CHAPTER-5
TRANSPORTATION

This chapter examines the transport aspect of the physical distribution system for the vanaspati industry. In this context, the role of different modes of transportation in the physical movement of vanaspati has been analysed. The reasons for high transportation costs in vanaspati business have been identified and the methods for reducing these costs have been suggested. For this purpose an attempt has been made to develop an optimum inter-modal-mix. The chapter further explains in detail the actual modes of transportation used by the three selected companies viz. HVOC, MARKFED and, ABC.

A. Transportation and Physical Distribution

Transportation plays a core role in the industrial and economic development of a nation. To complete the distribution network for any company, several modes of transportation are necessary. In fact, a distribution network consists of the integrated use of all the modes of transportation according to their cost and service characteristics. Cost of transportation generally varies with the speed with which goods are transported. Speedy mode of transport is expensive, for example air transportation. Slower mode is generally cheaper like the water transportation. The speed of transport affects not only the cost of transport but it also affects the cost of transit inventory, which varies inversely with the speed. Usually, factors like, customer service, cost, damages and losses
in transit, mode of payment, claims responsibility, speed etc. are taken into consideration while selecting a mode of transportation or a combination of modes of transportation.

B. Model Transport System and the Inter-Modal Transport Mix

Every mode of transport has certain features such as; size, speed, convenience, cost, reliability, accessibility, and variability of transport unit and flexibility of operation, which helps in the selection of the transportation mode. Thus, each transport user will assess the advantage and disadvantages of the different modes of transport available to him and will choose that mode of transport or combinations of modes, which will minimize his total cost and maximize the customer service. Further the transportation system should be in optimal co-ordination with other activity centres of physical distribution system.

The actual inter-modal-transport-mix must be calculated separately for each manufacturing company, by taking into consideration the following peculiar characteristics of that company into mind:

i) Location of the factory;

ii) The marketing model adopted by the unit.

iii) Extent of marketing territory.

iv) Availability, adequacy, timeliness, convenience, and cost of transport facility-rail or road.

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v) Customer service level aimed to be achieved by the company;

vi) Various aspects relating to warehousing, i.e. number, location and capacity of the warehouse, their accessibility by rail and road.

vii) Nature of the product i.e. whether the product is fast moving or slow moving.

viii) Minimum size of the lot to be acceptable to the transporter for carriage.

ix) Other costs connected with different modes of transportation.

All these factors will affect the modal-mix decision at the unit level. The relative emphasis between rail and road may vary not only from unit to unit but also from time to time and product to product for the same unit. So, the "trade-off" between rail and road should be the prime consideration, and freight is not the only consideration. The problem has to be looked at from a broader angle. A variety of mutually interacting costs other than freights are involved. Thus, for the optimum inter-modal-mix, a system approach considering all the activity centers of physical distribution, need to be adopted.

C. Transportation in Vanaspati Industry

Transportation is the most crucial area in the field of physical distribution of vanaspati. This is due to the fact that, about 15% of the total cost is accounted for by the transportation cost.²

The transportation cost is the function of average lead from the production site to the consumption point and the cost per tonne of transportation. Further, the average lead is the function of location of factory. This relationship is shown as under:

\[ T_c = f(A_L, C) \]

where:

- \( T_c \) - total transportation cost.
- \( f \) - Functional relation.
- \( A_L \) - Average lead from production site to the consumption point.
- \( C \) - Cost per tonne of transportation.

In vanaspati business, out of all the transportation modes, the use of road transport is predominant. But, earlier, when there were only a few units, rail transportation was also used by the vanaspati producers for the physical movement of their products over long distances. In the past, no effort had been made to use any other mode of transport.

Now, in general, in vanaspati business, the product is entirely distributed/transported from factory to the consumption points by road only. The information collected from the Railway Authorities shows that, Railways, in India, accept only full wagonload of at least 110 Qtls. In case of small quantities, railway will charge for 110 Qtls. In India, railway freights from one railhead to another railhead are higher than even the door to door service provided by the road transport in the country. In the case of railways, the number of material handling is more as compared to road transport as the
material handling in railway requires, to be done number of times as against twice only in the case of road transport. This leads to high deterioration and increase in loading and unloading costs. It is also found that railways usually take more time to get the product moved from one place to another. Railways usually charge freight in advance i.e. before the goods are moved and the attitude of railway employees dealing with goods is not found to be satisfactory. Delays caused in the movement of goods by railway leads to a huge amount of funds being blocked in transit inventory. In the case of railways, in India, a large number of formalities are to be complied with.

