This chapter evaluates the warehousing or storage aspect of the physical distribution system for vanaspati. It is an important marketing activity center as it ensures time, place and possession utility of a product. There are various factors, which usually affect the storage of vanaspati. These factors are: economy, level of customer service to be offered and control over the storage operations. This chapter further evaluates the existing system of warehousing used by the selected companies.

The chapter also throws light on some important aspects of warehousing like, location, size and number of warehouses to be used. These aspects are to be discussed with special reference to the companies selected under the present study. Lastly the internal layout of a warehouse has been discussed.

A. Warehousing and Physical Distribution System

Warehousing is one of the important activities of physical distribution system. So, for making the physical distribution system more effective and efficient, proper attention should be paid to the warehousing activity. It requires careful planning and monitoring. The rationale for establishing a warehouse in a distribution network is the creation of different advantages for the companies like; maintenance and improving the service level and lowering down the overall distribution costs. Warehousing is a significant component of Peter Drucker's "DARK CONTINENT".1 "It is an important

1 Peter Drucker: "The Economy's Dark Continent", Fortune, April, pp. 103.
element of physical distribution costs ranked after transportation and contributes about 26% of the total distribution cost". 2 In another study on distribution of fertilizers, it is concluded that, "Warehousing contributes a significant portion of distribution cost; coming next to the transport cost and may add up to 10% to the total cost of distribution". 3 Traditionally, warehousing activity was meant for the achievement of the following objectives:

i) Storage of goods when production exceeds the demands and releasing these goods when demand for these commodities was felt or when a scarcity of goods is anticipated.

ii) Bridging the gap between the production time and consumption time.

iii) Ensuring protection against delay and uncertainties in transportation and order processing.

But nowadays, with the development of trade, commerce and increase in competition in the market, warehousing assumes a pivotal place as "movement center" for the product. Warehousing is not only concerned with the product storage but is a pivotal in physical distribution system according to which movement is the primary objective of a warehouse. As per the new concept, a warehouse is a location, where incoming factory shipments are converted into outward shipments representing orders of customers.

Normally, every producer has three objectives in connection with the warehousing function. These are:


i) To avoid the stock-out possibility of the finished product.

ii) To improve the customer service level up to a certain level.

iii) To minimise the overall distribution cost by minimising the warehousing cost.

The first two above-mentioned functions are conflicting with the third one. For achieving the first two objectives there is a need for increasing the number of warehouses which will ultimately lead to an increase in the cost of this element in the total distribution cost. It is obvious that an increase in the number of warehouses leads to decrease in the size of an individual warehouse. But this fact increases the element of warehousing cost in the cost of distribution. At the same time an increase in the number of warehouses results in a decrease in the cost of transportation. Thus, there is a need to arrive at the optimum number and size of warehouses by which cost of distribution may be minimised/optimized by taking into account its impact/effect on the other elements of distribution costs. With a view to achieving optimum number and size of warehouses, there is a need to establish the functional and cost relationship among the various activity centers of physical distribution.

B. The Position of Warehousing in Vanaspati Distribution

Importance of warehousing in the vanaspati business may be visualized from the following points:

1. Vanaspati is an essential commodity of common and daily use. The assurance of regular supply of vanaspati should be ensured which is
possible through an effective storage system of vanaspati at distant places.

2. There is a stiff competition in the vanaspati market particularly with new units enjoying sales tax exemption in some states. To face severe competition an effective customer service is desirable which might be the result of an effective warehousing system.

3. The raw material for vanaspati i.e. edible oils, accounts for 80% of its total cost. Its undue or excessive storage may lead to a huge amount of funds being idle. Vanaspati should be stored in the right quantity, at the right time and the right place to minimize the cost.

4. Vanaspati is an essential commodity and consumed in every home. Its per capita consumption in India is very much lower as compared to other developed and developing countries. It would follow that its consumption may still be increased. For this purpose, expansion of warehousing facilities at distant places is required. Further vanaspati in India is still not supplied throughout the interior parts of the country by any of the vanaspati producers. It may be due to the neglect of the warehousing function. So there is a need to develop an effective warehousing system to increase the supply and consumption of vanaspati.

