shareholders	No. of Shares Held	% of Share Capital
1	Foreign Collaborator	1	87687455	70.92
2	Foreign Company	1	135474	0.11
3	Foreign Institutional Investors	18	1824141	1.47
4	Overseas Bodies Corporate	3	1003	0.00
5	Non Resident Individuals	329	225509	0.18
6	Financial Institutions	11	9665049	7.82
7	Indian Mutual Funds	22	1752091	1.42
8	a. Nationalized Banks	26	23620	0.02
	b. Other Banks	66	68583	0.05
9	Domestic Companies	1148	1974988	1.60
10	Resident Individuals	56853	20274376	16.40
11	Directors & Relatives	3	8009	0.01
	GRAND TOTAL	58481	123640298	100

Source: Annual Report 2006 Castrol India Ltd.

2.4 PRODUCTS PROFILE AND MARKET POTENTIAL

The products of Castrol India ltd. are classified under three heads – lubricants for commercial vehicles, lubes for passenger cars and lubes for motor bikes (2stroke and 4 stroke)

2.4.1 Commercial Vehicle Oils

1.	CRB Plus+	9.	Diesel Oil CRD 30 Xtra
2.	CRB Turbo	10.	Diesel Oil CRD 40 Xtra
3.	RX Super Plus	11.	Diesel Oil CRD 30
4.	RX Super Max	12.	Diesel Oil CRD 40
5.	CRB Prima	13.	Diesel Oil CRD Multigrade
6.	CRB Prima Plus	14.	Diesel Oil Tractor
7.	RX Super Gas	15.	Diesel Oil PumpsetTools
8.	RX Diesel Super		

2.4.2 Motor Cycles

Castrol offers a range of engine oils for 4-stroke and 2-stroke motorcycles Castrol Activ, Castrol Power 1 for 4-stroke bikes whereas Castrol Super TT , Castrol 2T for 2-stroke bikes and scooters

2.5 COMPETITIVE STRENGTH OF THE COMPANY - TRIZONE TECHNOLOGY

Over the past 4-5 years the motorcycle technology has seen a seen a transition from 2-stroke technology to 4-stroke technology. This has been led by advances in engine design and environmental concerns, with 4- stroke motorcycles being more fuel efficient and environment friendly. For these reasons 4-stroke technology is powering motorcycles and scooters into the future

Castrol has always been at the cutting edge of lubricants technology for automobiles with world class products like Activ and Power1 for motorcycles. Castrol has now raised the bar on motorcycle lubricants technology by introducing Trizone Technology across it's range of 4 stroke motorcycle oils. Trizone Technology provides the ultimate combined protection to the three critical parts of the engine – the engine, the clutch and gear. Castrol Trizone Technology represents the state-of-the-art in motorcycle lubricant technology to help motorcyclists get the most out of their vehicles.

Trizone technology has been developed by drawing on Castrol's unique heritage, its vast experience in countries around the globe and its experience gained from working with several winning racing teams across the years. It harnesses Castrol's cutting edge know how in motorcycle engine oil technology, honed at the leading edge of speed and endurance.

The competitive strength of the company has proven through the quarter 1 results for the year 2007. The results are been as follows:

In Rs. crores

	January - June 2007	January - June 2006	% increase	April- June 2007	April June 2006	% increase
Net Sales	982	853	15	540	477	13
Profit Before Tax	167	122	37	101	72	40
Profit After Tax	41.5	83	30	66	50	32

Castrol India Limited has declared its second quarter results for the period April to June 2007. A net sale for the quarter is up by 13%, PBT is up 40% and PAT up by 32% over the same period last year.

The Board of Directors has recommended an interim dividend of Rs.4.50 per share for the half year ending 30th June 2007. Commenting on the results, Naveen Kshatriya, Managing Director, Castrol India Limited, said, "Castrol India has achieved record results in Q2 with significant growth in revenue and profits. On an underlying basis, after removing exceptional items, the operating profit grew by 75%. This has been driven by better margins, attributed to better price realizations and improved product and customer mix. The raw material cost environment, while softening against Q1, continues at a very high level and is still on par with Q2 '06. The company believes that the Indian lube market is fast upgrading to higher standards in terms of lubricant technology and consumer/customer expectations in quality and service.

Castrol has stepped up brand investment substantially in the last quarter with focus on the premium portfolio, targeted at cars and bikes. Castrol Power1 Throttlemax, a popular event involving passionate bikers was successfully run across the country. Castrol

BikeZone, the company's world class bike servicing offer continues to expand and excite the target customers. The outlook for the rest of the year is positive, aided by a good monsoon and fast growing automotive sector. There could be challenges arising from strengthening of crude prices and consequent inflationary pressures.

2.7 FUNCTIONAL DEPARTMENTS IN THE PLANT

2.7.1 Production Department

The production department of the plant is in charge of production of lubes in the factory. The plant capacity of the Tondiarpet facility is 3000 kilolitre per month. The basic material for the production process is base oil which is been purchased from Indian Oil Corporation's Manali Refinery which is near to the plant.

2.7.2 Production Process

PRODUCTION PROCESS OF CASTROL LUBRICANTS
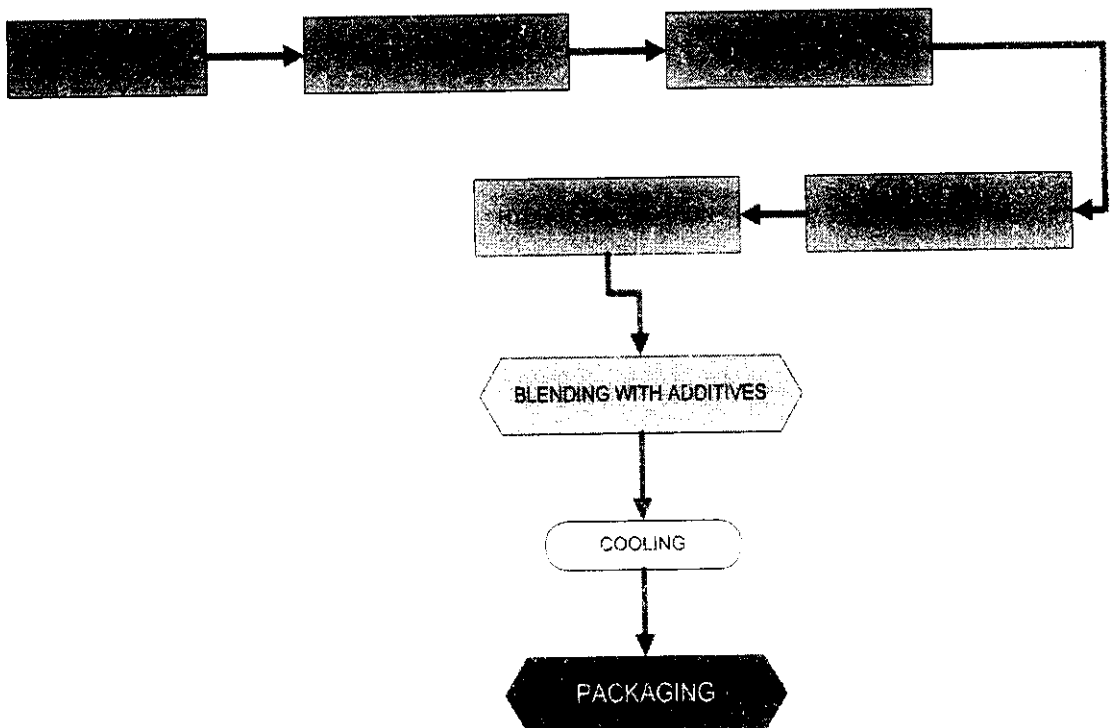
2.7.2.1 The basics

It's important for us to change our oil religiously. It's vital for our car's engine to have clean, fresh oil to properly do its job. But you still may be wondering what motor oil is exactly and how it works.

The oil used in our car has two primary ingredients: base oil and additives. The base oil allows the motor oil to perform its vital function - lubricating the engine's moving parts to protect them against wear and tear caused by friction. The additives provide additional engine protection by helping prevent the oil from deteriorating under the extreme temperature conditions in the engine.

The base oil is refined from crude (oil in its natural state when pumped from the ground). The crude must undergo a variety of refining processes before yielding base stock suitable for use in engine oil. Undesirable components such as wax, sulphur and nitrogen compounds must be removed. Unsaturated hydrocarbons must be extracted or converted into more stable molecules.

Crude is first separated by vacuum distillation into a series of fractions or viscosity ranges. The fractions intended for base oil production are processed further using various combinations of refining processes.

2.7.2.2 Refining processes

Solvent Extraction - separates the naturally occurring saturated and unsaturated hydrocarbons. The following process are carried out for refining

- Hydrofinishing - removes some of the nitrogen and sulphur compounds, improves colour, oxidation and thermal stability of base stock.
- Hydrotreating - converts some of the unsaturated hydrocarbons to saturated hydrocarbons to help improve yield prior to solvent extraction. This process also helps remove of large portion of sulphur and some nitrogen compounds.
- Hydrocracking - a sophisticated process in which molecules in the base stock fraction are rearranged into the desirable saturated hydrocarbon molecules. The yield of saturated molecules is much greater than that achieved with hydrotreating and solvent extraction.
- Hydroisomerization - when used along with hydrocracking, can transform the molecules of the base stock fraction into the most stable form possible.

2.7.2.3 Additives

- ✎ Base oil alone is not enough to properly protect our engine. Motor oil needs to perform a wide variety of functions under a wide range of engine operating conditions. Therefore several additives are incorporated into the formulation:

- ✎ Detergent/dispersant additives - used to maintain engine cleanliness, keeping the various contaminants in a fine suspension and preventing them from settling out on vital engine components.

