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FREIGHT COST OPTIMISATION IN LOGISTICS WITH REFERENCE TO AMARA RAJA BATTERIES LTD., TIRUPATHI

C. UMADEVI

ASST. PROFESSOR

**ANNAMACHARYA PG COLLEGE OF COMPUTER STUDIES
RAJAMPET**

DR. P. CHITTI BABU

PROFESSOR

**ANNAMACHARYA PG COLLEGE OF COMPUTER STUDIES
RAJAMPET**

ABSTRACT

The world economy depends on the efficient and effective movement of freight. Transportation and logistics supply chain also consume a significant proportion of each of our India budgets. Transportation cost involves above ten percent of our total economy. This percentage includes the personal transportation cost and also freight cost. It clearly indicates the key role that transportation plays in our country and the heavy responsibility of those who manage transportation facilities. Supply chains are the mechanisms which facilitate the supply of supply of products and the raw materials, from which products are made move from their source to the consumer. The supply chain is the most efficient will be able to deliver a product to the consumer at the lowest cost. The present study attempts towards the analysis of freight cost optimization in logistics with reference to Ammaraja batteries ltd. This analysis shows that freight cost optimization plays a major role in Real-time visibility, transparency and centralized decision-making power in Logistics management. Logistics management is one of the important processes that influence over all supply chain management process, effective transportation mode helps in altering the effective decision making, reducing lead days helps in reducing the cost of operation and improves the transportation efficiency.

KEYWORDS

freight cost, logistics, optimisation, supply chain.

INTRODUCTION

Freight costing is method of ascertaining the cost of providing service by a transport undertaking. This includes air, water, road and railways; motor transport includes privatcars, Freight forwarding market in India is poised to grow at a cargo of ~a% till 2018, In India, freight forwarding can be broadly categorized into Road, Rail, Air and Sea Freight India is expected to witness considerable growth in freight business provided freight companies diversify their business to other logistic segments.

MEANING

A freight rate is a price at which a certain cargo is delivered from one point to another. The price depends on the form of the cargo, the mode of transport (truck ship, train, and aircraft), the weight of the cargo, and the distance to the delivery destination. Many shipping services, especially air carriers, use dimensional weight for calculating the price, which takes into account both weight and volume of the cargo. Freight cost is a cost incurred in moving of goods, it includes packing, palletizing, documentation, loading and unloading charges carriage costs and marine insurance costs.

TYPES OF FREIGHT COSTS

Standard or Fixed Charges: These charges are including even though vehicle is operating or not. Such as Insurance premium, taxes, depreciation on vehicles and part of driver wages. Interest on capital, general supervision, and salary of operating managers is items come under the category of fixed or standing charges.

Maintenance charges: There are semi fixed or semi variable expenses in their nature and includes wear on tires, repairs and overheads painting etc.

Operating and running charges: these are the cost of operations. These charges vary slightly in direct proportion to kilometres etc. These expenses are variable or fluctuate in nature because they are dependent on distance covered and trips made by the vehicle.

Collection of costing data: After determining the cost unit, the cost regarding to the service is collected. The collected cost is a submitted under the heads suitable for control purpose i.e. fixed cost and variable cost. The presentation of cost information under different categories helps to improve managerial control over cost.

PROCEDURE

The freight cost will be calculated as shown below, it includes mainly Variable cost and Fixed costs.

Variable costs: Variable expenses are the running and operating activity charges. These include expenses of variable Nature, e.g. petrol, diesel, lubricating oil, grease etc. The Material Requisition Note and Time Sheet (or Log) bears the Vehicle No. The relevant Vehicle Account is debited with its direct material cost and direct labour cost. Direct Expenses such as fuel are debited to the Vehicle Account on the basis of Log Book and the cash/purchase/journal vouchers.

Variable cost=total quantity of output × variable cost per unit of output

Fixed Costs: Fixed Costs (Fixed Charges) include garage rent, insurance premium, road licence fees etc. the Fixed Costs are apportioned and absorbed by each Vehicle No. on the basis of the Overheads Absorption Rate which may be Actual or Pre- determined. The Fixed Costs attributable to the Vehicle are debited to the relevant Vehicle Account.

Fixed cost=total cost –variable cost; Total cost= fixed cost+ variable cost (quantity)

Profit or Loss: The Vehicle Account at this stage will reveal the profit or loss made on operating that vehicle the profit or loss is then transferred to the Costing Profit and Loss Account statement. The total Operating Cost of a period is divided by the number of Cost Units (KM/Ton etc.) supplied during the period to arrive at the Operating Cost per Unit for that period.

SUPPLY CHAIN MANAGEMENT

In simple words supply chain management can be defined as “The Company act as a link between suppliers and distributors, The Coordination of 5 key activities:

- (i) Plan (Forecasting)
- (ii) Source (Procurement, Purchasing)
- (iii) Make (Design, manufacturing)
- (iv) Deliver (Transportation, Distribution)
- (v) Return (unsold or refused)

LOGISTICS

The overall management of the way resources are obtained, preserved and transferred to the locations where they are required, it entails in identifying the potential suppliers and distributors, evaluating how accessible and effective they are in establishing healthy relationships and signing contracts with the companies who offer the best combination of price and the services to a company might also choose to handle its own logistics.

The Company optimized logistic costs through the following initiatives:

1. Improved truck loading factor by redesigning pallet sizes and intelligent space management.
2. Entered into annual contracts with all service providers with a risk purchase clause, leading to service dependability.
3. Established performance benchmarks among service providers.

ABOUT THE INDUSTRY PROFILE

A battery is an electronic and chemical device in which the free energy of chemical reaction is converted into the electrical energy contained in the active materials is converted into electrical by means of electrochemical oxidation reduction reactions.

Inventory in wider sense, is defined as any idle resource of an enterprise. It is a physical stock of goods kept for the purpose of future affairs. The term is generally used to indicate raw materials in process, finished products, packing, spares and others stocked in order to meet expected demand or distribution in the future.

The manufacturing process involved in production of maintenance free valve regulated lead acid storage batteries is given below.

- a) Grid Casting
- b) Plate Production
- c) Pasting
- d) Assembling
- e) Formation
- f) Dispatch

COMPANY PROFILE

Amara Raja Batteries Ltd incorporated under the Companies act 1956 in February 1985, and converted into public limited company on 6th September 1990. It is established by Mr. Rama Chandra N. Galla & the Chairman of Amara Raja Batteries LTD; He is a post graduate engineer with over 16 years' experience in power systems as an electrical engineer in Nuclear and conventional source power generating stations across the USA. He holds an M.S. Degree in system science from Michigan state university. RamachandraGalla worked in various capacities such as Sr. Electrical Engineer, Electrical Project Engineer, and Sr. Electrical Project Engineer for Sergeant & Lundy, Chicago, USA. He was involved in various Nuclear power plant projects.

Amara Raja is having a technological Joint Venture with Johnson Controls INC (JCI), USA in the year 1991 who owns 26% stake in the company. JCI is a Leading battery manufacture in USA. Johnson Controls is a Fortune 500 company and also the largest manufacturer of lead acid batteries in North America and a leading global supplier to major automobile manufacturers and industrial customers.