It would thus be clear that warehousing is an important marketing activity in the vanaspati business. With the complications in the markets, the job of vanaspati warehousing is becoming more expensive and complex day by day.
C Types, Location, Size and Number of Warehouses/Storage Facility

Following are some important decisions in connection with vanaspati warehousing:

(I) Type and Choice of Warehouses/Storage Facility:

Type and choice of warehouses/storage facility to be selected depends upon the distribution policies of the concerned company. Warehousing facilities used by various vanaspati manufacturers may be classified as under:

(a) Factory level warehousing/storage facility.
(b) Field depot level warehousing/storage facility.
(c) Dealer level warehousing/storage facility.

Usually, vanaspati manufacturers are keeping control over the warehousing facilities at factory and depot level only. Dealer-level warehousing is not under the control of producers. Vanaspati manufacturers normally possess 4-8 days arrangement of storage because the product is continuously consumable in nature and its long term storage results in keeping huge funds idle. Being a consumer product of daily use and of continuous consumption, the question of its huge storage at factory-level does not arise. Further, it is also not in the interest of vanaspati producers to block huge funds in the vanaspati storage due to heavy raw material-cost. To ensure the continuous supply of the product at different demand centers, vanaspati producers are keeping their stock at different places called depots or clearing and forwarding agents (CFA) to avoid stock out situations. It is
very difficult to move the product to different places in a very short span of time. Therefore, usually manufacturers store their products at some selected and convenient locations at different places called field depots and this ensures further movement as and when the demand arises. The companies/producers usually make the arrangement of these depots and CFA on the basis of demand potentials, area coverage, etc. The storage at depot level helps the producers to meet the requirements of various demand centers at shorter notice with relatively lower stock levels. The storage at depot-level i.e. at point nearer to consumption point ensures quick response and cuts short further secondary movement. However, a replenishment of stocks from the factory may take time, which may lead to lower customer service level and consequently, to decrease in sales. In the vanaspati business, there is a high degree of correlation between sales estimate and actual consumption. Therefore, possibility of stock-out or idle stocking is very low. This is all due to the fact that, vanaspati is consumed regularly and more or less in the same ratio every day/month/year.

Warehousing facilities used by different companies may also be classified from ownership and management point of view. These are: -

a) Company owned and managed type depot/warehouses.

b) Company hired and companies managed type warehouses/field depot godowns.

c) Other agencies hired or owned and managed type warehouses or depots (dealer's godowns).

d) Company hired and other agency operated type.
The actual choice of storage facility may be influenced by a variety of factors like, the use to which the warehouse will be put, cost incurred, nature of the product to be stored, nature of market for the product, availability, convenience, level of customer service to be offered, market coverage etc. The manufacturer would have to employ cross comparison of these factors between different types of warehousing facilities. For example, if the manufacturer is interested in establishing buffer storage with large capacity, it is desirable to choose owned and self-managed type warehouses. On the other hand, for terminal warehouse with smaller capacity, hired godowns operated by other agencies are preferred. At distant places where there is uncertainty of the market conditions, it is preferable to choose hired storage facility.

Another factor which influences the choice of warehousing facility is the cost involved in the facility. There are various costs i.e. fixed and variable involved in establishing storage facility. The main aim should be to minimize the cost of warehousing irrespective of the type of storage especially the variable costs so that operation of the warehouses will be viable and the over all distribution costs can be reduced.

Since vanaspati is a commodity of daily and regular consumption, it has to stay only for a few days in a godown i.e. hardly upto one week. Further, at a particular locality its demand is certain, so the question of excessive storage of vanaspati at particular locations does not arise. If the manufacturer, does so it will lead to huge amount of funds being blocked in idle condition, which will ultimately lead to high distribution cost. Vanaspati by nature is a commodity, having a steady flow in the market, so it
requires that type of storage facility, which has a quality to provide speedier service and is a cheaper one. Most of the vanaspati producers have chosen hired and self operated or managed type of storage facility at different places in the market. From the field survey, it is found that, vanaspati is also stored by dealers at different places to ensure continuous supply to customers. But the manufacturer has no direct or indirect control over such storage facility. When product passes from the factory or factory depot to dealers, it becomes the property of dealers and the manufacturer have no control over its affairs. As stated earlier, in India, vanaspati is usually stored at three levels i.e. at factory level (in a factory godown), at depot level, and lastly in the dealers' stores. Out of all these levels, the manufacturer himself controls first two levels of storage directly but control on the dealer-level-storage is fully exercised by the dealers.