- ✎ Rust and corrosion inhibitors - added to protect the engine from water and acids formed as combustion by-products.

- ✎ Antioxidants - added to inhibit the oxidation process, which can result in oil thickening and sludge formation.

- ✎ Anti-wear additives - form a film on metal surfaces to help prevent metal-to-metal contact.

- ✎ Viscosity modifiers and pour point depressants - help improve the flow characteristics of motor oil.

2.7.2.4 Grades

In order for motor oil to perform its major function - lubrication - its viscosity (the measure of its thickness or resistance to flow) must be capable of holding up under our engine's extreme temperature conditions.

Oil thins when heated and thickens when cooled. Choosing the proper viscosity grade for the ambient temperature of our geographic location becomes vitally important.

- ✎ A monograde is oil whose viscosity is defined at only one temperature, either high or low.

- ✎ A multigrade must meet both high and low temperature viscosity requirements simultaneously.

This makes multigrades an easy and popular year-round choice for drivers who experience hot summers and harsh winters. They are easily recognized by the dual viscosity designation (i.e. 10W-30 where the 10W is the low temperature, or winter designation and the 30 is the high temperature designation). It is the viscosity modifier additive that produces a thickening effect at high temperatures but is dormant at low temperatures.

Table of Grades

SAE Viscosity Grade	Temperature Conditions	Descriptions
5W-30	Below 0° F	Provides excellent fuel economy and low temperature performance in most late-model automobiles. Especially recommended for new cars.
10W-30	Above 0° F	Most frequently recommended viscosity grade for most automobile engines, including high-performance multivalve engines and turbo-charged engines.
10W-40	Above 0° F	The first multigrade introduced. A good choice for controlling engine wear and preventing oil breakdown from oxidation. Note: Always check our owner's manual or warranty requirements before using this grade.
20W-50	Above 20° F	Provides maximum protection for high-performance, high-RPM racing engines. Excellent choice for high temperature and heavy loads such as driving in the desert or towing a trailer at high speeds for long periods of time.
SAE 30 SAE 40	Above 40° F Above 60° F	For cars and light trucks, where recommended by manufacturers. Not recommended when cold-temperature starting is required.

2.7.3 MATERIALS DEPARTMENT

The department is controlled by materials manger who is in charge of the all the action. The department takes care about the purchasing and storing the raw materials and dispatch of the final products. The department consists of Stores Controller. Purchase Supervisors, Packaging Supervisors and workers.

2.7.4 QUALITY CONTROL DEPARTMENT

The department is in charge of the quality control of the products dispatched from the plant. The department is controlled by Quality Control Manager and assisted by the supervisors.

2.7.5 HUMAN RESOURCE DEPARTMENT

The human resource department is the department in charge of all the HR activities of the plant which is headed by HR manger of the Plant who is directly controlled by the Vice President (HR) of Castrol India Ltd. at Mumbai Office. The total employee strength of the plant is around 220 workers and 35 office staff. The HR policies implemented in the plant are the policies developed entirely for the Castrol India Ltd. The department also gives training for truck drivers on safety and skilled driving.

The department takes care about the human resource function like contracting of job, training, and salary & wage administration. It is headed by Human resource Manager; the department is controlling the office administration of the plant. The recruitment process for the low level workers are done in the plant remaining all the recruitment process are carried out by the head office of Castrol India ltd at Mumbai.

3. MACRO-MICRO ANALYSIS

3.1 Macro view of Logistics industry.

The Indian economy has been growing at an average rate of more than 8 per cent over the last four years (Srinivas, 2006) putting enormous demands on its productive infrastructure. Whether it is the physical infrastructure of road, ports, water, power etc. or the digital infrastructure of broadband networks, telecommunication etc. or the service infrastructure of logistics – all are being stretched to perform beyond their capabilities. Interestingly, this is leading to an emergence of innovative practices to allow business and public service to operate at a higher growth rate in an environment where the support systems are getting augmented concurrently. In this paper, we present the status of the evolving logistics sector in India, innovations therein through interesting business models and the challenges that it faces in years to come.

Chandra and Sastry (2004) have pointed towards two key areas that require attention in managing the logistics chains across the Indian business sectors – cost and reliable value add services. Logistics costs (i.e., inventory holding, transportation, warehousing, packaging, losses and related administration costs) have been estimated at 13-14 per cent of Indian GDP which is higher than the 8 per cent of USA's and lower than the 21 per cent of China's GDP (Sanyal, 2006a). Service reliability of the logistics industry in emerging markets, like India, has been referred to as slow and requiring high engagement time of the customers, thereby, incurring high indirect variable costs (Dobberstein et. al.

Figure 1: Elements of Logistics Cost in India
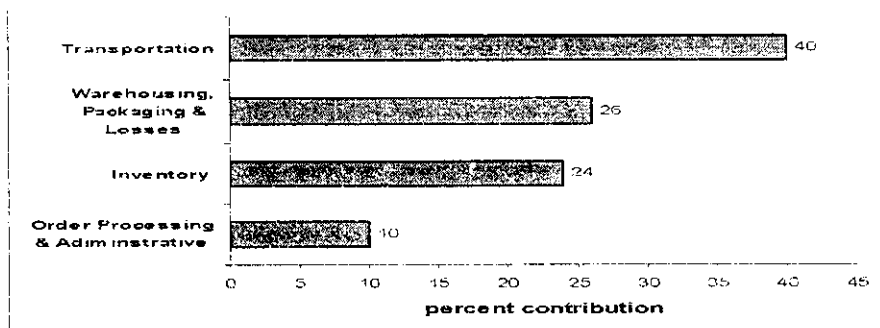
Source: Sanyal (2006a)

Goods are transported predominantly by road and rail in India. Whereas road transport is controlled by private players, rail transport is handled by the central government. With the second largest network in the world, road contributes to 65 per cent of the freight transport (Rastogi, 2006). Road is preferred because of its cost effectiveness and flexibility. Rail, on the other hand, is preferred because of containerization facility and ease in transporting ship-containers and wooden crates. Sea is another complementary mode of transport. Ninety five per cent of India's foreign trade happens through sea (Deccan Herald, 2006). India has 12 major ports, six each on the West and East coasts and 185 minor ports. Table 2 maps the various modes on different performance indicators, clearly indicating the vitality and importance of road transport in Indian economy. There is also evidence of an, across the board, increase in freight traffic for all modes indicating an increased logistics activity. For instance, the per cent change in road, rail, air and sea cargo traffic has increased, between 2001 and 2005, from 5 to 14 per cent, 4 to 7.5 per cent, 6 to 20 per cent and 3.5 to 11 per cent respectively (CMIE Database, 2006).

The Indian logistics business is valued at US$ 14bn and has been growing at a CAGR of 7-8 per cent. As mentioned earlier, the logistics cost represents 13-14 per cent of the country's GDP. The market is fragmented with thousands of players offering partial services in logistics; it is estimated that there are about 400 firms capable of providing some level of integrated service (Mahalaksmi, 2006). The economy is expected to grow around ten per cent over the next ten years and sectors like chemicals, petrochemicals (especially distribution), pharmaceuticals, metals and metal processing, FMCG, textile, retail and automobile are projected to grow the fastest. New business models are emerging as new firms, both domestic and foreign, enter the market

3.2 Micro Analysis

The lubricant industry operates with four major players (Indian oil Corporation limited, Bharat petroleum Corporation limited, Hindustan petroleum Corporation limited and Castrol India limited) contributing to over 70% of the market. There are several players including global majors operating in the balance 30% of the market, leading to an extremely competitive market scenario. The year 2006 has been very difficult for the industry with cost of raw materials seeing an unprecedented increase, in a global scenario where crude oil prices also touched an all time high. While increased lube consumption in industrial sector and growth in motorcycle and car population has increased the market growth rate, emerging product technologies and improved commercial vehicle productivity

has dampened the growth. these developments coupled with the new cost base of the industry, are likely to influence the direction of industry and customer behaviour over the next 3-5 years.

Crude oil, the main input into base oil, reached an all time high of US$77 during the year. though it softened during the last quarter of 2006, the rise in crude price was rapid and the behaviour volatile. This adversely impacted sentiment and supplies of lube base oils in the market. Following the sharp increase in crude and the global supply-demand imbalance, the price of base oils rose disproportionately during 2006. From an average 2005 price of US$ 550/tonne (ICIS-low prices) the fourth quarter price was at a record US$ 1000/tonne. this was also followed by a sharp rise in additive prices during the year (over 7%). the base oil and additive categories also had supply issues in the case of selected high grade categories like poly alpha olefins and Group 3 base oils.

During 2006, the Indian market did not see major supply problems in base oils due to the strong support by local refiners and the emergence of Bharat petroleum Corporation limited with an additional supply capacity of over 180,000 tonnes

Emerging long drain technologies from Original Equipment Manufacturers (OEMs)

Key commercial OEMs continue their pursuit of longer drain lubricants and Ashok Leyland limited announced the new drain standard of 36.000 kms for their new trucks. This move is expected to trigger a similar response from other key OEMs which will impact volume consumption of lubes significantly in the next five years

New Original Equipment Manufacturers (OEMs) in the market

The year 2006 also saw several global OEMs setting up/ accelerating their efforts in India. BMW, VW, Man and Renault announced ventures in India as stand alone or Joint Ventures with local OEMs. this is expected to provide additional opportunities for the lube players.

In 2007, the projected base oil and CoGS (Cost of Goods Sold) scenario for the industry is expected to be stable with a slight softening in the frst half of the year. this would arise from strong local supply capacities, falling crude prices and some global refners trying to correct their inventory positions.