Amara Raja has its Registered Office and Head Office at Karakambadi near Tirupati in A.P. Karakambadi is located at an approximate distance of 12 kms from Tirupati. The manufacturing campus at Karakambadi is one of the most beautifully landscaped campuses and boasts of state of the art manufacturing facilities.

- **MISSION**

"To transform our spheres of influence and to improve the quality of life by building institutions that provide better access to better opportunities, goods and services to more people...all the time".

- **VISION-2025**

Through the Amara Raja way and through ensuring progressive partnership we will be a global leader in. batteries and battery technologies and dominant player in Indian Ocean.

RESEARCH METHODOLOGY

A company with global customers like Amara Raja Batteries Ltd Products needs real-time visibility of inventory and collaboration improvements with suppliers and customers.

NEED FOR THE STUDY

The object of freight cost management is to optimise the whole value chain of the distribution of goods and merchandise .one of the main aspect of such analysis is the optimization of the vehicle routes to deliver final products to customers. in such cases the problem usually involves distance, cost, number of vehicles, or profits among different variables, we also take into account environmental costs in which we include traditional costs along with environmental cost estimates in real scenarios, the detailed estimation of the environmental cost is essential for an appropriate development of the procedure are as follows

- To gain transportation management solutions that can save time and cost which are precious.
- To adopt advanced technologies to address global networks and capacity complexities.
- Drive to control and minimise transportation costs; &
- Rapid response to plan and security fluctuations

SCOPE OF THE STUDY

Amara Raja Batteries company along with the lead logistic services provider to the parent company conducted an in depth study of the transportation network of both the companies their as is networks, constraints and requirements were understood in detail through meeting this enable initial scope of the study like:

- For Better visibility of both inbound and outbound shipments for real-time monitoring of the entire freight process
- To Receiving orders automatically and tendering loads to carriers directly through the system
- To ensure Visibility of supplier routing guides, ensuring compliance and accountability
- To Improve process automation and optimization with Lean Logistics to streamline the payment process

OBJECTIVES

- To provide an accurate basis for quotation and fixing of rate to freight.
- To contribute the effective design of the sustainable logistic networks and balancing environment and also profit to manufacturers and supplier.
- To compare the effectiveness of logistics management at Karakambadi Tirupati road lines.

SOURCES OF DATA

- Survey with lorry drivers on routes and toll costs and information given by the transporters.
- Information from the staff working in logistics department.

TOOL AND TECHNIQUES**CRITICAL PATH METHOD (CPM)**

Critical path method is observed in a network one can enumerate many sequences of activities. from starting event to end event. each sequence will contain different combination of activities with different duration. One of the important objects of network analysis is to know the minimum possible time by which the project can be completed. This is done by determining the critical path i.e.: the sequence of activities lying on the critical path should be taken first.

PROJECT EVOLUTION AND REVIEW TECHNIQUE (PERT)

It means programme evaluation and review technique is a probabilistic model based on the beta distribution. It derives its estimates based on probability accuracy. Pert is a popular technique of network analysis. According to the originators of the pert, any given activity delineated in a network is unlikely to be completely on time. Sometimes all aspects of a job may be easier to complete than expected, while at other times, unexpected snags may occur, causing unplanned delays, this method uses three times estimates for an activity, rather than a single estimate

LIMITATIONS

- Road transport noise impact and Impact of road transport polluting emissions.
- Too expensive and fluctuations in fuel prices.
- Increasing handling cost and Increasing loss and damage.
- Limitation by highway weight and service.
- Speed limitations and hours of service rules. And Motor carrier delay exceeds.
- Poor use of automation for exception recognition and resolution and Poor road conditions.
- Shortage of drivers and Lack of skilled labour (drivers, cleaners).

DATA ANALYSIS AND INTERPRETATION**CALCULATION OF FREIGHT****LEAD TIME CALCULATION**

To reduce the lead time, it is necessary to find what the routes available to reach are the distribution point. By finding all the routes based on kilometres and time we can choose the way to transport. Only the kilometres will not help to reduce the lead time and also the road conditions and comfort traffic will take a major part to reduce the lead time.

The company issues lead days to the transporters to deliver the goods on time, the lead timings are given below (followed by the company);

LEAD-TIME OF AMARAJA BATTERIES

1. There are 12 destinations such as Kochi, Bhopal, Indore, Jabalpur, Mani deep, Bhiwandi, Mumbai, Nagpur, Nasik, Pune, Tane, Bhubaneswar and their lead days are 3,5,5,5,5,5,3,5,5,5,5,5 respectively.
 2. On these lead timings the company and the transporters are making the goods deliver in the distribution channel.
- From the research, by following different road maps the lead time can be reduced than the company following.