Some vanaspati companies also appoint clearing and forwarding agents (CFA) for the distribution of vanaspati. Normally these CFAs have their own warehouses or they hire the warehouses for this purpose. They are serving as distribution channel to vanaspati manufacturers. In this case warehousing facilities are fully hired and managed by these CFAs. Usually, vanaspati manufacturers are keeping some advance from these CFAs in the form of security (ranging from Rs. 10,000 to Rs. 85,000 in some companies) The manufacturers, in this case, have no control over warehousing facilities.

During the course of discussion with different officials of selected companies, it is found that, some government agencies are also ready for providing warehousing facilities, but it is not found suitable for vanaspati manufacturers to do so. These government agencies (CWC, SWC etc.) are
also linked with railway tracks. But railway transport facilities are also not suitable in the vanaspati business. That is why, there is hardly any vanaspati manufacturer, who is using railways as transporter of his commodities. It has also been found that, there are a number of formalities to be complied with in case of the use of government warehousing. Again it may cause delay due to untimely orders and holidays etc. Vanaspati commodity requires only small storage capacity due to its continuous consumable nature. Storage facilities are again preferred at scattered places, where godown of the CWC and SWC are not available. So due to all these reasons, vanaspati manufacturers are mostly using hired godowns at different places all over the country which are most convenient, flexible and cheaper and providing highest level of services.

(II) The Location, Size and Number of Depots/warehouses: -

The determination of location, size and number of the warehouses/depots is the crux of the warehousing task. These decisions are generally affected by variety of factors such as; customer service level to be offered nature of demand of the product, policy competitor's and comparative advantages of each decision. These decisions also affect the inventory carrying cost of the company. Inventory carrying cost is again influenced by inventory sales ratio, which is in turn determined by the decisions relating to location, size and number of storage points.

i) Location: -

Selection of location of a warehouse/depot is one of the important decisions upon which effective distribution of a commodity is based. This decision is generally taken by taking into consideration the demand factor
and economy in transportation cost etc. There are certain locations where the density of population is quite high like that in cities. The consumption of vanaspati at these locations is obviously high due to more demand. So the storage points in case of vanaspati business are generally located in cities where demand of vanaspati is quite high. It is due to the fact that, it (vanaspati) is a commodity of daily use of every household and should be stored nearer to consumption points to provide better and immediate customer service.

Further, transportation is another aspect which influences the locational decision of a depot or a warehouse. It should be selected in such a way that transportation cost to and from the depot may be minimized, so as to reduce distribution costs. So, for the manufacturers, it becomes necessary to conduct an exploratory survey for identifying the demand pockets and estimating the cost of transportation to and from the depots. The basic consideration in selecting a location for depot is the distribution strategy of the individual manufacturer. However, following are the general criteria followed by the vanaspati manufacturers while selecting a storage location/depot.

i) Strength of population to be served;

ii) Central point of the city;

iii) Assurance of availability of transportation and more particularly road vehicle like trucks for secondary movement from depot godown to dealers.

iv) Availability of uncovered market;
v) Spread of dealer's network;

vi) Lead-time from the factory to the consumption point.

vii) Suitability of the godown to the vanaspati product.

viii) Availability of product at different places.

ix) Availability of adequate loading and unloading facilities.

x) Availability of suitable godown space at reasonable rent.

xi) Location should be such that, it can cater to a number of convenient destination around it at least total freight.

xii) Availability of secondary transport at competitive rates.

xiii) Availability of suitable communication facilities.

ii) **Size and Number: -**

The size of the warehouse/godown or space to be hired for the storage of vanaspati has an impact on the size of inventory to be held in the warehouse. The nature of vanaspati is such that it involves continuous consumption throughout the year. Thus, it is not stored for a long period. The space of warehouse should be hired by taking into account the normal demand of the product during a particular period and lead time for the accomplishment of an order to the company.