Market behaviour and outlook

The lubricant industry is broadly divided into three major sectors: automotive, Industrial and marine, the automotive sector is the largest and the share of industrial sector grows as the market develops.

Automotive Lubricants

The automotive lubricant sector can be segmented as per the following vehicle categories:

- trucks, tractors and off road equipment - mainly diesel engine oils
- passenger cars - mainly gasoline engine oils
- Motorcycles and 3-wheelers - 2-stroke and 4-stroke oils

Market growth:

The automotive lubricant market is expected to have grown by around 3% on the back of a strong economic performance. this has been led primarily by the increased motorcycle and car sales, growth in agri market and a booming construction sector. the old generation truck market and the 2-stroke lubes market, is expected to continue to decline by over 10% per annum. OEMs of Commercial vehicles have introduced long drain lubricants for both the engine as well as the gear box. as these vehicles grow to a significant proportion of the market, there will be volume reduction of both engine and gear oil consumption with the possibility of superior quality lubricants with higher margin potential replacing the current grades

Non-Automotive

Industrial lubricant demand is dependent on industrial production and growth trends in the economy. Industrial production growth crossed 11% in 2006. accelerating for the fourth consecutive year. this growth was led by rising output in India's core industry sectors - auto companies, primary metals, sub-assemblies, cement and textile. Industrial growth trend is on a continuous rise since the latter half of 2003 and this augurs well for the segment.

Planned investment in public construction projects is expected to help sustain the rapid growth in the industrial sector. also, the accelerated growth in manufacturing related projects in India, especially in the area of auto manufacturing and auto components, is

aiding this growth. With Indian manufacturing sector positioning itself as a possible and credible outsourcing destination, we believe that the industrial growth and by inference the industrial lubricant business will grow faster in the next three years.

With auto component outsourcing from low-cost countries becoming an imperative for global auto majors, India has emerged as a quality destination with strong redesigning capabilities. Indian component producers are expected to carve their own niche with a 3-4% share of the potential global market of US$ 700 billion by 2015. this, supported by a double digit growth in passenger car and 2-wheeler segment. is expected to result in the industrial lubricant industry growing at 3-5% in 2006-07.

Industrial sector

At the macro economic level, with good monsoon conditions supported by a strong industrial growth, India looks set to maintain its high growth trend in 2006, with real GDP growth projected at over 9% per annum. In the core segments, global benchmarking and standards is becoming critical. Industry is looking for global best practice sharing, where our Company is implementing global segment offers to align to the needs of the industry. proliferation of Small & Medium enterprise clusters supporting the core industry is a huge opportunity which our Company plans to capture through the new route to market change implemented during 2006.

4. DATA ANALYSIS & INTERPRETATION

The whole data relates to the distribution destination of Castrol lubricants from their clearing and forwarding stations located at Chennai. Bangalore Hyderabad and Palakkad. The distribution policy of Castrol India is described as below:

4.1 DISTRIBUTION CHANNEL CHART
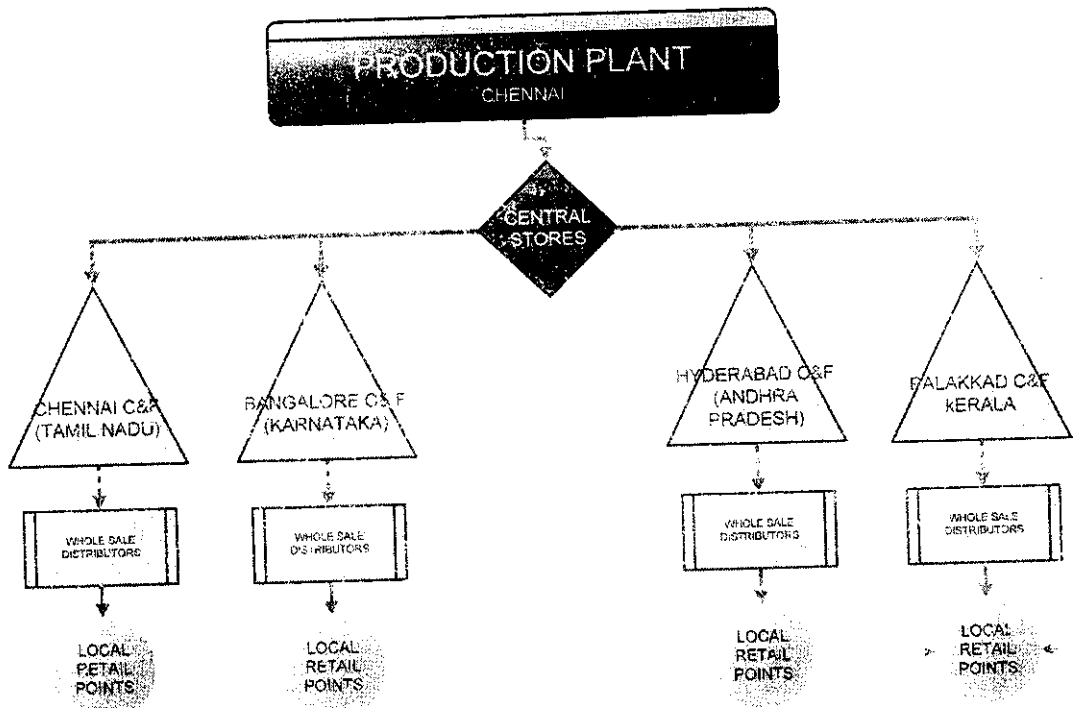
The locations to which the lubricants are transported are given in the below table, it covers around 62 locations in the four states.

The following tables will show the distribution pattern and related aspects of Castrol India ltd in four states of Tamil Nadu, Kerala, Karnataka and Andhra Pradesh.

4.2 TABLES OF ANALYSIS
4.2.1 Table of Distribution Distances (Central C&Fs)

LOCATIONS (DISTANCES IN MILES)	DISTANCE FROM CHENNAI	DISTANCE FROM BANGALORE	DISTANCE FROM PALAKKAD	DISTANCE FROM HYDERABAD
CHENNAI	0	201	312	381
BANGALORE	201	0	234	323
PALAKKAD	312	234	0	587
HYDERABAD	381	323	587	0

Interpretation:

The above table depicts the distance between the central C&Fs and the plant.

METHOD USED IN CALCULATION OF DISTANCE BETWEEN PLANT & LOCATION

Illustration

PLANT (CHENNAI) → 201 MILES → C & F (BANGALORE) → 0 MILES → LOCATION (BANGALORE)

TOTAL
201 MILES
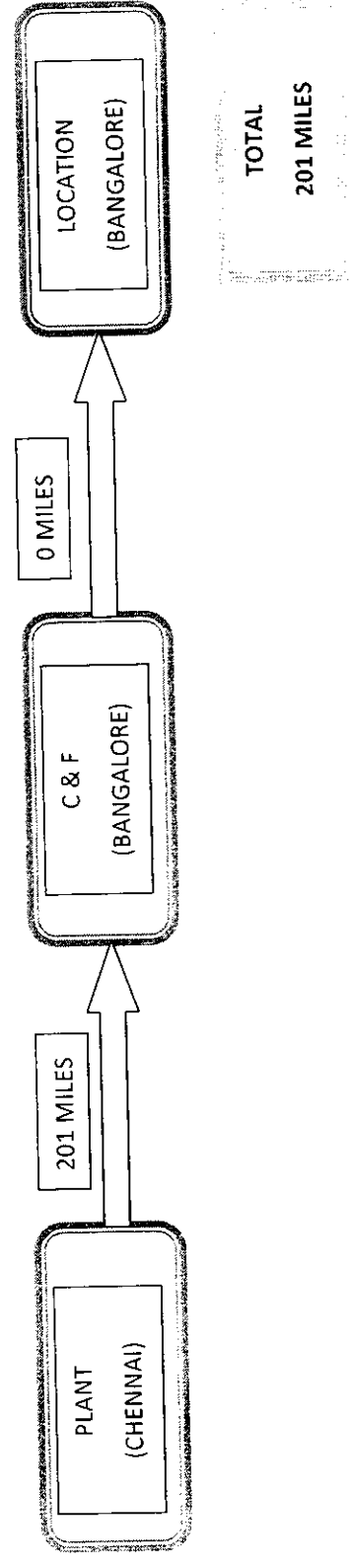
4.2.2 STATE WISE DISTRIBUTION LOCATIONS (CHENNAI ZONE) IN MILES

LOCATION	DISTRIBUTION DISTANCE FROM CHENNAI	DISTRIBUTION DISTANCE FROM BANGALORE	DISTRIBUTION DISTANCE FROM PALAKKAD	DISTRIBUTION DISTANCE FROM HYDERABAD	OPTIMUM	C&F
HOSUR	179	224	524	560	179	CHENNAI
PONDICHERRY	99	371	589	480	99	CHENNAI
THIRUVANAMALAI	110	316	527	491	110	CHENNAI
VELLORE	79	324	563	460	79	CHENNAI
CUDDALORE	113	384	575	494	113	CHENNAI
SALEM	189	314	432	570	189	CHENNAI
NAMMAKKAL	218	345	425	599	218	CHENNAI
ERODE	225	350	397	606	225	CHENNAI
COIMBATORE	281	408	339	662	281	CHENNAI
KRISHNAGIRI	148	254	494	529	148	CHENNAI
THIRUCHY	191	409	461	572	191	CHENNAI
THIRUNELVELLI	349	528	530	730	349	CHENNAI
NAGERCOIL	392	570	538	773	392	CHENNAI
DINDUGUL	249	405	406	630	249	CHENNAI
MADURAI	263	436	438	644	263	CHENNAI
TANJORE	221	439	491	662	221	CHENNAI
SIVAKASI	303	477	483	684	303	CHENNAI
KUMBAKONAM	241	464	508	622	241	CHENNAI
TOTAL DISTANCE					3850	

Interpretation:

From the table, it can be clearly interpreted that the distance to 18 location from Chennai C&F with a total of 3850 miles using least distance method.