TABLE NO. 1: SUGGESTED ROUTES FOR GIVEN DESTINATIONS

Destination	root	hi way	Routes	lead time
Kochi	3	NH 47	1.karkambadi,vellore,krishnagiri,dharmapuri,erode,coimbathore,palakad,trissur,kerla	2days,1 hour
		NH46&47	2.karkambadi,chittor,vellore,coimbathur,palakad,trissur,kochikeata	2days,8min
		SH31	3.karkambadi,chittor,ambbur,erode,coimbathur,palaked,trissur,kochi,keral	1day,9hrs,9min
Bhopalr	2	NH17	1.karkambadi,nellore,ongole,vijayawada,nagapur,Bhopal	4days,1hr,3min
		NH18&7	2.karkambadi,kadapa,nagapur,Bhopal	4days,2min
Indore	3	Ichapurrd	1.karkambadi,kadapa,akola,indore	4days,3min
		NH7	2.karkambadi,kadapa,akola,madyapradesh	4days,3min
Jabalpur	4	NH18	3.karkambadi,kadapa,icchaparvoad,akola,indore	3days,7h,8min
		NH17	1.karkambadi,nellore,rajamondry,raipor,chathisgarh,Jabalpur	4d,7h,6m
		NH12A	2.karkambadi,nellore,ongole,vijayawada,pamunoo, chathisgarh,Jabalpur	4d,1h,7m
		SH5	3.karkmbadi,nellore,ongole,telangana,nagpur,madypradesh	3d,8h,5min
Manideep	3	Mancheriard	4.karkambadi,kadapa,nagpur,Jabalpur	3d,8h,1m
		NH17	1.karkambadi,kadapa,nh65road,nanded,manideep	4d,1h,8m
		MPSH15	2.karkambadi,nellore,ongole,karimnagar,nagpur,manideep	4d,1h,1m
Jabalpur	6	NH69	3.karkambadi,kadapa,telangana,nagpur,manideep	3d,9h,6m
		NH4	1.karkambadi,chittor,kolar,benglore,tummakur(on construction)harihar,(road work on AH47/davangiri,hariharbipass)huballidarwad AH47->belgavi,kolhapor karad,satara(road on work,so AH47/mumbai,punebipass)bhiwand	3d,5h,7m
		NH4	2.karkambadi,kadapa,tadipatri,gunthakal,gadak,bellgal,kolhapur,karad,safara,pune(construction zoenmaharashtra	3d,3hrs
		NH9	3.karkambadi,kadapa,nandyal,kurnool,mahaboobnagar,kalaburagi,solapur,(construction zoen)bhiwandi	3d,2h,4m
		NH9	4.karkambadi,kadap,nandyal,kurnool,yadagiri,solapur,pune,maharashtra	3d,1h,8m
		NH9	5.karkambadi,kadapa,tadipatri,AH43-gooty- adonin,rayachuru,solapur,pune	3d,2h,2m
Bhiwandi	5	NH13	6.karkambadi,kadapa,tadipatri,gunthakal,ballari,hospaet,vijayapurya,pune	3d,2h
		NH4	1.karkambadi,chittor,kolar,benglore,tummakur(on construction)hirhuru,hubli-darvad,belgavi,kolapur,karad,shathara,pune(on construction)Mumbai	3d,5h,5m
		NH4	2.karkambadi,kadapa,tadipatri,gunthakal,gadak,hubli-darwad,belgavi,kolapur karad,satara,pune	3d,32h,2m
		NH9	3.karkambaadi,kadapa,nandyal,kurnool,pune(on construction)	3d,1h,6m
		NH9	4.karkambadi,kadapa,tadipatri,gunthakal,ballari,hospaet,vijayapur,ombara Pune	3d,1h,6m
Nagpur	3	NH9-AH43	5.karkambadi,kadapa,tadipatri,sindanur,vijayapur,munbari,pune	3d,1h,3m
		NH7	1.karkambadi(nagapur road),nellore,ongole,telangana,nagapur	3d,6m
		NH7	2.karkambadi,kadapa,kurnool,ongole(main road)ngapur	3d,3m
Nasik	4	NH7	3.karkambadi,kadap,(tdp road)ngapur	3d,2m
		NH4	1.karkambadi,vellore road work on AH7,davangiri,(hariharnbipass)hublli bellgani,kolhapur,sahar,punneae/croad,nasik	3d,7h,4m
		NH-18	2.karkambadi,kadapa,kalapuragu,solapur,ahmednagar,nasik 3.karkambadi,kadapa ahmednagar,nasik	3d,1h,6m 3d,3h,6m
Pune	5	NH-9	4.karakambadi,kadapa,ahmednagar,nasik(rayachur-mahabbobnagar)root	3d,1h,2m
		NH-4	1.Karkambadi,chittor,kolar,tumakur (on construction) hiriyur (on construction) Davanagiri (on construction)hubli-darwad,AH=47,belgari,kolhapur,karal,satara Pune	3d,1h,5m
		NH-4	2.karkambadi,chitradurga,davanagiri(on construction)hubli-darwad,AH=47, belgari,kolhapur,karal,satara,pune	2d,9h,8m
		NH-9	3.karkambadi,kadapa,nandyala,kurnol,mahaboobnagar,pass by international campus)partly toll roadNH-9PUNE	2d,9h,4m
Tane	4	NH-9	4.karkambadi,nandyal,kurnool,mahaboobnagar,pass by new aidgah,pune	2d,9h,2m
		NH-9	5.karkambadi,nandyal,kurnool,mahaboob nagar,solapur,pune	2d,8h
		NH-4	1.karkambadi,chitoor,kolar,banglore,thumkur(on construction)harihar,hubli-darwad,AH47 belgavi,kolhapur,karad,satara,pune(on construction)mumbai-pune bi pass,lonavala ,navi-mumbai,thane	3d,5h,6m
		NH-9	2.karkambadi,kadapa,tadipatri,guntakal,gadag,hubli-darwad,belgavi,Kolhapur karad,satara,pune	3d,2h,8m
		NH-9	3karkambadi,kadapa,nandyal,kurnool,mahaboob nagar,kalaburage,pune, , lonavala, navy-mumbai ,tane	3d,2h,2m
Bhubaneswar	1	NH9	4.Karkambadi, kadapa, tadipatri, guntakul. Ballari(pass by continue strait on ballarihublii road, ammobavani temple) bagalkoti, panthapur, pune ,lonavala navy -mumbai, tane.	3d,1h,2m
		NH5	1.karkambadi, nellore, ongole, bhimavaram, rajamundry, srikakulam, barmupur	

Freight can be calculated on the basis of the following information.

Diesel cost : with load 1 Lt =3.8km and with out load 1Lt =4km

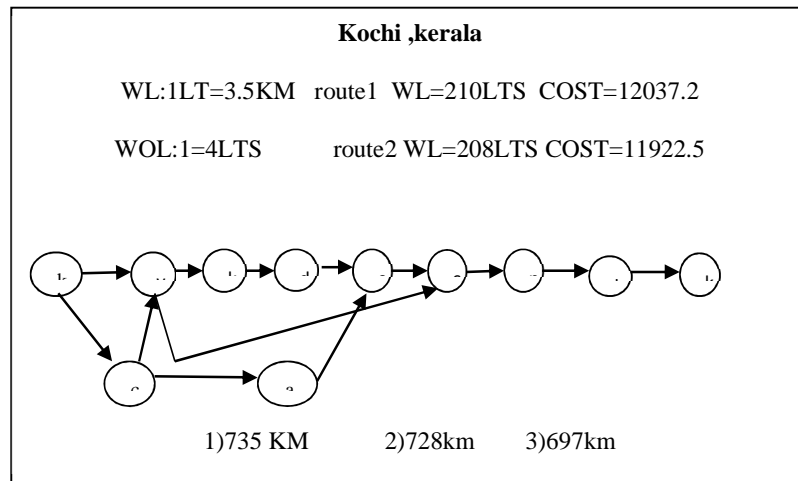
Toll charges: Toll gate cost details is collected from the transporters and from route drivers.

→ 60km=1 tollgate and 1toll gate cost exceeds between 150 to 350

Wear &tear: Collected from the transporters were tyres are changed for every 30,000 km

→ 80,000KM=1 TIME and 1 pair= 44000 rupees(radial tyres)

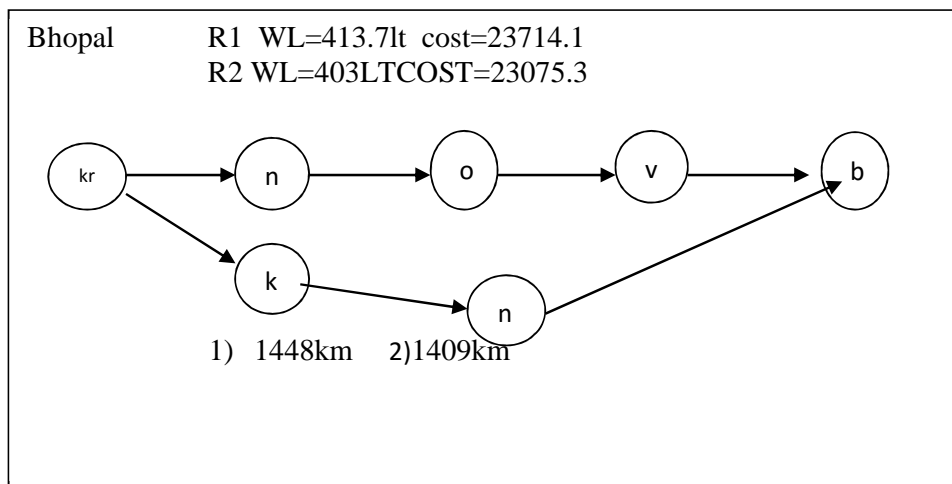
FIGURE 1: POSSIBLE ROUTES FOR KOCHI AND KERALA



Source: Data is collected from the google maps and transporters.