Other mode of transport such as; inland waterways, coastal movement and air transport are not found suitable for the vanaspati business. Air transport is very costly and cannot be afforded for a product like vanaspati. Inland waterways and coastal transport are very slow modes of transport and are also not available throughout the interior parts of the country.

When strengths and weaknesses of different modes of transports are considered in relation to vanaspati industry, road transport is generally preferred. At present for a variety of reasons viz., easy and spot availability, lesser amount of material handling, lighter packaging requirement, flexibility of operations and easy accessibility, the road transport qualifies to hold a pre-dominant position in transportation.

A review of production, consumption, and number of factories in vanaspati industry in chapter three shows that the vanaspati factories in India are not located as per zonal demand/consumption but are concentrated in certain zones. So vanaspati is generally transported from one zone to

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another. Therefore, transportation becomes more important. The concentration of vanaspati units in the states of Punjab, Haryana, Uttar Pradesh, Rajasthan, Gujarat, Madhya Pradesh, Maharashtra etc. has made the north and western zone surplus in the production of vanaspati. On the other hand, southern and Eastern zones are deficient in production and are not in a position to cater the consumer needs of these zones. Thus, there is a locational imbalance in the consumption and production of vanaspati. This indicates that massive movement of vanaspati over long distances is required from the states of Punjab, Haryana, Uttar Pradesh, Rajasthan, Himachal Pradesh, Delhi, Gujarat, Madhya Pradesh and Maharashtra i.e. from northern and western zones to the high consumption belt of Andhra Pradesh, Karnataka, Kerala, Tamilnadu, Pondicherry, Assam, Bihar, Manipur, Meghalaya, Nagaland, Orissa, Sikkim, West Bengal, Arunachal Pradesh, Andaman and Nicobar Islands in the Eastern and Southern zones. The Eastern and Southern zones will continue to remain deficient inspite of the additional units installed during the last 4-5 years.

In order to carry such massive quantities of vanaspati, the use of all the transport facilities available in the country should be made. The need for an integrated transportation system therefore, can not but be emphasized. But, in India, the transport system is not sufficiently developed to meet the growing requirements of transportation in the economy.\(^4\)

Thus, lack of consistent and stable transport policy, lack of clarity on the relative role to be played by the different transport modes and inability to

draw-up an optimal inter-modal-mix, has inhibited time the development of transport arrangement for vanaspati. Neither individual manufacturer, nor the industry as a whole, is able to develop a long term or medium term policy for transportation, in view of the continuous flux and shifts in the policies coupled with the vagaries in actual availability of the different modes of transport.

D. Transport System of Selected Companies

The transportation system of selected companies (i.e. MARKFED, ABC & HVOC) under the present study would now be discussed. Actual mode of transportation used by all the selected companies is road only. The actual costs borne by these selected companies in the states of Punjab, Haryana and some other destinations have been analyzed and suggestions for the reduction of the ever-increasing transportation costs have been made.

1) Hindustan Vegetable Oils Corporation Ltd. (HVOC): -

a) Mode of Transportation: -

The movement of vanaspati from plants to all destinations falling under the company's marketing zone is done by road only. The basic criteria for selecting road transport by HVOC are:

i) Protection of company's current marketing share.

ii) Efficient and economic movement and distribution of vanaspati during the whole year.

iii) Requirement of small quantities.

iv) Availability of products
v) Demand assessment and trend of consumption.

vi) Supply of product at consumption points.

vii) Door to door service.

viii) Lesser number of material handling.

ix) Minimize total cost of transportation from factory to consumption points.

x) At the spot service i.e. as and when required.

xi) Suitability of modes.

xii) Customer service.

xiii) Convenience.