4.2.2.1 GRAPH ON DISTRIBUTION MATRIX OF CHENAI ZONE

DISTRIBUTION DISTANCE MATRIX OF CHENNAI ZONE

Legend:
- CHENNAI
- BANGALORE
- PALAKKAD
- HYDERABAD
- OPTIMUM

X-axis categories: HOSUR, PONDICHERRY, THIRUVANAMALAI, VELLORE, CUDDALORE, SALEM, NAMMAKKAL, ERODE, COIMBATORE, KRISHNAGIRI, THIRUCHY, THIRUNELVELLI, NAGERCOIL, DINDUGUL, MADURAI, TANJORE, SIVAKASI, KUMBAKONAM

Y-axis: DISTANCE IN MILES — 0, 100, 200, 300, 400, 500, 600, 700, 800, 900

4.2.3 STATE WISE DISTRIBUTION LOCATIONS (BANGALORE ZONE) IN MILES

LOCATIONS	DISTRIBUTION DISTANCE FROM CHENNAI	DISTRIBUTION DISTANCE FROM BANGALORE	DISTRIBUTION DISTANCE FROM PALAKKAD	DISTRIBUTION DISTANCE FROM HYDERABAD	LEAST DISTANCE (OPTIMUM)	C&F
BANGALORE	201	201	546	706	201	BANGALORE
BELGUAM	498	498	778	769	498	BANGALORE
DEVANAGIRI	357	357	641	697	357	BANGALORE
BELLARY	433	433	763	593	433	BANGALORE
GAURIBADNUR	245	245	588	660	245	BANGALORE
MYSORE	279	279	477	781	279	BANGALORE
MANDYA	257	257	562	760	257	BANGALORE
GULBARGA	578	578	912	512	578	BANGALORE
BIJAPUR	511	511	824	213	511	BANGALORE
BAGALKOT	472	472	650	594	472	BANGALORE
MANGALORE	293	293	503	894	293	BANGALORE
HASSAN	309	309	420	809	309	BANGALORE
RAICHUR	516	516	819	499	516	BANGALORE
HUBLI	445	445	722	716	445	BANGALORE
TOTAL DISTANCE					5394	

Interpretation:

From the table, it can be clearly interpreted that the distance to 14 location Bangalore C&F with a total of 5394 miles using least distance method.

4.2.3.1 GRAPH ON DISTRIBUTION MATRIX OF BANGALORE ZONE

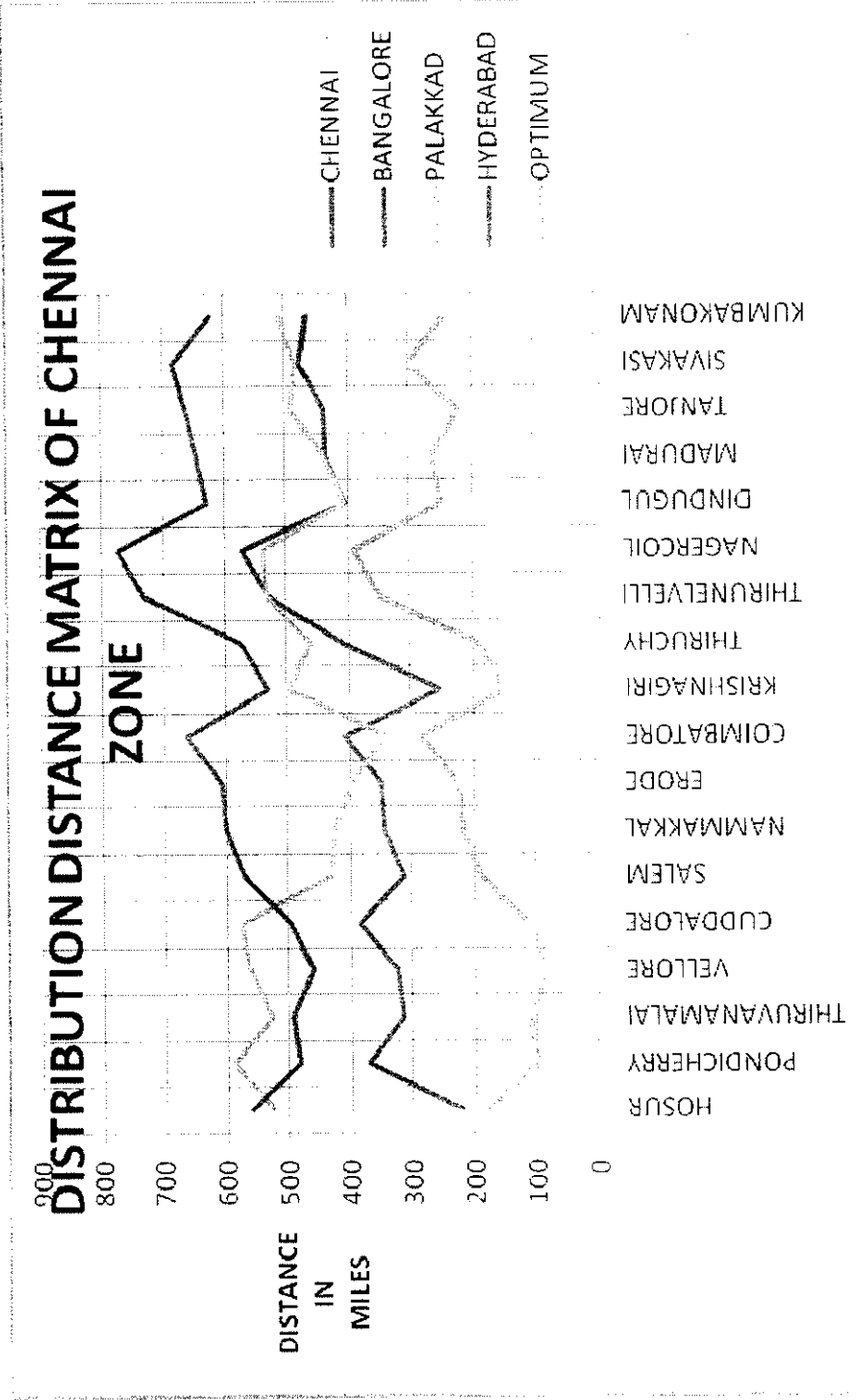DISTRIBUTION DISTANCE MATRIX OF BANGALORE ZONE

4.2.4 **STATE WISE DISTRIBUTION LOCATIONS (PALAKKAD ZONE) IN MILES**

LOCATIONS	DISTRIBUTION DISTANCE FROM CHENNAI	DISTRIBUTION DISTANCE FROM BANGALORE	DISTRIBUTION DISTANCE FROM PALAKKAD	DISTRIBUTION DISTANCE FROM HYDERABAD	OPTIMUM	C&F
PALAKKAD	312	435	312	587	312	PALAKKAD
THRISSUR	347	437	347	596	347	PALAKKAD
COCHIN	394	474	394	625	394	PALAKKAD
ALLEPEY	431	509	431	660	431	PALAKKAD
KOTTAYAM	431	509	431	658	431	PALAKKAD
QUILON	480	545	480	706	480	PALAKKAD
TRIVANDRUM	515	593	515	742	515	PALAKKAD
MALAPPURAM	349	396	360	554	349	CHENNAI
CALICUT	365	375	382	531	365	CHENNAI
KASARGOD	442	422	482	500	442	CHENNAI
CANNANORE	396	374	430	480	396	CHENNAI
TOTAL DISTANCE					4462	

Interpretation:

From the table, it can be clearly interpreted that the distance to 7 locations are from Palakkad C&F and 4 from Chennai C&F with a total of 4462 miles using least distance method.