Interpretation: Three possible routes are available for kochi, based on the fixed and variable cost calculation ,it is found that third route is the best possible route for transportation of logistics from karkambadi to kerala.

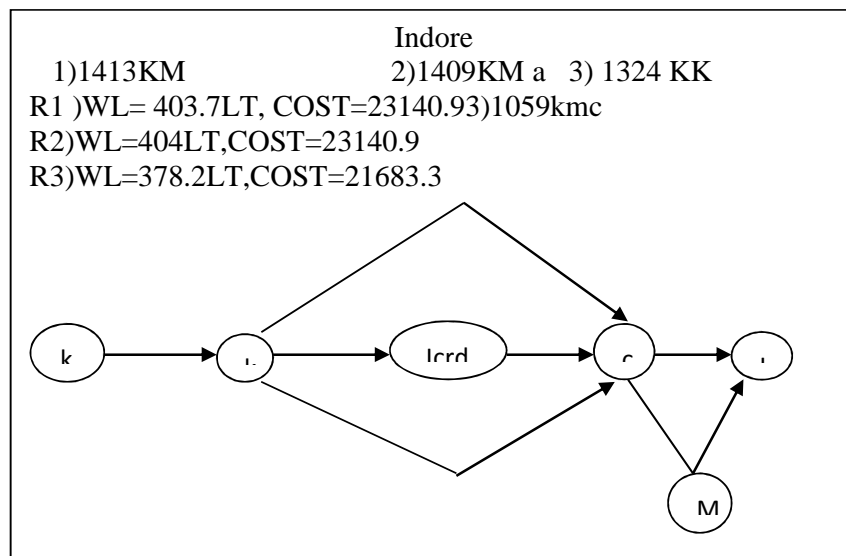
FIGURE 2: SUGGESTED ROUTES FOR BHOPAL



Source: Data is collected from the google maps and transporter

Interpretation: According to Bhopal 1st route is the best possible route for the transportation.

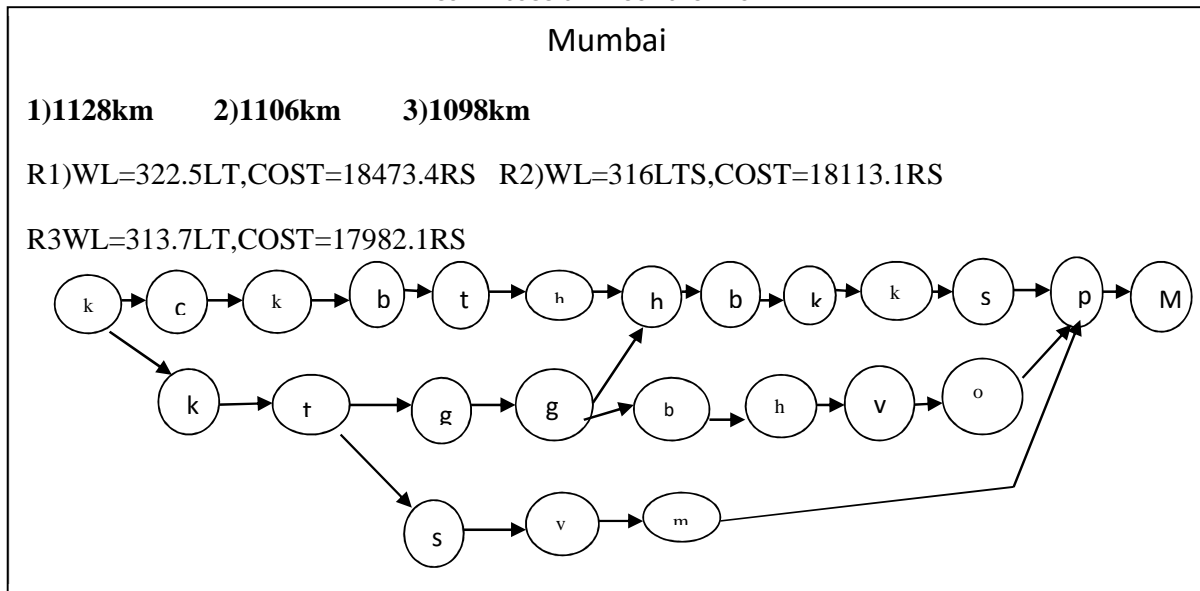
FIGURE 3: SUGGESTED ROUTE FOR INDORE



Source: Data is collected from the google maps and transporters

Interpretation: There is three possible routes forindore route 3 is the best possible route.

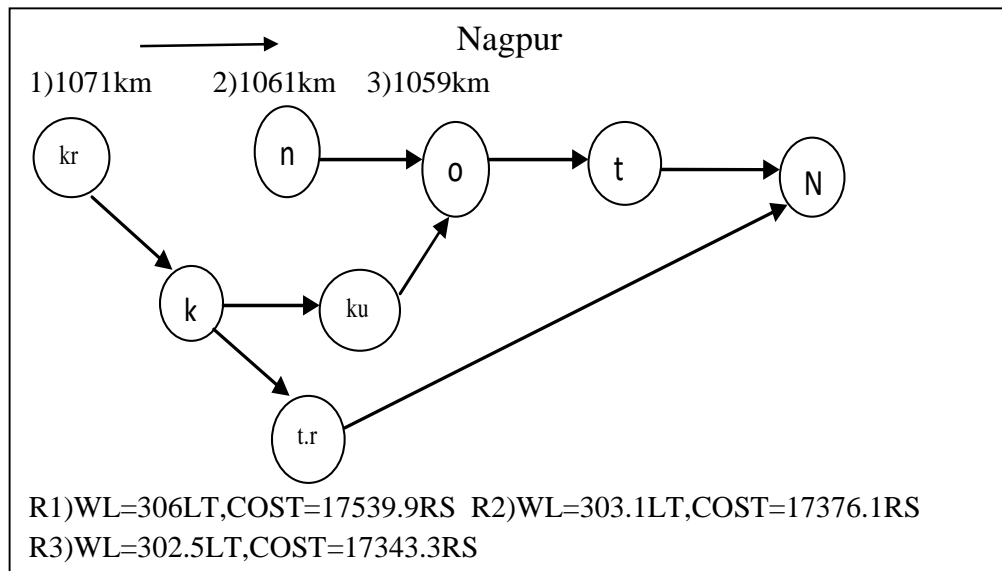
FIGURE 7: SUGGESTED ROUTES FOR MUMBAI



Source: Data is collected from the google maps and transporters

Interpretation There is 3 possible routes for mumbai Among three routes the least possible routes for Mumbai is route 3.