Further the movement of vanaspati can be broken into two categories.

i) **Primary movement by road:**

This indicates the movement of material from the factory to the depot godown and factory to the dealers’ godown in case of direct movement by dealers or other agencies.

ii) **Secondary movement by roads:**

This indicates the movement of material from depot godown to the dealers or other consuming agencies. The movement from dealers to retailer is not covered under the secondary movement because these costs are not borne by the company. All the destinations are served by the road transport irrespective of their distance from the factory.
As already stated, the whole movement (100%) is undertaken by road transport (both primary and secondary). Therefore, the question of the share of railway or any other mode in the vanaspati movement does not arise.

The costs of transportation of material upto dealer's destination are borne by the company itself. Table 5.1 (Appendix-I) gives the details of actual transportation cost of 9 MTs of vanaspati borne by HVOC (AVU) to different destinations of Punjab, Haryana and some other destinations in 1991 and 1995. From the table, it is clear that, there is a considerable increase in the road freight over the period of last 4-5 years. The table indicates an increasing trend in the transportation costs. Tables 5.2 and 5.3 (Appendix- I) show a comparative picture of rail and road freights applicable to vanaspati movement of HVOC. These tables show that, road transport is still cheaper for all the destinations all over the country and also in Punjab and Haryana (both for short and long distances). Further, it is observed that there are a number of bottlenecks and problems in the case of rail transport. That is why, railway is not a suitable mode for a commodity like vanaspati which needs quick and spot service which is not possible in case of railways. In the case of railways, following difficulties are usually encountered:

i) Railways accept only full wagonload of 110 quantals of vanaspati. If the vanaspati producers want to dispatch smaller load, they have to pay the freight for 110 quantals. But, vanaspati is normally demanded in smaller quantity say; 20 quantals, 50 quantals, 60 quantals or 90 quantals etc.

ii) In case of railways, special packaging of the product is required, which leads to higher total costs of the product.
iii) The loading and unloading time by the railways has been fixed. The company has to load and unload the product within the time prescribed. The railway authorities in case of additional time taken by the producer will charge demurrage.

iv) Railway, usually charges advance freight. If the manufacturer wants to pay the freight at the destination, the railway authorities will make surcharge @ 10%.

v) The number of material handling by railways is more which leads to higher loading and unloading costs and also loss through leakage and deterioration.

vi) Railway does not provide door to door service. So, for this purpose, road transport is preferable.

vii) It is also seen that railways are costlier than road for all destinations irrespective of distance in case of vanaspati business.

viii) Flexibility of operation in case of railways is least.

ix) Behaviour of railway officials is also not very co-operative.

x) Railways usually seek extra loads to the same destination, which leads to delay in service and blocking of funds.

Due to all these reasons, railway is not the preferred mode for the vanaspati transportation.

b) Optimum Transportation: -

From the field survey, it is also found that both the Delhi Vanaspati Unit (DVU) and Amritsar Vanaspati Unit (AVU) are supplying their
products to different destinations over the country without keeping in mind the transportation costs. The HVOC should take into consideration the transportation cost factor, while dispatching the product from the two locations to different destinations. Table 5.4 (Appendix-I) shows the optimum transport dispatch for the supply of its products from different units to different locations according to the cost of transportation. So, the company should follow the optimum pattern as shown by table 5.4. (Appendix-I) Chart 5.1 (Appendix-III) shows the movement of HVOC vanaspati in the states of Punjab, Haryana and other states. This chart shows that the company has been using only hired trucks for the movement of its product.

2) Markfed Vanaspati and Allied Industry Khanna: -

(a) Mode of Transportation:

Markfed is also distributing its products all over its marketing territory only through roads. Markfed has moved its products both through hired trucks and its own fleet of eight trucks of 9 MT capacity each. The company hires the trucks from outsides only when, its own trucks are busy. After the material reaches the various depots, the registered dealers again through road transportation take it. Some times, local dealers lift the material directly from the factory premises. The co-operative societies lift the product both from the Markfed's depots and factory at their own convenience. The cost of transportation both from factory to depots and from depot to dealer's destination is borne by the company itself. In case any depot holders meet these costs, the company reimburses these later. The basic guidelines in vanaspati movement strategy by Markfed are as follow:
i) Efficient and economic movement of vanaspati throughout the year.

ii) Protection and expansion of company's present market.

iii) Supply of material in the interior parts of the market upto consumption points.

iv) Availability of products from depots.

v) Demand assessment and trend of consumption.

vi) Provide maximum customer service at least cost.