4.2.4.1 GRAPH ON DISTRIBUTION MATRIX OF PALAKKAD ZONE
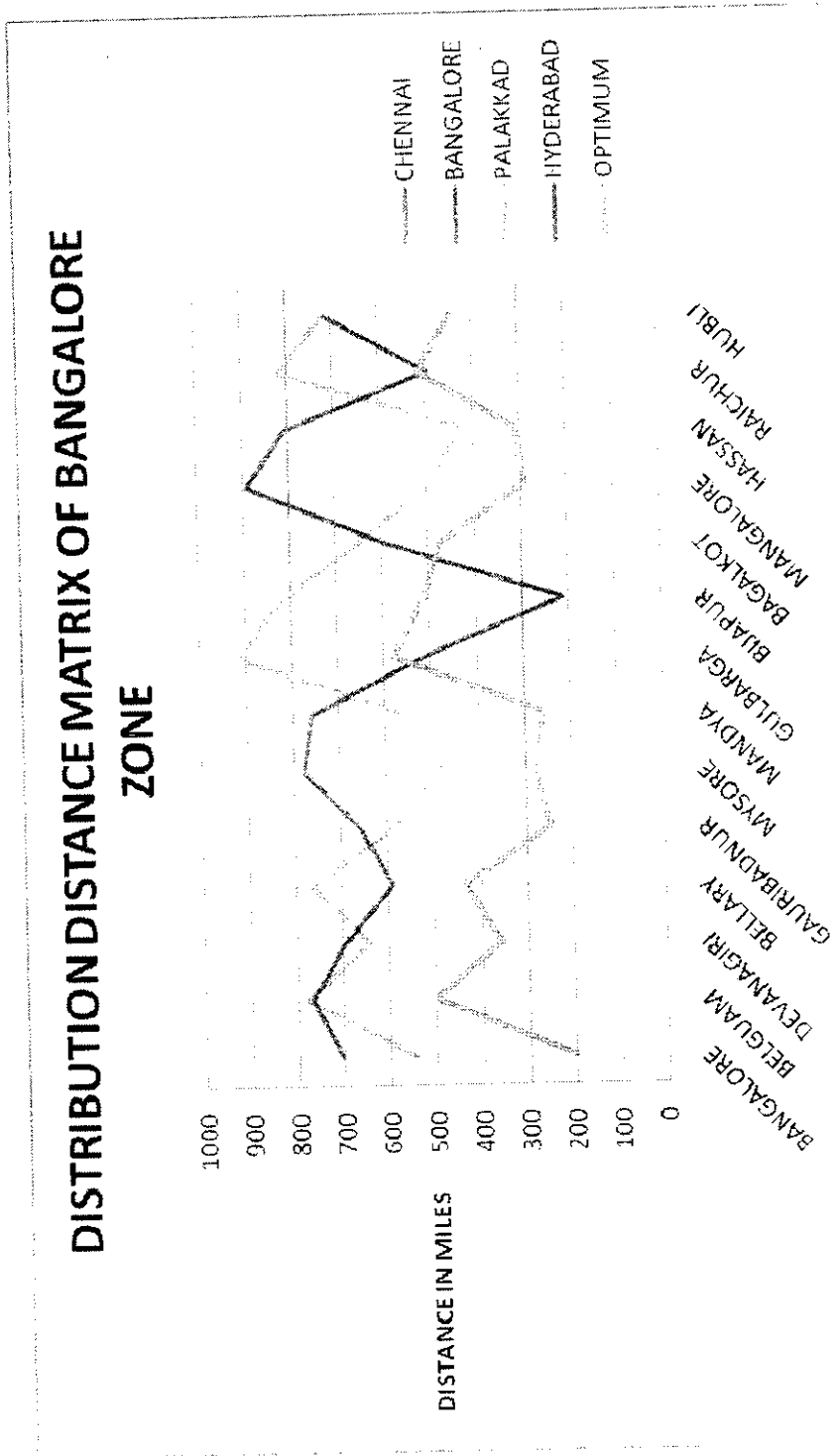

DISTRIBUTION DISTANCE MATRIX OF PALAKKAD ZONE

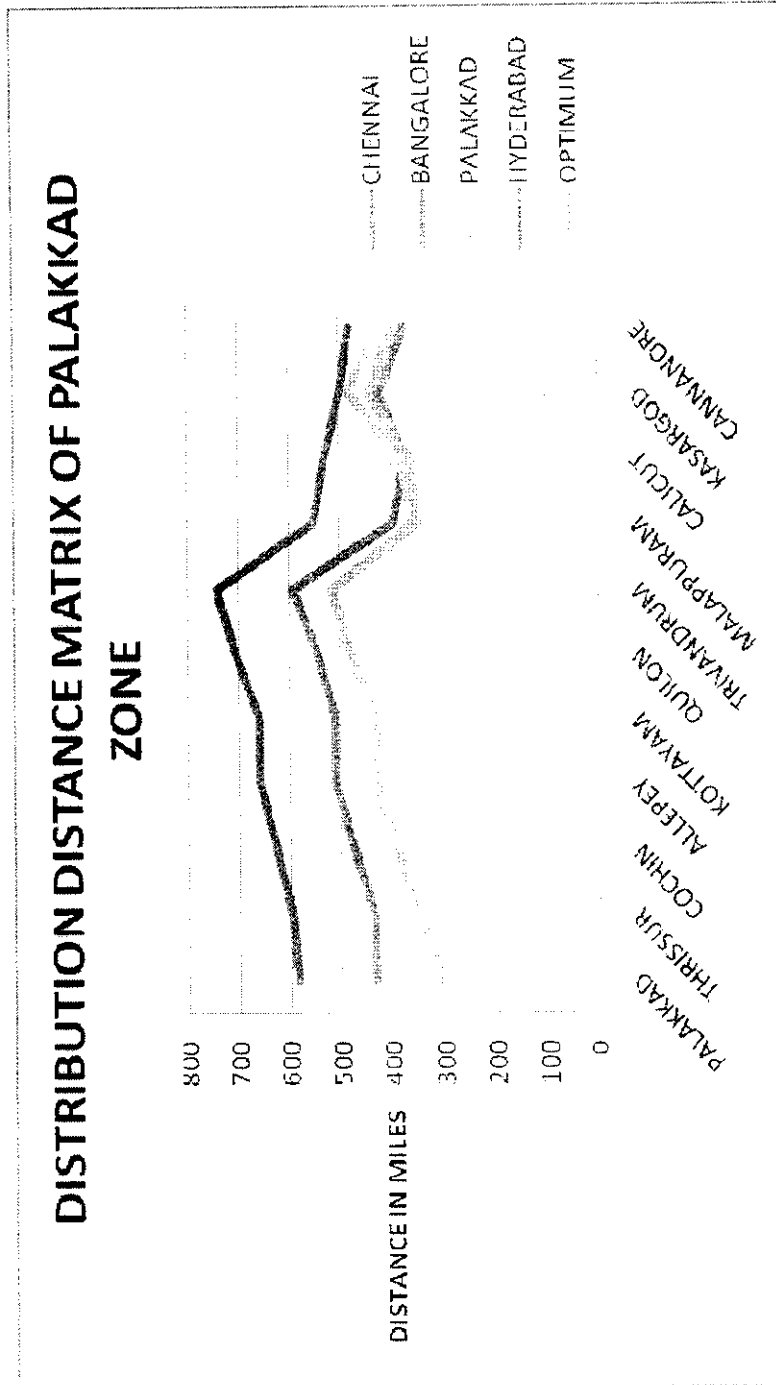4.2.5 **STATE WISE DISTRIBUTION LOCATIONS (HYDERABAD ZONE)**

LOCATIONS	DISTRIBUTION DISTANCE FROM CHENNAI	DISTRIBUTION DISTANCE FROM BANGALORE	DISTRIBUTION DISTANCE FROM PALAKKAD	DISTRIBUTION DISTANCE FROM HYDERABAD	OPTIMUM	C&F
HYDERABAD	381	524	899	381	381	HYDERABAD
SECUNDERABAD	388	530	905	387	387	HYDERABAD
KARIM NAGAR	497	609	984	497	497	HYDERABAD
WARRANGAL	468	609	985	465	468	HYDERABAD
NIZAMBAD	473	618	993	473	473	HYDERABAD
KURNOOL	263	404	844	501	263	CHENNAI
MEHOOB NAGAR	326	469	781	435	326	CHENNAI
NELLORE	102	419	695	686	102	CHENNAI
THIRUPATHI	84	341	618	683	84	CHENNAI
ONGOLE	174	491	768	644	174	CHENNAI
PRODATHUR	181	383	698	579	181	CHENNAI
SRIKAKKULAM	513	837	1116	779	513	CHENNAI
BHIMAVARAM	320	644	916	608	320	CHENNAI
VIZAKAPATNAM	458	776	1055	714	458	CHENNAI
VIJAYAWADA	261	579	853	538	261	CHENNAI
GUNTUR	241	559	833	556	241	CHENNAI
KAKINADA	375	698	921	647	375	CHENNAI
KHAMMAM	335	536	750	498	335	CHENNAI
TOTAL DISTANCE					**5839**	

Interpretation:

From the table, it can be clearly interpreted that the distance to 13 locations are from Chennai C&F and 5 from Hyderabad

C&F with a total of 5839 miles using least distance method.

DISTRIBUTION DISTANCE MATRIX OF HYDERABAD ZONE

Legend: CHENNAI, BANGALORE, PALAKKAD, HYDERABAD, OPTIMUM

DISTANCE IN MILES

X-axis cities: HYDERABAD, SECUNDERABAD, KARIM NAGAR, WARRANGAL, NIZAMBAD, KURNOOL, MEHBOB NAGAR, NELLORE, THIRUPATHI, ONGOLE, PRODATHUR, SRIKAKKULAM, BHIMAVVARAM, VIZAKAPATNAM, VIJAYAWADA, GUNTUR, KAKINADA, KHAMMAM
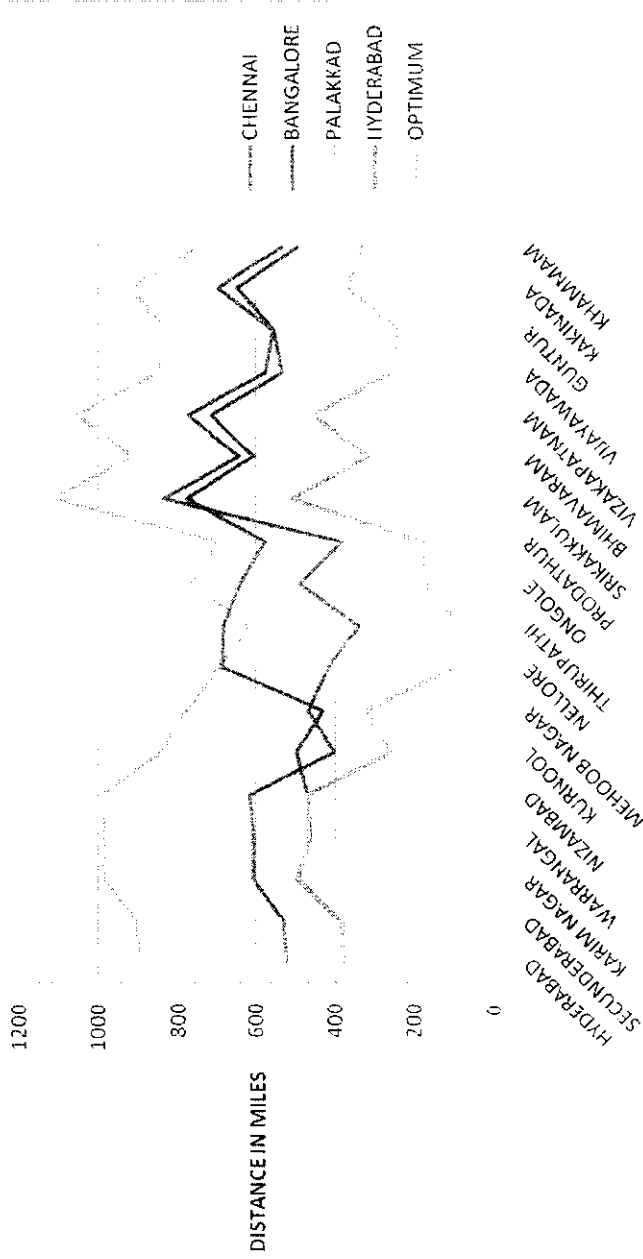
4.2.6 **STATE WISE DISTRIBUTION LOCATIONS (EXISTING)**