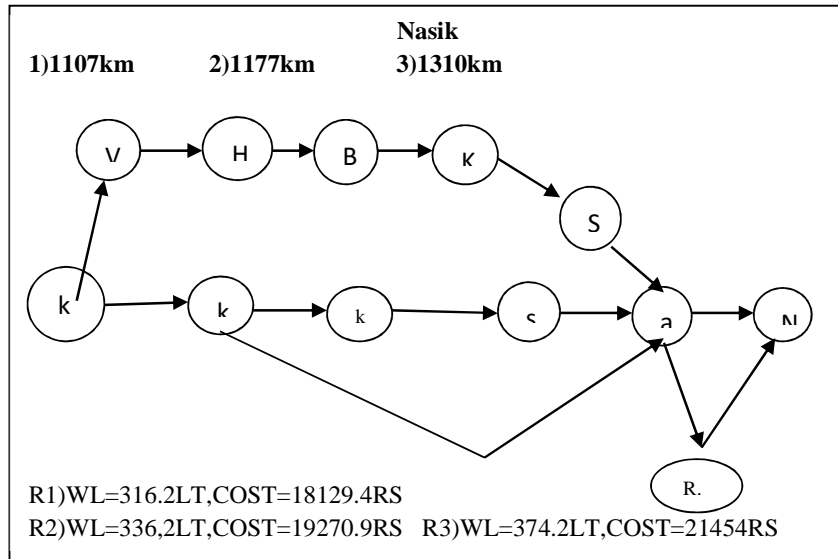
FIGURE 8: SUGGESTED ROUTES FOR NAGPUR



Source: Data is collected from the google maps and transporters

Interpretation :There is three possible routes for Nagpur, among them least possible route for Nagpur is rou--te 3.

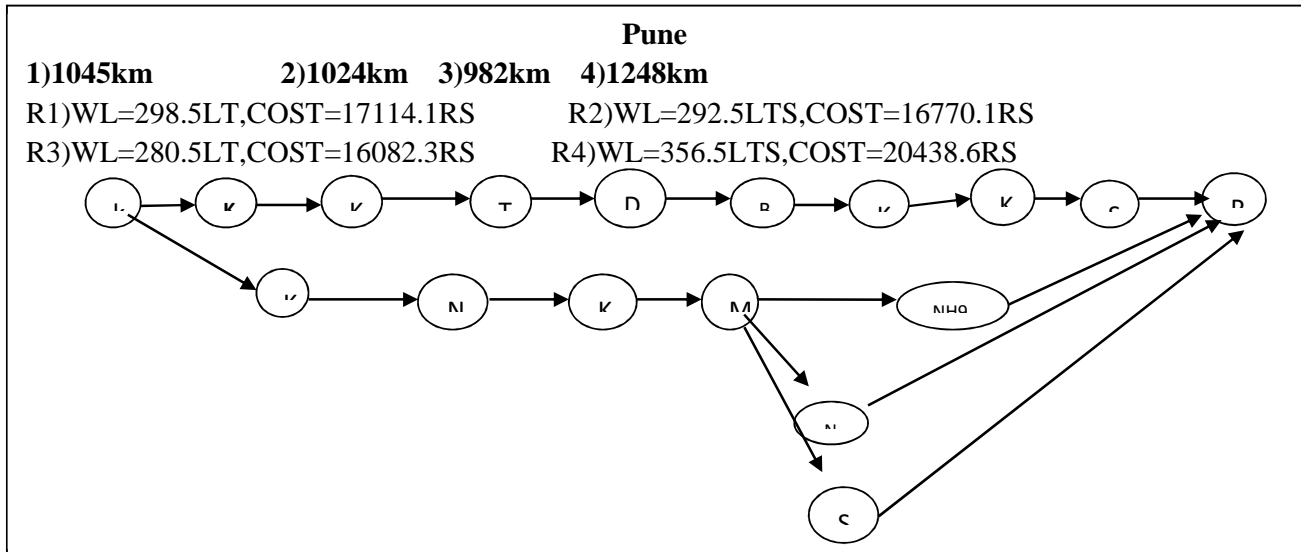
FIGURE 9: SUGGESTED ROUTES FOR NASIK



Source: Data is collected from the google maps and transporters

Interpretation:There is three possible routes for nasik among them,the least possible route for nasik is route 1.

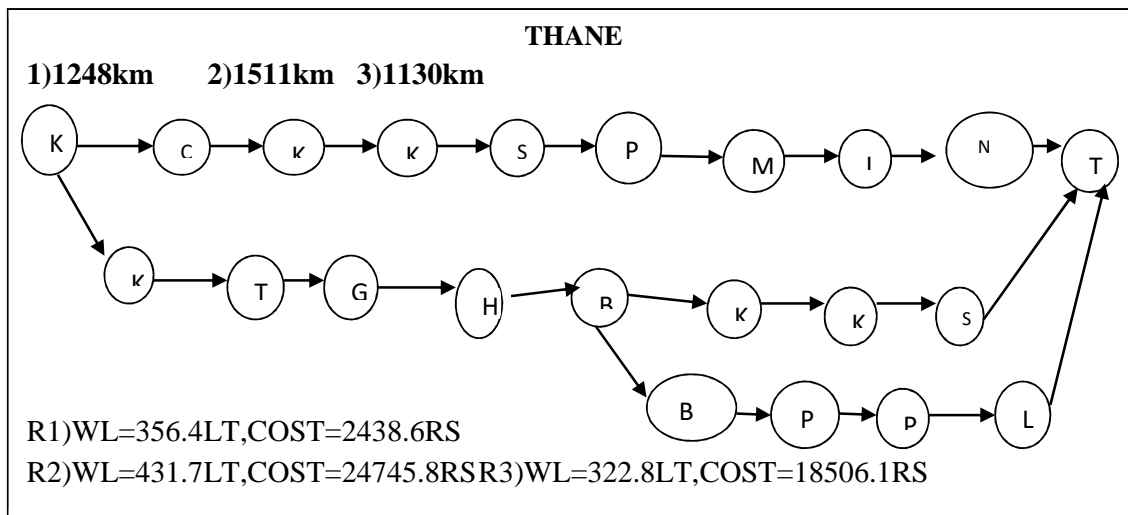
FIGURE 10: SUGGESTED ROUTES FOR PUNE



Source: Data is collected from the google maps and transporters

Interpretation : The least possible route for the pune is route and there is 4 possible routes available, Among them least possible route for the pune is route 3.

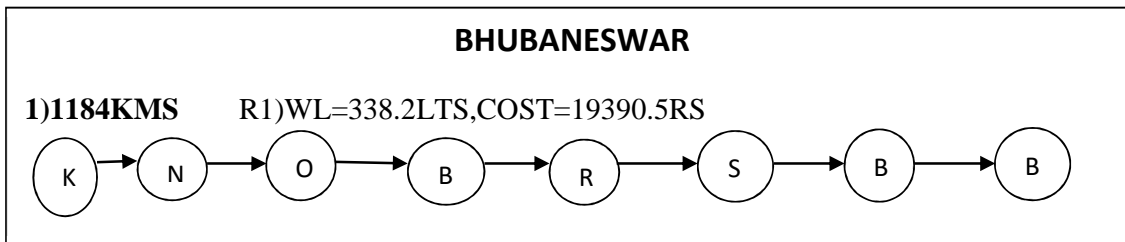
FIGURE 11: SUGGESTED ROUTES FOR TANE



Source: Data is collected from the Google maps and transporters

Interpretation: There is 3 possible routes for tane among Them, the least possible route for tane is route 3.