Besides the above-mentioned parameters, emphasis and priority have been given to underdeveloped marketing areas with potentials.

As already explained, Markfed is distributing its product, through road transport only. Two types of costs are borne by the company in the transportation process. These are:

i) **Primary Freights: -**

   This is the cost borne by the company for carrying its product from factory premises to the field depots.

ii) **Secondary Freights: -**

   This is the cost borne by the company for carrying its product from field depot to the dealer's godowns.

The actual transportation costs per 9 MTs borne by Markfed during the year 1991-92 and 1994-95 are shown in Table 5.5 (Appendix-I). This Table further shows a significant increase in the transportation cost in the last 3-4 years. The table also shows an increasing trend in the transportation cost of vanaspati over different destinations.
Further, Table 5.6 (Appendix-I) shows the comparative statement of rail and road freight prevailing in the year 1994-95. From the table, it is identified that, road transport is still the cheapest mode. The prevailing road freights to different destinations as shown by Table 5.6 (Appendix-I) are lower than that of railways. In case of railway, company has to bear three transportation costs:

- From factory to dispatching railhead (by road).

- From dispatching railhead to destination railhead (by rail).

- From destination railhead to depots godown (by road).

Table 5.6 (Appendix-I) shows that the total of all the above mentioned three costs is much more than the costs borne through road transport.

Table 5.6 (Appendix-I) also shows that the second segment (mentioned above) i.e. the railway transportation cost from dispatching rail head to destination rail head is higher than even the total transportation cost borne through road transport from door to door. Besides this, railway is not a suitable mode due to a number of reasons, as explained earlier in case of HVOC. This is the reason that, all the vanaspati producers are adopting road transport.

b) Optimum Transportation:

The company (Markfed) has only one vanaspati unit at Khanna. Therefore, the application of optimum transportation model is not possible but it may be applied for the secondary movement. Table 5.7 shows the freight rates per tonne contracted by Markfed for the movement of its
product over a period of time. The table indicates that as the distance increases, the rate of increase in the freight declines. In other words, we can say that, the increase in the freight rate is higher in the small distance slabs and lower in the longer distance slabs. Vanaspati is generally distributed in more quantity in the shorter distance areas and in small quantities over far distant areas. So, the increasing trend of transportation cost in the lower distance slabs becomes even more significant. Thus, this locational imbalance leads to a severe problem in the vanaspati industry. This continuous increase in the freight rates is also due to the stronghold of transporters unions, increased prices of diesel and fuel(which is an administered price by the government of India), and the cost of the spares. The transportation cost can be reduced only by accepting a least tender from time to time for different destinations, which is the existing practice of the company. Further, dealers should be instructed to pick the product from their nearest depot so that transportation costs may be minimized. Chart 5.2 (Appendix-III) shows the movement of Markfed vanaspati to different destinations of Punjab, Haryana and other states.

3) Amrit Banaspati Company Ltd. (ABC):

a) Mode of Transportation:

ABC is also transporting its product through road to all the destinations falling under the company's marketing zone. The vanaspati movement strategy of ABC has the following features:

i) An efficient and economic movement of product throughout the year and throughout the whole markets territory.

ii) Demand assessment and consumption trends.
iii) Protecting the company's current market by supplying high quality product and maximum customer service.

iv) Expanding the current market share.

v) Supplying product to the interior area upto the consumption points.

vi) Underdeveloped market with potential should be given priority.

Amrit Banaspati company Ltd. has its depots at various places over its marketing territory. The company transports its product both through owned and hired trucks. In case of hired trucks, transportation costs are borne by the company itself both for primary and secondary movement. In case, depot or dealer pays transportation costs, the company reimburses these later. The company has its own fleet of 8 trucks of 9 MT capacity each for the movement of its product to different places. Company hires the trucks from transporter only if, its own trucks are busy at the time of receipt of an order. The total movement of the product is divided into two parts.

i) Primary movement by Roads: -

It is the movement of the product from the factory godown to the field depot. This movement is either done by company's own trucks or hired trucks depending upon the availability of own trucks at the time of the shipment of an order, the cost of which is borne by the company.

ii) Secondary movement by Roads: -

This is the movement of product from field depot to the dealer's godowns. Usually, this is done through the hired trucks, the cost of which is borne by the company. The company reimburses the freights paid by the depot/CFA later. The ABC has also the facility of direct sale to dealers from
the factory godown. All the transport facilities are provided to the dealers by the company in case of direct lifting of material from the factory.