Usually, small warehouses are uneconomical as compared to big warehouses. On the other hand, a large number of small warehouse lead to high inventory turnover ratio, leading to large overhead and other related costs. In big warehouses, there are many facilities such as improved material handling devices, effective management etc. On the other hand better
customer service and speedier delivery of the product is ensured in small and medium sized warehouses.

From the above analysis, it is clear that there are certain strengths and weaknesses of both big and small sized godowns/warehouses. It would imply that there should be an optimum sized warehouse, which may be able to fulfil the demand of a particular locality. The optimum size of the warehouse/depot godown is determined by following factors in case of vanaspati business:

i) Customer service level to be achieved.

ii) Volume of sales.

iii) Transit time.

iv) Demand of the product.

v) Desired market share.

vi) Rush of orders etc.

The optimum warehouse capacity at a given place could be worked out by reckoning the volume of sale and the desired market share in the area and by applying two other factors of transit time and peak seasonal demand. Once the optimum capacity is crossed, it would be advantageous to open an additional warehouse at a new location than the further expansion of the existing warehouse.

The decisions on location, size and number of warehouses are very much interrelated. A large number of warehouses leads to higher costs and better customer services. On the other hand, a lesser number of warehouses leads to lower costs and lower level of customer service. But the
manufacturer always tries to provide maximum customer service at the lowest warehousing cost. It is possible only if number of warehouses is optimum. Thus, the company should make the cost benefit - analysis and decide upon the optimum number of warehouse locations. The choice of optimum number of warehouses is determined by following factors:

i) Consumption potential of vanaspati and its current level of consumption.

ii) Geographical spread of each warehouse territory.

iii) Number of distributor retailers to be served by each warehouse/depot.

iv) The costs involved in operating the warehouse/depot.

v) Level of customer service to be offered.

vi) The acceptable order execution time and possible speed of replenishment of stock, and

vii) Traffic of huge orders.

D. Warehousing Facility in the Selected Units

Having discussed the warehousing functions in the vanaspati industry, the following section discussions this activity in the case of the selected units. In the first instance the type of warehouses employed by the units is discussed. In the second part the decision regarding size, location and number of warehouses are discussed.
(a) Type of Warehouses Used: -

(1) Hindustan Vegetable Oils Corporation Ltd. :-

HVOC is mainly storing its product/vanaspati in factory godowns at factory level. Dealers and other agencies are usually picking the products from the factory godowns. HVOC is also having hired depots at different places operated by them. In some places, HVOC vanaspati is stored by CFA for these CFAs and company performs which warehousing functions is not making any arrangement for storage. These CFAs are getting a prescribed rate of commission on the sales. Warehousing of vanaspati is not a problem for HVOC because they are producing in very small quantity and supplying easily its products to local markets. So the question of vanaspati storage at distant places does not arise. HVOC is having a huge storage capacity at all the units at factory premises, which remain idle throughout the year due to very low capacity utilization. At every unit of HVOC, it has about 2000 MTs. storage capacity each at any point of time. The corporation has also hired some depots (approximately 18 at different places) for storing vanaspati at different places. During, 1993-94, HVOC occupied/hired 6 field depots in Punjab with 1200 MT storage capacity in aggregate, 4 depot in Delhi with 1000 M.T. storage capacity in aggregate and only one depot in Haryana with 100 M.T. storage capacity at a time. HVOC is not using the facility of any government agency warehouse in any state.

(2) Markfed Vanaspati and Allied Industries, Khanna :-

Markfed is distributing its vanaspati through field depot (company hired and company managed type storages), CASS (Co-operative Agricultural Service Societies), CMS (Co-operative and Marketing
Societies) and CFAs (private storage by dealers clearing and forwarding Agents). For ensuring timely delivery of its products to channel members and to ultimate customers, MARKFED is storing its products at factory godown, at Markfed's field depot, at dealers level and CASS levels. Markfed has its network of field depots and CFAs in different states where it usually stores its products at different places or throughout its marketing area. Markfed being a co-operative sector company is also making the use of the services of co-operative societies for its warehousing needs. So, Markfed, some times stores its product in the godowns of these co-operative societies at different levels i.e. District level, Tehsil and village level etc. But it is to be noted that the product in the hands of these co-operative societies becomes the property of these societies and no more of the company. During 1994-95, MARKFED made the use of about 19 field depot, 2724 CASS, 119 CMS and 5 DWS. In Punjab, Markfed has 9 field depots (including 5 CFA), 5 DWS, 119 CMS and 2724 CASS where it stores its product. In the state of Haryana, Markfed's product is stored in two depots. So far as government-warehousing facilities are concerned, Markfed is not making the use of warehouses of government agencies.