FIGURE 12: SUGGESTED ROUTES FOR BHUBANESWAR



Source: Data is collected from the google maps and transporters

Interpretation :There is only one possible route for Bhubaneswar is route 1.

TABLE 2: VARIABLE COST AND FIXED COST CALCULATION

Destination	Freight	Fuel .rs	Engine oil	Toll tax	Wear&tear	Total
Kochi	28,350.00	11,132.14	1,000.00	900.00	1,837.00	13,032.14
Bhopal	39,018.60	21,841.90	1,000.00	1,738.00	3,620.00	30,072.10
Indore	35,516.70	21,313.98	1,000.00	1,696.00	3,532.50	24,579.90
Jabalpur	41,039.10	22,053.11	1,000.00	2,003.00	4,172.50	25,056.11
manideep	39,883.50	20,936.88	1,000.00	1,756.00	3,657.50	23,692.88
bhiwandi	39,600.00	17,422.26	1,000.00	1,502.00	3,130.00	19,924.26
Mumbai	41,850.00	17,014.98	1,000.00	1,494.00	3,112.50	19,508.98
Nagpur	30,600.00	16,547.37	1,000.00	1,285.00	2,677.50	18,832.37
Nasik	32,850.00	16,698.22	1,000.00	1,328.00	2,767.50	19,026.22
Pune	30,375.00	15,763.00	1,000.00	1,254.00	2,612.50	18,017.00
Tane	18,825.00	1,000.00	1,498.00	3,120.00	21,323.00	
Bhubaneswar	17,859.70	1,000.00	1,421.00	2,960.00	20,280.70	

Source: Collected from srisrinivasa transportation pvt.ltd,madanapalli

TABLE 3: FIXED COST CALCULATIONS FOR ROUTE 1

Destination	Freight	Intrest	Driver	Cleaner	Insurance	Rd.tax	Total
Kochi	28,350.00	4,677.75	2,268.00	425.25	623.70	2,583.3	10577.7
Bhopal	39,018.60	6,438.06	3,121.48	585.27	897.41	2,583.3	13625.54
Indore	35,516.70	5,860.25	2,847.77	532.75	816.88	2,583.3	12640.6
Jabalpur	41,039.10	6,771.45	3,283.12	615.58	943.89	2,583.3	14197.03
Manideep	39,883.50	6,580.77	3,190.63	598.25	917.32	2,583.3	13870.22
Bhiwandi	39,600.00	6,534.00	3,168.00	594.00	910.80	2,583.3	13790.1
Mumbai	41,850.00	6,905.25	3,348.00	627.75	962.55	2,583.3	14426.55
Nagpur	30,600.00	5,049.00	2,448.00	459.00	703.30	2,583.3	11242.6
Nasik	32,850.00	5,420.25	2,628.00	492.75	755.55	2,583.3	11879.85
Pune	30,375.00	5,011.87	2,430.00	452.62	698.62	2,583.3	11175.61
Tane	40,320.00	6,652.80	3,225.60	604.80	927.36	2,583.30	13993.86
Bhubaneswar	43,753.50	7,219.32	3,500.28	656.30	999.43	2583.30	14957.98

Source: Collected from srisrinivasa transportation pvt.ltd, madanapalli

TABLE 4: VARIABLE COST CALCULATION FOR ROUTE 2

Destination	Freight	Fuel .rs	Engine oil	Toll tax	wear&tear	Total
Kochi	28,350.00	10,981.30	1,000.00	874.00	1,820.00	12,855.30
Bhopal	39,018.60	21,253.65	1,000.00	1,691.00	3,515.00	23,944.65
Indore	35,516.70	21,253.65	1,000.00	1,696.00	3,532.40	23,949.65
Jabalpur	41,039.10	25,175.50	1,000.00	2,003.00	4,172.50	28,178.50
Manideep	39,883.50	22,068.20	1000	2,633.00	3,657.50	25,701.20
Bhiwandi	39,600.00	17,105.49	1,000.00	1,361.50	2,835.00	19,466.99
Mumbai	41,850.00	16,683.00	1,000.00	1,327.00	2,765.00	19,010.00
Nagpur	30,600.00	16,004.34	1,000.00	1,272.00	2,652.50	18,276.34
Nasik	32,850.00	17,754.11	1,000.00	1,412.00	2,942.50	20,166.11
Pune	30,375.00	15,446.23	1,000.00	1,229.00	2,560.00	17,675.23
Tane	40,320.00	22,792.24	1,000.00	1,813.00	3,777.50	25,605.24
Bhubaneswar	43,753.40					

Source: Collected from srisrinivasa transportation pvt.ltd,madanapalli

TABLE 5: FIXED COST CALCULATIONS FOR ROUTE 2

Destination	freight	Intrest	Driversa	Cleanersa	insurance	Rd.tax	Total
Kochi	28350.00	4,677.75	2,268.00	425.25	623.70	2,583.30	10577.7
Bhopal	39018.60	6,438.06	3,121.48	585.27	897.41	2,583.30	13625.54
Indore	35,516.70	5,860.25	2,847.77	532.75	816.88	2,583.30	12640.6
Jabalpur	41,039.10	6,771.45	3,283.12	615.58	943.89	2,583.33	14197.03
Manideep	39,883.50	6,580.77	3,190.63	598.25	917.32	2,583.30	13870.22
Bhiwandi	39,600.00	6,534.00	3,168.00	594.00	910.80		13790.1
Mumbai	41,850.00	6,905.25	3,348.00	627.75	962.55	2,583.30	14426.55
Nagpur	30,600.00	5,049.00	2,448.00	459.00	703.30	2,583.30	11242.6
Nasik	32,850.00	5,420.25	2,628.00	492.75	755.55	2,583.30	11879.85
Pune	30,375.00	5,011.87	2,430.00	452.62	698.62	2,583.30	11175.61
Tane	40,320.00	6,652.80	3,225.60	604.80	927.36	2,583.30	13993.86
Bhubaneswar	43,753.50	7,219.32	3,500.28	656.30	999.43	2,583.30	14957.98

Source: Details collected from srisrinivasa transportation pvt.ltd,madanapalli

TABLE 6: VARIABLE COST CALCULATIONS FOR ROUTE 3

Destination	Freight	Fuel .rs	Engineoil	Toll tax	Wear&tear	Total
Kochi	28,350.00	10,513.69	1,000.00	800.00	1,700.20	11,953.69
Bhopal	39,018.60					
Indore	35,516.70	19,971.49	1,000.00	1,589.00	3,310.00	25,870.49
Jabalpur	41,039.10	20,333.50	1,000.00	1,618.00	3,370.00	22,951.50
Manideep	39,883.50	21,117.89	1,000.00	1,680.00	3,500.00	23,797.89
Bhiwandi	39,600.00	16,788.72	1,000.00	1,336.00	2,782.50	19,124.72
Mumbai	41,850.00	16,568.24	1,000.00	1,318.00	2,745.00	18,886.24
Nagpur	30,600.00	15,974.17	1,000.00	1,270.00	2,647.50	18,244.17
Nasik	32,850.00	19,760.31	1,000.00	1,572.00	3,275.00	22,332.31
Pune	30,375.00	16,082.30	1,000.00	1,178.00	2,455.00	18,260.30
Tane	40,320.00	17,045.15	1,000.00	1,356.00	2,825.00	19,401.15
Bhubaneswar	43,753.50					