TAMIL NADU		KARNATAKA		KERALA		ANDHRAPRADESH	
LOCATION	DISTANCE	LOCATION	DISTANCE	LOCATION	DISTANCE	LOCATION	DISTANCE
HOSUR	179	BANGALORE	201	PALAKKAD	312	HYDERABAD	381
PONDICHERRY	99	BELGUAM	498	THRISSUR	347	SECUNDERABAD	387
THIRUVANAMALAI	110	DEVANAGIRI	357	COCHIN	394	KARIM NAGAR	497
VELLORE	79	BELLARY	433	ALLEPEY	431	WARRANGAL	465
CUDDALORE	113	GAURIBADNUR	245	KOTTAYAM	431	NIZAMBAD	473
SALEM	189	MYSORE	279	QUILON	480	KURNOOL	501
NAMMAKKAL	218	MANDYA	257	TRIVANDRUM	515	MEHOOB NAGAR	435
ERODE	225	GULBARGA	578	MALAPPURAM	360	NELLORE	686
COIMBATORE	281	BIJAPUR	511	CALICUT	382	THIRUPATHI	683
KRISHNAGIRI	148	BAGALKOT	472	KASARGOD	482	ONGOLE	644
THIRUCHY	191	MANGALORE	293	CANNANORE	430	PRODATHUR	579
THIRUNELVELLI	349	HASSAN	309			SRIKAKKULAM	779
NAGERCOIL	392	RAICHUR	516			BHIMAVARAM	608
DINDUGUL	249	HUBLI	445			VIZAKAPATNAM	714
MADURAI	263					VIJAYAWADA	538
TANJORE	221					GUNTUR	556
SIVAKASI	303					KAKINADA	647
KUMBAKONAM	241					KHAMMAM	498
TOTAL DISTANCE	**3850**		**5394**		**4564**		**10071**

Interpretation:

From the table it is clearly stated that the existing distances in the distribution throughout 4 zones of .Chennai, Bangalore,

Palakkad and Hyderabad are 3850, 5394, 4564 and 10071 miles respectively.

4.2.5.1 GRAPH ON EXISTING DISTANCES (CHENNAI ZONE)

DISTANCES FROM CHENNAI
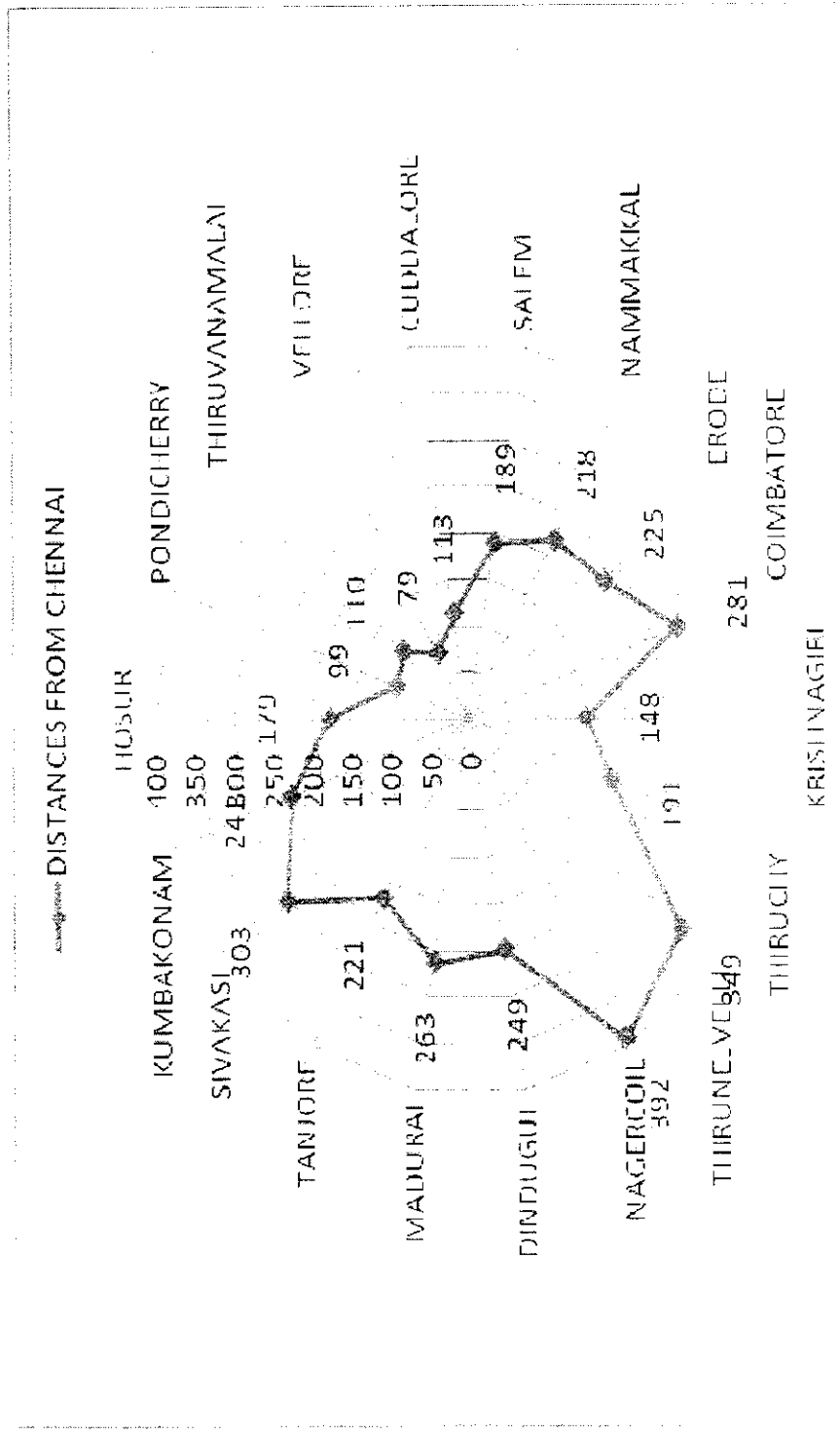
4.2.5.2 GRAPH ON EXISTING DISTANCES (BANGALORE ZONE)