(3) Amrit Banaspati Company Ltd. :-

ABC is a private sector company and it mainly depends upon the facilities of hired and own-operated and managed godown for the purpose of storing its product. The company is making the use of self-owned and operated godowns at factory level and company-hired and managed godown (usually called company depot) at field level. With these warehousing facilities, ABC is also making the use of CFA godown but these godowns
are not controlled and managed by the company officials. These godowns are just owned or hired by dealers to the company. ABC (Rajpura unit) has about 27 field depots at different places of its marketing territory. In Punjab, it has 7 depots while in Haryana, it is operating 4 depots at different places. These depots are working as field warehouses of ABC for vanaspati storage. ABC, dispatches all its material in different states through these depots and CFAs.

Thus, all the companies selected under the present study are using the space and services of company hired and managed godowns which undertake the storage of vanaspati at different/scattered marketing areas. These godowns are generally hired from private individuals.

The sale of vanaspati is normally affected through a bank draft in favour of the concerned company by a particular dealer/CFA, on the basis of which a delivery order is prepared and issued to him by the sales officer or area sales officer. After taking this delivery order, the dealer goes to the depot godown or factory godown, as the case may be to lift the material and transit it to the sales point. Later, the area officer sends this draft to the company concerned. Sometimes, the dealers prepare the Bank Draft in the name of the company and send it directly to the company office and get the delivery directly from the factory. The sale of a particular company depends upon the off-take of vanaspati by its distributors, which further depends largely upon the quality of service extended to them by a particular company. With the increase in competition, in vanaspati business, packaging, pricing remaining constant factors, warehousing plays a very important long term role in enhancing the vanaspati sales and its
consumption. Thus, the vanaspati manufacturers should realize the importance of this aspect of vanaspati distribution and should make all efforts to ensure the uninterrupted flow of vanaspati from the godown to render the valuable services to their distributors, which are so important in vanaspati trade.

Since, all the companies selected under the present study are using the services of factory depots at the factory level, company hired and managed type warehouses at field level, dealers are quite satisfied with their services. It is also found that the field depots are only providing services for limited time hours, say from 9.00 A.M to 5.00 P.M, which generally leads to a decrease in the time of operation and ultimately to decrease in company's sales.

Despite all this, dealers are very much satisfied with the services of company hired and managed depots. The services of government agency warehouses i.e. CWC and SWC warehouses, are not so suitable and convenient in the vanaspati trade. Therefore, no vanaspati producer is using the services of CWC and SWC warehouses. The services of factory-hired-depot are also cheaper as compared to CWC and SWC warehouses. Some manufacturers dispatch their products to CFA i.e. commission agents who make their own arrangement for the storage of goods and manufacturers are exempted from storage charges. Further, a considerable amount of flexibility can be incorporated in the services rendered by CFA while, in case the government agencies such as CWC and SWC, this flexibility cannot be incorporated. It is true that the material is more safe in CWC and SWC warehouse, but this safety can be obtained from factory depots also by
getting the material insured. The companies like MARKFED and ABC take the material to depot godowns, provide the time and leverage to the dealers to negotiate the sale and earn a fixed and predetermined amount of profit in their transaction. This arrangement is beneficial in the long term and earns the loyalty of dealers and retailers. So, all the companies should evolve a sound warehousing policy, which could take care of the specific marketing needs of primary and secondary market. There could be an intelligent blend of factory depots and CFA godowns as per the requirements of a region. Thus by keeping the future in mind the companies should start exploring the possibilities of setting up factory and depot godowns with such facilities.

b) Size, Location and Number of Warehouses: -

The selected companies do not have any rationalization with regard to the number of warehouses and also with regard to the consumption centres to be catered to by the various warehouses.