Source: Details collected from srisrinivasa transportation pvt.ltd,madanapalli

TABLE 7: FIXED COST CALCULATION FOR ROUTE 3

Destination	Freight	Intrest	Driversa	Cleaners	Insurance	Rd.tax	Total
Kochi	28,350.00	4,677.75	2,268.00	425.25	623.70	2,583.30	10577.7
Bhopal	39,018.60						
Indore	35,516.70	5,860.25	2,847.77	532.75	816.88	2,583.30	12640.6
Jabalpur	41,039.10	6,771.45	3,283.12	615.58	943.89	2,583.33	14197.03
Manideep	39,883.50	6,580.77	3,190.63	598.25	917.32	2,583.30	13870.22
Bhiwandi	39,600.00	6,534.00	3,168.00	594.00	910.80	2583.30	13790.1
Mumbai	41,850.00	6,905.25	3,348.00	627.75	962.55	2,583.30	14426.55
Nagpur	30,600.00	5,049.00	2,448.00	459.00	703.30	2,583.30	11242.6
Nasik	32,850.00	5,420.25	2,628.00	492.75	755.55	2,583.30	11879.85
Pune	30,375.00	5,011.87	2,430.00	452.62	698.62	2,583.30	11175.61
Tane	40,320.00	6,652.80	3,225.60	604.80	927.36	2,583.30	13993.86
Bhubaneswar							

Source: Data collected from srisrinivasa transportation pvt.ltd,madanapalli

TABLE 8: VARIABLE COST CALCULATION FOR ROUTE 4

Destination	Freight	Fuel .rs	Engine oil	Toll tax	Wear&tear	Total
Kochi	28,350.00					
Bhopal	39,018.60					
Indore	35,516.70					
Jabalpur	41,039.10	20,152.50	1,000.00	1,603.10	3,340.00	22,755.60
Manideep	39,883.50					
Bhiwandi	39,600.00	16,954.65	1,000.00	1,348.79	2,810.00	19,303.44
Mumbai	41,850.00					
Nagpur	30,600.00					
Nasik	32,850.00					
Pune	30,375.00	14,812.69	1,000.00	1,498.00	3,120.00	17,310.69
Tane	40,320.00					
Bhubaneswar	43,753.50					

Source: Data collected from srisrinivasa transportation pvt.ltd, madanapalli

TABLE 9: FIXED COST CALCULATION FOR ROUTE 4

Destination	Freight	Intrest	Driversa	Cleanersa	Insurance	Rd.tax	Total
Kochi	28350.00						
Bhopal	39,018.60						
Indore	35,516.70						
Jabalpur	41,039.10	6,771.45	3283.12	615.58	943.89	2583.33	14197.03
Manideep	39,883.50						
Bhiwandi	39,600.00	6,534.00	3,168.00	594.00	910.80		13790.1
Mumbai	41,850.00						
Nagpur	30,600.00						
Nasik	32,850.00						
Pune	30,375.00	5,011.87	2,430.00	452.62	698.62	2,583.30	11175.61
Tane	40,320.00						
Bhubaneswar	43,753.50						

Source: Data collected from srisrinivasa transportation pvt.ltd, madanapalli

TABLE 10: VARIABLE COST CALCULATION FOR ROUTE 5

Destination	State	Freight	Fuel .rs	Engine oil	Toll tax	Wear&tear	Total
Kochi	Kerala	28350.00					
Bhopal	Madyapradesh	39018.60					
Indore	Madyapradesh	35516.70					
Jabalpur	Madyapradesh	41039.10					
Manideep	Madyapradesh	39883.50					
Bhiwandi	Madyapradesh	39600.00	16,999.9	1000.00	1352.39	2,817.50	19,352.29
Mumbai	Maharastra	41850.00					
Nagpur	Maharastra	30600.00					
Nasik	Maharastra	32850.00					
Pune	Maharastra	30375.00					
Tane	Maharastra	40320.00					
Bhubaneswar	Maharastra	43753.50					

Source: Data collected from srisrinivasa transportation pvt.ltd, madanapalli

TABLE 11: FIXED COST CALCULATION FOR ROUTE 5

Destination	freight	Intrest	Driversa	Cleanersa	Insurance	Rd.tax	Total
Kochi	28,350.00						
Bhopal	39,018.60						
Indore	35,516.70						
Jabalpur	41,039.10						
Manideep	39,883.50						
Bhiwandi	39,600.00	6534.00	3,168.00	594.00	910.80	2583.33	13790.1
Mumbai	41,850.00						
Nagpur	30,600.00						
Nasik	32,850.00						
Pune	30,375.00						
Tane	40,320.00						
Bhubaneswar	43,753.50						

Source: Data collected from Srisrinivasa transportation pvt.ltd, Madanapalli

Based on these fixed and variable cost calculations of the minimum possible routes, calculate total operating cost for trip from the details collected from transporters.

FIXED COST DETAILS

- Vehicle capacity =21 tones
- Cost of vehicle (12 tyre)=2270000
- Interest rate=16% on total freight
- Insurance cost=2.3%on total freight
- Road tax =7750 for 3 month

VARIABLE COST DETAILS

- Fuel cost= 61.22rs perlt
- Engine oil 1ltr=250rs
- Toll gate

- o National highway 60km=1 toll gate
- o Others =it may changed
- o Toll price =minimum 60 to 350 rs for each toll gate
- Wear and tear= 2.5rs on each kilometre
- Tyres are changed for every 80000km once
- It cost around 1pair=44000 (radial tyres)

TOTAL OPERATING COST CALCULATION

TABLE 12: TOTAL OPERATING COST DETAILS AS PER AMARARAJA COMPANY

Destination	Variable cost	Fixed cost	Total freight
Kochi	12,761.55	15592.50	28350
Bhopal	17,558.37	21460.23	39018.6
Indore	15,982.51	19533.80	35515.7
Jabalpur	18,467.55	22571.50	41039.1
Manideep	17,947.57	21935.92	39883.5
Bhiwandi	17,820.00	21780.00	39600
Mumbai	18,832.50	23017.50	41850
Nasik	14,782.50	18067.50	32850
Pune	13,668.75	16706.25	30375
Thane	18,144.00	22176.00	40320
Bhubanewar	19,689.07	24064.42	43753.5
Nagpur	13,770.00	16830.00	30600

Based on the above calculation summary i must suggest operating cost for the best possible routes i.e