DISTANCE FROM CHENNAI

BANGALORE

DEVANAGIRI

BELGUAM

BELLARY

GAURIBADNUR

MYSORE

MANDYA

GULBARGA

BIJAPUR

BAGALKOT

MANGALORE

HASSAN

RAICHUR

HUBLI

357

433

245

279

257

578

472

293

309

445

201

498

600
500
400
300
200
100
0
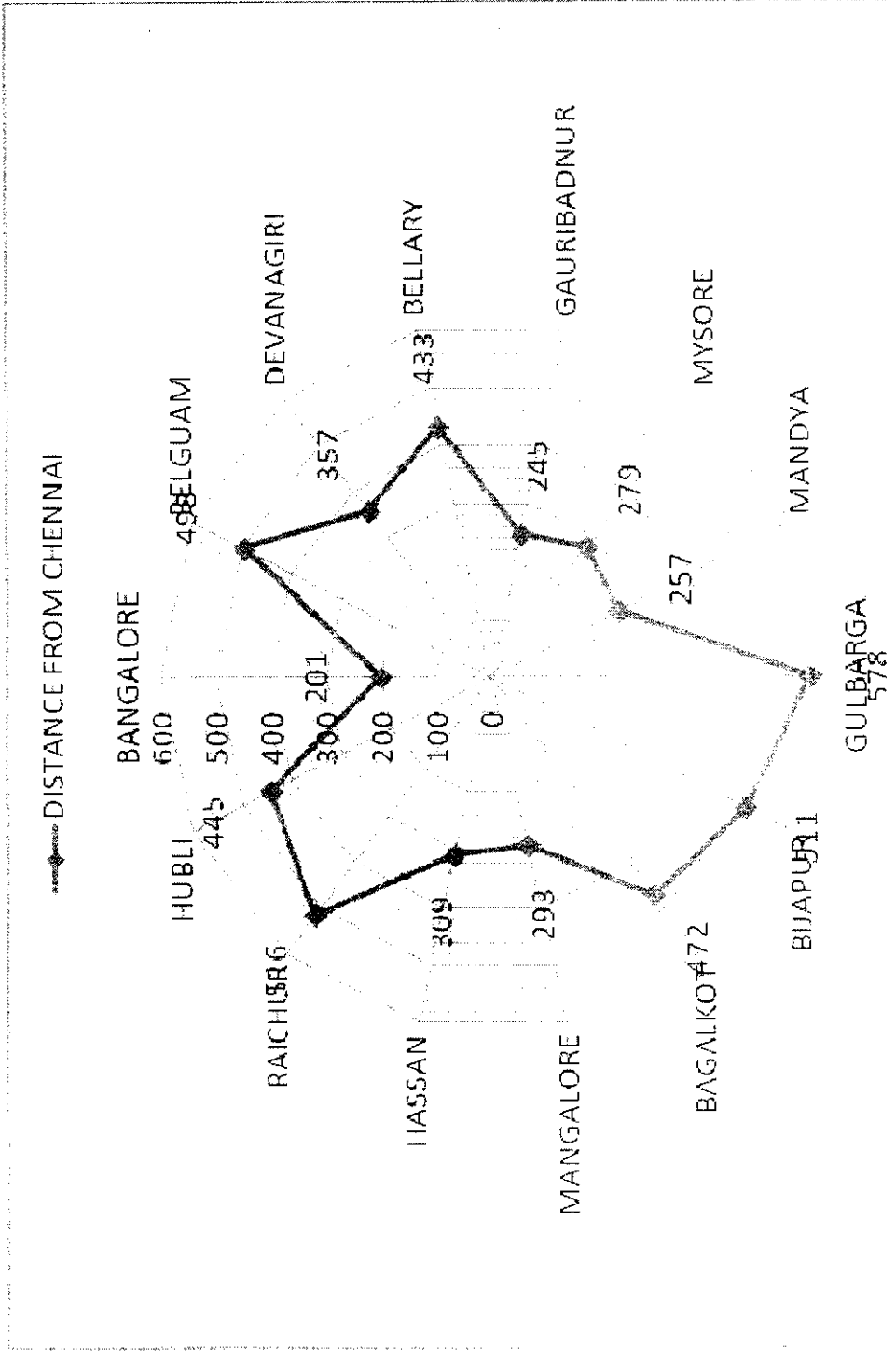
4.2.5.1 GRAPH ON EXISTING DISTANCES (PALAKKAD ZONE)

DISTANCE FROM CHENNAI

PALAKKAD

600
500
400
300
200
100
0

THRISSUR 347

COCHIN 394

ALLEPEY 431

KOTTAYAM 431

QUILON 480

TRIVANDRUM

MA APPURAM 360

CALICUT 384

KASARGOD 482

CANNANORE 430

312
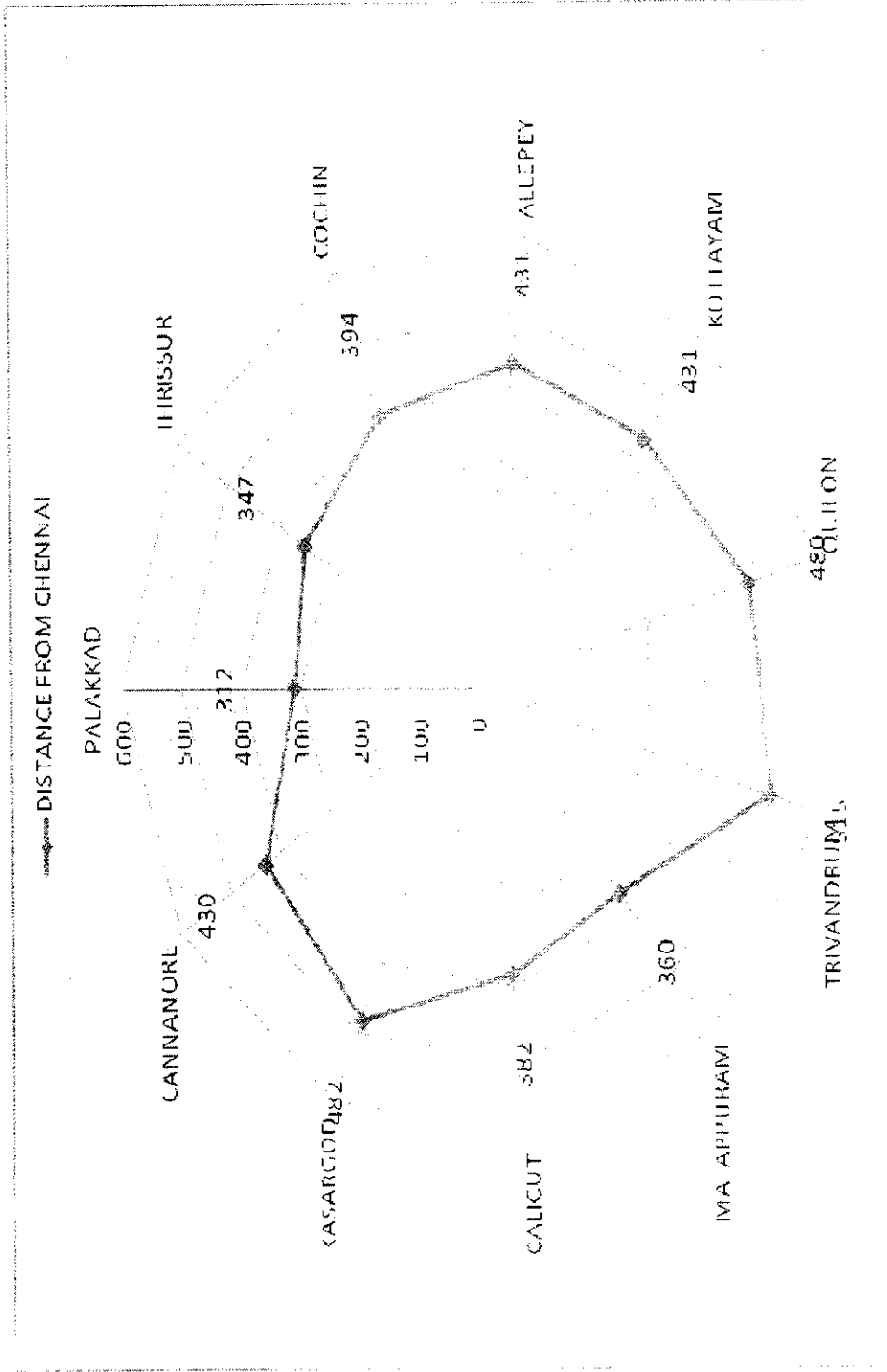
4.2.5.1 GRAPH ON EXISTING DISTANCES (HYDERABAD ZONE)

Legend:
- DISTANCE FROM CHENNAI

HYDERABAD: 800, 700, 600, 500, 400, 300, 200, 100, 0
SECUNDERABAD: 387
KARIM NAGAR: 497
WARRANGAL: 465
NIZAMBAD: 473
KURNOOL: 501
MEHOOB NAGAR: 435
NELLORE: 685
THIRUPATHI: 673
ONGOLE: 644
PRODATUUR: 579
SRIKAKULAM: 779
BHIMAVARAM: 608
VIZAKAPATNAM: 538
VIJAYAWADA: 538
GUNTUR: 556
KAKINADA: 547
KHAMMAM: 498
HYDERABAD: 181, 387, 498
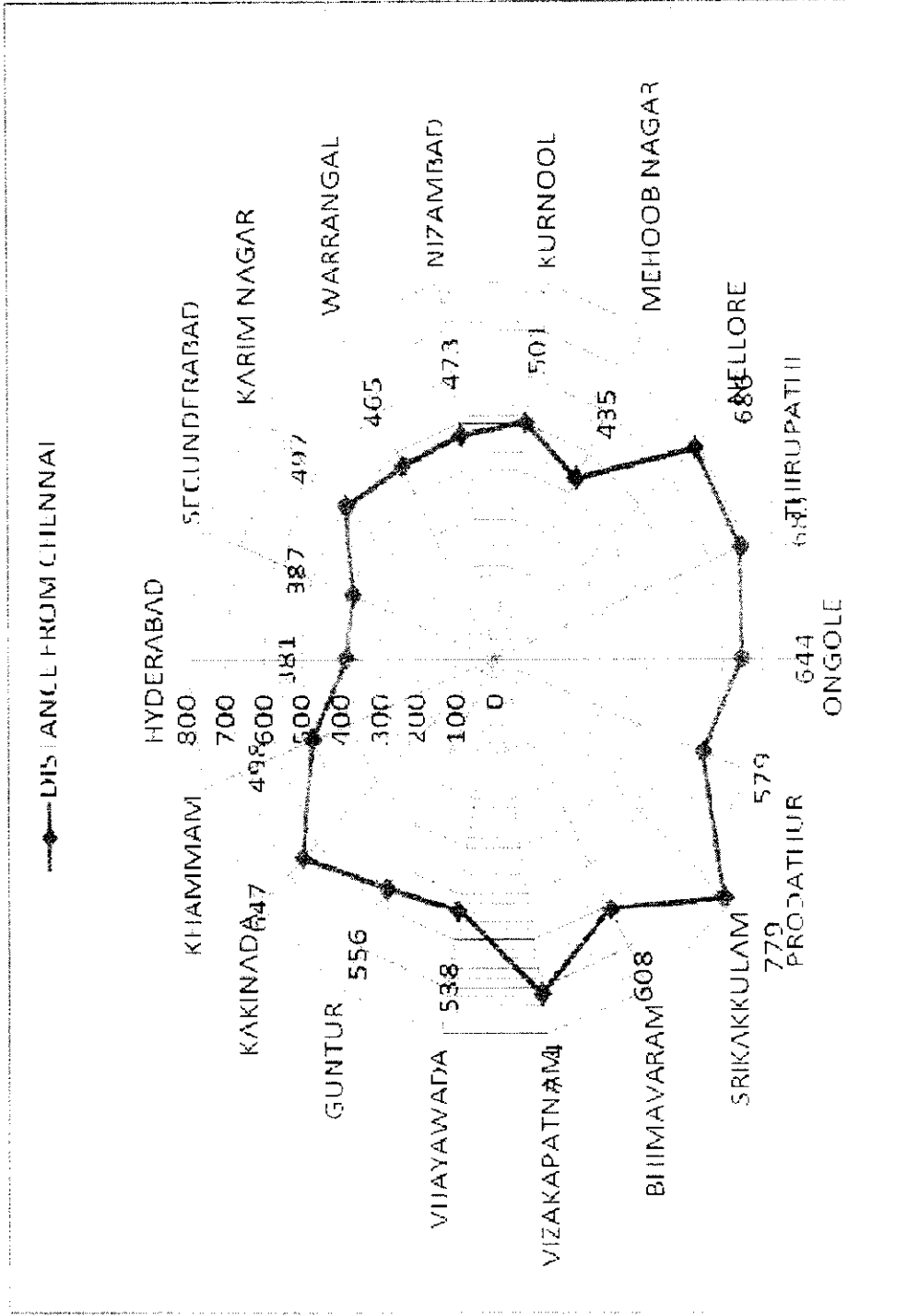
4.2.6 TABLE OF ANALYSIS - MATRIX OF DISTRIBUTION OF CASTROL INDIA LTD