Thus in this section, a model has been suggested for arriving at the optimum number of warehouses. This model also considers the size and location of the warehouses simultaneously.

The strategic warehouse-cum-depot location can be calculated on the basis of set criteria. A number of location models which can be classified as algorithmic, simulation or heuristic type, have been developed to answer most of the key questions about the number, location and size of a warehouse godown. Out of these models, the heuristic model is the most efficient and best suited in solving the problems of identifying optimum location, size and number of depots-cum-warehouses for vanaspati
distribution-cum-storage purpose. Following are the basic critical factors to be considered while applying this model.

i) Estimated demand at different points under consideration.

ii) Transportation facilities and accessibility.

iii) The number of nodal points that has to be served by each depot-cum godown.

iv) Lead-time and various associated costs.

On the basis of these informations a company can select a suitable model to arrive at the optimum location solution as well as determine the capacity of warehouse/depot or godown.

For selecting these possible locations nearer the consumption centre a "heuristic model" would be best suited. As an example, "ABC" which wants to decide the other strategic locations in any area which is served at present by Ambala depot of ABC in Haryana, developed a heuristic model. The position in this regard is explained by Table 6.1 (Appendix-I). This table shows the demand of ABC vanaspati (i.e. Gaggan and Amrit vanaspati) at these locations and it also gives the detail of distances and the trend costs of each location from all other locations. According to this model, the demand-weighted distances have been taken as travel cost from one location to an other by assuming that demand is concentrated at a point in the location. The travel cost for a location to the warehouse in that location is therefore zeros. Following are the few steps, which are involved in determining the best warehouse/depot godown locations by using the heuristic model/approach.
i) First step is the preparation of travel cost table. With the help of this table total travel cost to each depot/warehouse location from all other depot/warehouse locations are to be calculated and the location corresponding to least travel total cost are to be found. If the number of depot/warehouses to be located is one, then this is the optimum solution. If more than one warehouse/depot locations are desired then go to step no.(ii) for further optimization.

ii) For each location, determine the current least travel cost. This is the least travel cost from that location to all locations selected as a site for the warehouse/depot godown. Then compare this current least travel cost for each location with the travel cost to all of the locations that have not been selected yet. If the travel cost is less than the current least travel cost otherwise set the travel cost equal to the current least travel cost.

iii) Calculate the total travel costs from all the locations to each location that has not yet been selected and locate a depot-cum-godown in the location with the least total travel cost.

iv) If the company wants to open more warehousing locations or it is found that the number of warehouse locations is less or not adequate, then go to step no. (ii) again and again. Otherwise assign each location to the warehouse which results in the least travel cost for that location.

Table 6.2 (Appendix-I) shows the calculations for the location of Nine (9) depot-cum-godowns or warehouses at 10 location points served by
Ambala Depot of ABC. The following table shows the preferences of these locations.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Locations</th>
<th>Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ambala</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Kaithal</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Kurukshetra</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Panipat</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Karnal</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Pundri</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>Kalka</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>Yamunanagar</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>Shahabad</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Pehowa</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Table 6.2 (Appendix-I)

Now, if ABC wants to have one depot, it should be at Shahabad; for more than one; second depot should be at Panipat, third at Ambala; fourth at Karnal and so on. Thus other organization can by using this model, rationalizes their warehousing functions.

E Internal Layout and Design of a Warehouse

a) Importance of Layout and Design:

Internal layout and design of a warehouse are again among the significant areas in the management of a warehouse. It is the internal layout and design of a warehouse, which increases the efficiency of workers at the time of loading and unloading, and provides convenience at the time of inspection of material at different time intervals. The internal layout and design of a warehouse depend upon the purpose for which it is constructed. In most of the companies, this area of warehousing management has been neglected. The design and layout of a warehouse are concerned with length, width and height of the godown and placement of doors, windows and
ventilators. At the time of making the design and layout of a warehouse facility proper thrust must be given to the effect of temperature and humidity on the product which may ultimately cause the loss of quality of the product to be stored in a godown.

The designing of a godown/warehouse requires information about the type of available building, material handling techniques, skills, storage system and the equipment to be used for various operations.