TABLE 13: SUGGESTED CALCULATION SUMMARY FOR ROUTE 1

Destination	variable cost	Fixed cost	Total	Depreciation	Total freight	Profit
Kochi	13,032.14	10,577.70	23,609.84	2,360.98	21,248.85	7,101.15
Bhopal	30,072.10	13,625.54	43,697.64	4369.76	39,327.87	309.27
Indore	24,579.90	12,640.60	37,220.50	3,722.05	33,498.45	2,017.25
Jabalpur	25,056.11	14,197.03	39,253.14	3,925.31	35,327.82	5,711.28
Mandeep	23,692.88	13,870.22	37,563.10	3,756.31	33,806.79	6,076.74
Bhiwandi	19,924.26	13,790.10	33,714.36	3,371.43	30,342.92	9,257.08
Mumbai	19,508.98	14,426.55	33,935.53	3,393.55	30,541.97	11,308.03
Nagpur	18,832.37	11,242.60	30,074.97	3,007.49	27,067.47	5,782.53
Nasik	19,026.22	11,879.85	30,906.07	3,090.60	27,815.46	2,559.54
Pune	18,017.00	11,175.61	29,192.61	2,919.26	26,273.34	14,046.66
Tane	21,323.00	13,993.86	35,316.86	3,531.68	31,785.17	11,968.33
Bhubaneswar	20,280.70	14,957.98	35,238.68	3,523.86	31,714.81	-1,114.81

Source: Data collected from srisrinivasa transportation pvt. ltd, madanapalli

TABLE 14: SUGGESTED FREIGHT CALCULATION SUMMARY FOR ROUTE 2

Destination	variable cost	Fixed cost	Total	Depreciation	Total freight	profit
Kochi	12,855.30	10,577.70	23,433.00	2,343.30	21,089.70	7,260.30
Bhopal	23,944.65	13,625.54	37,570.19	3,757.01	33,813.17	5,205.43
Indore	23,949.65	12,640.60	36,590.25	3,659.02	32,931.22	2,584.48
Jabalpur	28,178.50	14,197.03	42,375.53	4,237.55	38,137.97	2,901.13
Mandeep	25,701.20	13,870.22	39,571.42	3,957.14	35,614.27	4,269.23
Bhiwandi	19,466.99	13,790.10	33,257.09	3,325.70	29,931.38	9,668.62
Mumbai	19,010.00	14,426.55	33,436.55	3,343.65	30,092.89	11,757.11
Nagpur	18,276.34	11,242.60	29,518.94	2,951.89	26,567.04	4,032.96
Nasik	20,166.11	11,879.85	32,045.96	3,204.59	28,841.36	4,008.64
Pune	17,675.23	11,175.61	28,850.84	2,885.08	25,965.75	4,409.25
Tane	25,605.24	13,993.86	39,599.10	3,959.91	35,639.19	4,680.81
Bhubaneswar						

Source: Data collected from srisrinivasa transportation pvt. ltd, Madanapalli

TABLE 15: SUGGESTED FREIGHT CALCULATION FOR ROUTE 3

Destination	variable cost	fixed cost	Total	Depreciation	Total freight	profit
Kochi	11,953.69	10,577.70	22,531.39	2,253.13	20,278.25	8,071.75
Bhopal						
Indore	25,870.49	12,640.60	38,511.09	3,851.10	34,659.98	855.72
Jabalpur	22,951.50	14,197.03	37,148.53	3,714.85	33,433.67	7,605.43
Mandeep	23,797.89	13,870.22	37,668.11	3,766.81	33,901.29	5,982.21
Bhiwandi	19,124.72	13,790.10	32,914.82	3,291.48	29,623.33	9,976.67
Mumbai	18,886.24	14,426.55	33,312.79	3,331.21	29,981.57	11,868.43
Nagpur	18,244.17	11,242.60	29,486.77	2,948.67	26,538.09	4,061.91
Nasik	22,332.31	11,879.85	34,212.16	3,421.21	30,790.94	-190.94
Pune	18,260.30	11,175.61	29,435.91	2,943.59	26,492.32	3,882.69
Tane	19,401.15	13,993.86	33,395.01	3,339.50	30,055.50	10,264.50
Bhubaneswar						

Source: Data collected from srisrinivasa transportation pvt. ltd, Madanapalli

TABLE 16: SUGGESTED CALCULATION SUMMARY FOR ROUTE 4

Destination	variable cost	Fixed cost	Total	Depreciation	Total freight	profit
Kochi						
Bhopal						
Indore						
Jabalpur	22,755.60	14,197.03	36,952.63	3,695.26	33,257.36	7,781.74
Mandeep						
Bhiwandi	19,303.44	13,790.10	33,093.54	3,309.35	29,784.18	9,815.82
Mumbai						
Nagpur						
Nasik						
Pune	17,310.69	11,175.61	28,486.30	2,848.63	25,637.67	4,737.33
Tane						
Bhubaneswar						

Source: Data collected from srisrinivasa transportation pvt. Ltd., Madanapalli

TABLE 17: SUGGESTED FREIGHT CALCULATIONS FOR ROUTES

Destination	variable cost	Fixed cost	Total	Depreciation	Total freight	profit
Kochi						
Bhopal						
Indore						
Jabalpur						
Mandeep						
Bhiwandi	19,352.29	13,790.10	33,142.39	3,314.23	29,828.16	9,771.84
Mumbai						
Nagpur						
Nasik						
Pune						
Tane						
Bhubaneswar						

Source: Data collected from srisrinivasa transportation pvt. Ltd., Madanapalli.

These are the freight calculations made for the possible routes, based on these possible routes; the best possible route is selected.

FINDINGS

1. Company always depending on transporters for shipping logistics so, it takes much time.
2. Some drivers felt that there is no welfare facilities existed in the company for them especially for food, so it leads to their dissatisfaction.
3. Company can take steps on its own on reducing the lead days based on above calculations by giving suggestion to the transporters rather than completely depending on the transporters decisions.
4. Rather than depending on the transporters it is better to buy the new Lorries by the company for transporting.
5. By showing the expense on purchase of Lorries, company can deduct its tax to some extent.
6. ARBL can try to handle the Distribution and Exim departments along with purchase and logistics in Tirupathi.
7. Company can try to increase the bonus amount to the suppliers and to transporters, so that they can be punctual in time on delivering the goods.

SUGGESTIONS

1. Company can take steps on its own on reducing the lead days based on above calculations by giving suggestion to the transporters rather than completely depending on the transporters decisions. Rather than depending on the transporters it is better to buy the new lorries by the company for transporting. By showing the expense on purchase of lorries, company can deduct its tax to some extent.
2. Company can try to increase the bonus amount to the suppliers and to transporters, so that they can be punctual in time on delivering the goods, it will help in the customer satisfaction and increases the suppliers demand, and also provide welfare facilities like food accommodation etc for them.

CONCLUSION

It is concluded that freight cost optimization plays a major role in Real-time visibility, transparency and centralized decision-making power in Logistics management itself, and logistics management is one of the important process that influence over all supply chain management process, effective transportation mode helps in altering the effective decision making, reducing lead days helps in reducing the cost of operation and improves the transportation efficiency.

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