Chart 5.3 (Appendix-III) shows the movement of material from the factory to the ultimate consumers in the state of Punjab, Haryana and other destinations under the company's marketing zone. Further, due to the non-availability of previous road freight lists, the trends of company's transportation cost cannot be ascertained.

Table 5.8 (Appendix-I) shows the comparative statement of rail and road freights applicable in 1994-95. From the table it is identified that, the freights in case of railway, are much higher as compared to road transportation. The table shows that the freights of railway from one platform to another are even more than that of door to door services provided by road transport. ABC also feels that, there are a number of inconveniences in case of railways and quality of service is also not satisfactory. So, railway, from both the angles i.e. cost and quality of service, is not a preferred mode of transportation in case of vanaspati business. Usually, vanaspati producers need quick service, due to the fact that, there is a considerable amount of funds tied-up in the finished products which may lead to higher cost in case of deliberate delay. In case of undue delay in transportation process, these funds may remain idle, which may ultimately lead to an increase in total costs. Hence, all the vanaspati producers prefer road transport to railways.

b) Optimum Transportation: -

From the field survey and data available, it is found that, the company (ABC) is not able to make optimum use of transportation facilities available
to it. For example, ABC (R) is supplying its products to those destinations, which are very much closer to ABC (G). This fact shows that, the company is not following an effective transportation policy. So, for this purpose, an optimum solution has been suggested for some destination in Table 5.9.

4) **Inter-Company Comparison:**

Table 5.10 (Appendix-I) shows the inter-company freight comparison of the selected companies under the present study in 1994-95. From the table, it is identified that there has been a wide variation in the freight rates of these companies.

Further, from table 5.11(Appendix-I), it is observed that, different rates of freights have been fixed by the contracts entered into by the ABC (R) for different destinations (depots) of same distance slabs. The situation of other companies may also be the same. So, from all this, it may be concluded that there is a considerable scope of saving, out of these freights if, an effective transport policy is followed.

From the foregoing analysis, it is observed that, all the selected companies under the present study show an upward trend in the transportation costs, which result in higher distribution costs. In order to reduce the costs of physical distribution, it becomes essential to transport the product at the minimum possible cost, which may be possible by followings, the pre-mentioned pattern in this chapter i.e. by distributing the product according to the optimal pattern. This pattern again may be followed for the secondary movement of the product from the depot to the dealers.
E. Transportation Costs in Vanaspati Distribution

Out of the total cost of physical distribution of vanaspati, transportation costs (both primary and secondary) form the single largest component. Therefore, an attempt for the reduction of distribution cost should begin with a reduction of the transportation costs. According to an estimate transport costs in vanaspati business account for as much as 55% of the total selling and distribution costs\(^5\) in the business. It is also observed that transportation costs in vanaspati distribution are showing an upward trend. Some important factors responsible for this upward trend are:

a) Higher costs associated with movement: -

Firstly, cost of transportation and warehousing has gone very steeply due to the increased demands of these services. Further, to vanaspati manufacturers, road transport is more suitable and they do not have any other cheaper and convenient alternative available for transportation of their products. So, they pay high costs. For door to door service with minimum amount of material handling, they are dependent upon the monopolized road transport system.

b) Costs associated with shorter distances: -

Vanaspati units are scattered at different places in the country. Therefore, their major markets are lying at the nearer places. For shorter distances, the costs of transportation per M.T. are high as compared to long distances, which ultimately lead to high transportation cost. Moreover, the

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\(^5\) Balance Sheet (1989-90) of Markfed Vanaspati and Allied Industries, Khanna, Freight and Cartage is 55\% of the total selling and distribution expenses.
increase in transportation cost per M.T. for shorter distances is high as compared to longer distances.

c) Costs associated with long distances: -

Vanaspati is a liquid commodity. Normally, vanaspati manufacturers have to bear the cost of leakage and deterioration due to mishandling during the long journey of the product.