In India vanaspati usually is packed in tin containers, HDPE containers, HDPE film pouches and corrugated boxes. So, containers warehouse should be constructed by taking these packing into consideration.

b) Factors Affecting Layout and Design:

Factory godowns are constructed usually by taking into consideration, the nature of the product to be stored, amount/size of the product, requirement of the product, existing production capacity, current sales, seasonality of the product, consumption pattern of the product, possibility of enhancing the production capacity etc. Usually, these godowns are constructed with concrete and cemented material and are covered with cemented sheet at the top/roof. Vanaspati godowns are also constructed in the form of cold stores for thickening up of the vanaspati after the production process. Immediately after production, the product is usually procured in these cold stores and then moved to simple godowns. If product is produced in small quantities as in the case of HVOC it is stored in these cold godowns.

In a discussion with different officials of selected companies, following points were suggested in connection with design and layout of vanaspati warehouses/storage facility:
(i) The godown should have a high plinth and concrete floor preferably treated with anticorrosive material ventilators and doors should be able to be closed tightly. When required cross ventilation should be possible during clear days.

(ii) The godown should be divided into as many rectangular slacks bases as possible so that different blocks of material may be formed to facilitate inspection and counting.

(iii) There should be orderly shelves for keeping corrugated boxes in the safe position to provide better service at the time of loading and unloading.

(iv) The stacks/blocks should be formed in such a way that these can be inspected at different interval of times to ensure that no deterioration due to leakage etc. has taken place.

(v) The height of blocks formed should be such that (up to 5' to 6'high), it should conveniently accommodate the mechanical arrangement and the labourers at the time of loading and unloading.

Storage structure is again one of the key elements in the warehousing of any commodity. It is concerned with the formation of block stacked and system of keeping the packaging units in the storage space provided. The storage structure should, therefore, be such that, vanaspati retains its nutrient content and keeps its physical and chemical character intact. There should be proper control of the relative humidity and temperature during the course of storage. Humidity and temperature are two basic factors, which may affect the condition of vanaspati, and hence control of these two is of utmost importance.
F. Conclusion

From the foregoing analysis, it is seen that warehousing is an activity of physical distribution, which requires a very careful planning, and control. Traditionally, warehousing was considered only as a static unit in the distribution chain, but nowadays, it is concluded as pivotal in the physical distribution system and it forms a place where incoming factory shipment of products are converted into outgoing movement representing customer orders. Major functions performed at a warehouse are receiving, transfer, selection and shipping in addition to storage.

The core decisions in vanaspati warehousing are type, location, number and size of warehouses. So far as type of warehouses are concerned there may be:

i) Company owned and companies operated type.

ii) Company hired and managed type; and

iii) Company hired and other agency managed type.

All these types of godowns have their own merit and demerits. But one significant observation is that the company owned and operated type godowns are available at factory level (within the factory premises) only. All the vanaspati companies are making use of these three types of warehouses/godowns. At the field level companies have to hire the godown for the smooth flow of the product and better customer service. None of the organisation are using CWC and SWC warehouses because of beaurocratic delays and improper design and location of these warehouses.
Location, size and number of warehouses are the crux/core of warehousing task. Location of a warehouse plays a pivotal role in the vanaspati business because, it is the location of warehouse which ensures the timely delivery of the product at the scattered places over the wide marketing area as and when demanded. Adequate location of a warehouse ensures the availability of the product as and when it is demanded by the customers, because it is stored nearer to the consumption points to provide maximum level of customers service.

It has been observed in the study, that all the three organizations have not adopted any method or model to decide on the number, size and location. Warehouses have sprung up on an ad-hoc basis and no attempt has been made to study the cross-impact between different warehouses.

The present study has suggested a heuristic model for the above problem.

The internal layout and design of a warehouse is also one of the important aspects of warehousing problem. The layout and design of a warehouse should be such that, the product is protected from temperature, humidity and other natural evils. Generally, a warehouse for vanaspati should have high plinth and concrete floor treated with anti-corrosive material. It must have proper ventilation and paroling facilities for the movement of carts or manual carts inside the warehouse for speedy loading and unloading. The storage structure of a vanaspati warehouse (godown) must be such that it is able to retain its nutrient content and keep its physical and chemical character intact. Again the storage structure should be such that, periodical inspection and counting may be possible from time to time.