ZONES	TAMIL NADU	KARNATAKA	KERALA	ANDHRA PRADESH
DISTANCES (EXISTING)	3850	5394	4564	10071
DISTANCES (OPTIMIZED)	3850	5394	4462	5839
DEVIATION/SAVINGS	0	0	102	4232

Interpretation:

From the table it is clearly visible that the existing pattern of distribution is optimum only in Chennai and Bangalore zone. In other two zones a deviation from optimality of about 102 miles in Palakkad zone and a large deviation of 4282 miles in Hyderabad zone is been spotted.

DISTRIBUTION DISTANCES & DEVIATION

	TAMIL NADU	KARNATAKA	KERALA	ANDHRA PRADESH
DISTANCES (EXISTING)	3850	5394	4564	10071
DISTANCES (OPTIMIZED)	3850	5394	4462	5839
DEVIATION/SAVINGS	0	0	102	4232

DISTANCES IN KM

4.2.7 TABLE OF DISTRIBUTION COST & SAVINGS

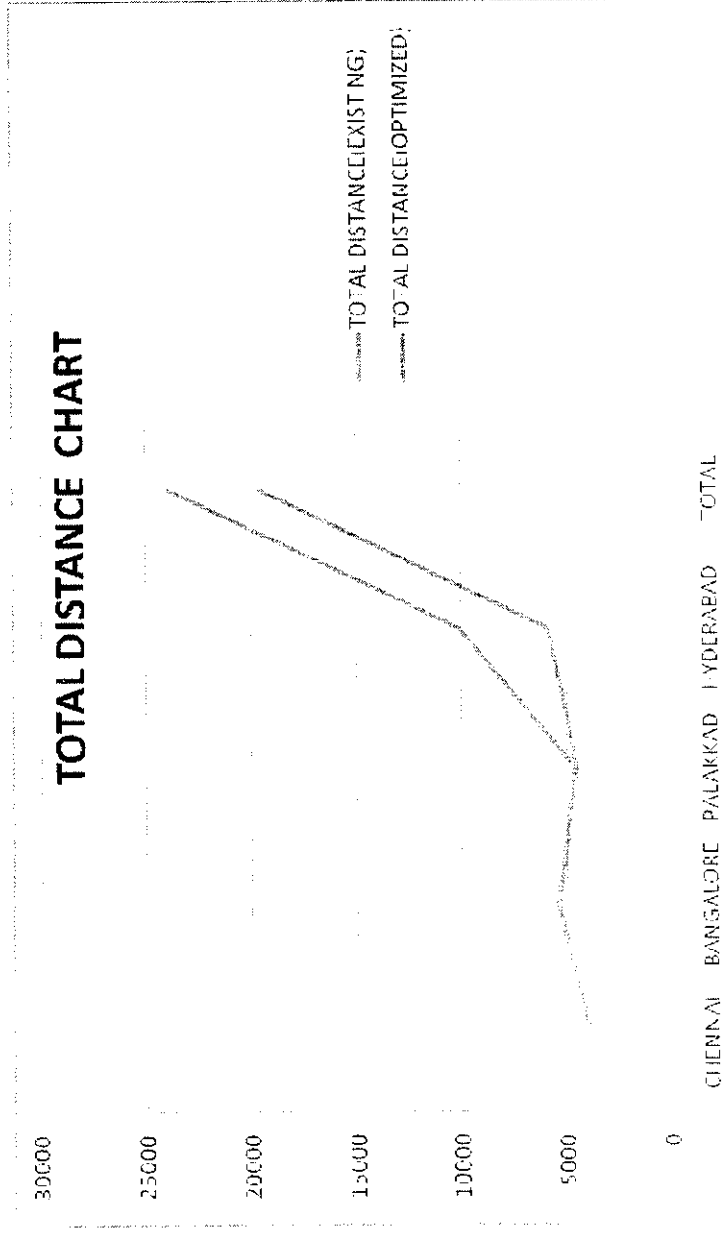| TOTAL PRODUCTION(ANNUAL IN KILOLITRE)	MONTHLY PRODN	ANNUAL PRODN	DISTBN COST/TRUCK	AVGE DISTBN COST/KM	DISTBN COST / LITRE
AREA WISE SUPPLY					
CHENNAI ZONE	700	8400	3000	15.58	0.375
HYDERABAD ZONE	800	9600	14000	36.75	1.75
PALAKKAD ZONE	200	2400	18000	57.7	2.25
BANGALORE ZONE	700	8400	12000	59.7	1.5

DISTRIBUTION COST EXISTING & OPTIMIZED	CHENNAI	BANGALORE	PALAKKAD	HYDERABAD	TOTAL
TOTAL DISTANCE(EXISTING)	3850	5394	4564	10071	23879
DISTRIBUTION COST	15.58	36.75	57.7	59.7	169.73
TOTAL COST(EXISTING)	59983	198229.5	263342.8	601238.7	1122794
TOTAL DISTANCE(OPTIMIZED)	3850	5394	4462	5839	19545
TOTAL COST(OPTIMIZED)	15.58	36.75	57.7	59.7	169.73
TOTAL COST(EXISTING)	59983	198229.5	257457.4	348588.3	864258.2
COST DIFFERENCE/SAVINGS	0	0	5885.4	252650.4	258535.8

Interpretation:

From the above table it can be seen that a total savings of Rs. **258535.8** can be obtained the company by restructuring its existing distribution policy from the locations covering under Chennai plant.

4.2.7.1 GRAPH OF TOTAL DISTANCE COVERED BY 4 ZONES

TOTAL DISTANCE CHART

TOTAL DISTANCE(EXISTING)

TOTAL DISTANCE(OPTIMIZED)

30000			
25000			
20000			
15000			
10000			
5000			
0			

CHENNAI   BANGALORE   PALAKKAD   HYDERABAD   TOTAL

Chapter 5
FINDINGS, SUGGESTIONS & CONCLUSION

5.1 Findings

The above analysis has shown that the existing distribution matrix of Castrol India plant at Chennai Facility is not optimized. The details of the findings are as follows:

1. The optimum distance covered during distribution process is 3850 miles through out the Chennai zone covering 18 destinations and is equal to the existing pattern.

2. The optimum distance to be covered by 14 locations under Bangalore C&F is about 5394 miles using least distance method.

3. The optimum distance covered to 7 locations are from Palakkad C&F and 4 from Chennai C&F with a total of 4462 miles using least distance method under Palakkad zone

4. The optimum distance covered to 5 locations are from Hyedrabad C&F and 13 from Chennai C&F with a total of 5839 miles using least distance method under Palakkad zone.

5. The deviation between the optimum and existing is very high in Hyderabad zone of about 4232 miles and Palakkad zone having a deviation about 102 miles.

6. The existing distributions of Bangalore C&F & Chennai C&F are optimum

7. The deviation between the existing distance matrix and optimized distance matrix through least cost method has shown a additional cost of Rs. Rs 258535.8/- which can be saved per load towards the total places existing in the matrix.

5.2 Suggestions

5.2.1. The present distribution policy is rigid. The policy should be amended in the manner that the products should be supplied from the production site itself the orders should be processed from the C&Fs and send to the Plant, so that the optimum distance can be attained in distribution.

5.2.2. There is high range of deviation in Hyderabad zone, so the it is better to shift the C&F point to more optimum location

5.3 Conclusion

Globally, the Castrol brand is synonymous with world class lubricants for automobile, marine and industrial applications. The continuous innovations, leading edge marketing and technology, backed by customer centric business approach, have established Castrol as a global super brand. It is therefore not surprising that the brand is over 100 years strong and growing younger!

In India, Castrol has an even stronger presence, occupying high ground in technology and customer relationships. Castrol India has an extraordinary position in the BP lubricants business worldwide because of its omnipresent salience, strong consumer preference and market share. The brand has the characteristics of a niche player with mainstream presence in market shares and materiality. However, brand Castrol has remained restricted to the arena of lubricants. India is in a period of rapid transformation driven by strong economic growth. The benefits of this growth are evident from strong corporate results, accelerating.

The success of concern is based on the performance of its all processes. The optimization of every process should be ensured theoretically and practically.

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