d) Costs associated with small shipments: -

Vanaspati is a consumer product. It is normally ordered/demanded in small quantities say; 10 Qtl. 20 Qtl. or 50 Qtls. A truck has a capacity of 90 quintals. So, when a small order is received, the company has to pay the freight for 90 quintals or little bit lesser, which leads to relatively high cost of transportation due to under utilization of the vehicle capacity. Otherwise, the company has to hire small vehicles, which are normally hired at relatively higher transportation freight rates.

e) Costs associated with central sales tax: -

If the vanaspati factory is located in a state which is exempted from sales tax and the company wants to sell its product in another state where tax is leviable on the product, it has to book its material as self consignment to the depot situated in the consuming state (that other state) to avoid sales tax. This system leads to an additional material handling, transportation and storage costs.

There may be so many other factors like storage constraints at depot level, non-availability of transporter at the time of order, road haulage at BEP etc. which leads to addition costs.
From the above analysis, it is evident that transportation costs of vanaspati are quite high, but it is also equally clear that, there is a considerable scope of reducing these costs. Vanaspati transportation cost can be reduced by:

1) **Optimizing the Inter-modal-Transportation-mix:**

This aims at the systematic utilization of the different modes of transport or their combination, whereby operation of each mode may be improved. In order to determine the optimum inter-modal-mix, the major criteria are to minimize the cost of transportation. At present, road is the only mode used by the vanaspati manufacturers in India. Therefore, an optimum-modal-mix is not possible.

2) **Reducing the traffic lead through rationalization of the distribution system:**

In the selected companies, there is no written transport or distribution policy. So, they should have a written policy, which must be rationalized from time to time. Rationalization of distribution plan with a view to ensure a significant reduction in the traffic lead is an urgent need in today's context. There are a number of reasons for the long lead pattern. The raw-material based location of factory push up the lead between the production and consumption points. Another reason is the preference of customers towards a particular brand. All these reasons make it more difficult to adopt a judicious distribution plan without incurring long lead and higher distribution costs. Reduction in lead would also facilitate speedier movement of product besides reducing the distribution costs. The present
distribution policy could be described as biased towards reduction of traffic lead over looking other factors related to vanaspati marketing.

F Conclusion

From the previous analysis, it is concluded that, transportation is an essential element in the physical distribution system of any company. In case of vanaspati business, it gains more significance as it ensures smooth and regular supply to the consumers at distant places. Transportation costs also account for the major part of the total physical distribution cost of vanaspati. There are a variety of factors like; concentration of vanaspati units at few places, continuous demand, wide spread rural market, high and increasing rail and road freights etc. which make the transportation of vanaspati the most challenging and complex task.

Roadways are the major and the only preferred carrier of vanaspati in India. No vanaspati manufacturer is having a written transport policy. Road transport is the advantageous mode as compared to rail or other modes of transportation irrespective of length of distance as already explained due to its quick service, cheapness, accessibility, flexibility of operation, less material handling, availability etc. However, this mode also has its own problems like; high capital cost of trucks, high and increasing cost of fuel and spare, high incidence of road taxes, inadequacy of roads and trucks etc.

Presently, road transport system is holding the key position in the vanaspati movement (both primary and secondary) irrespective of the length of distance. All the companies selected under the present study namely; HVOC, ABC, and MARKFED are using only road transport for the movement of their product to different places over the country.
An attempt for the reduction of total cost of vanaspati may be initiated with an attempt at reducing the transportation cost, which is the largest component in the total physical distribution cost of vanaspati.

The inter-company comparison of costs of these companies shows that, there is a considerable scope for the reduction of transportation costs.

For the reduction of transportation cost an attempt has been made to find out optimum-inter-modal transportation-mix. But it is found that, at every distance slab, road transport seems to be cheaper and convenient mode in vanaspati business. Beside its cheapness, road transport also provides a number of other facilities over the railways and other modes. In case of companies having more than one unit (i.e. ABC and HVOC) an attempt has also been made to follow the optimal supply pattern which will ultimately help in the reduction of total cost.

The transportation costs can also be reduced by reducing the lead through rationalization of the distribution pattern, which can be brought about by marking a core marketing area for each manufacturer. In case, any company has more than one production unit at different places an attempt may be made for the optimum transportation model to minimize the transportation cost.