CHAPTER-8

PACKAGING AND MATERIAL HANDLING

Material handling and packaging is one of the important activity centres of physical distribution system. There is a great deal of interaction between material handling and packaging aspects of the distribution system.1

The decision on material handling is to a great deal dependent upon the type of packaging. So, this chapter is divided into two parts i.e. 'material handling' and 'packaging'. In this chapter, packaging is taken in the first instance and material handling' in the second.

Part -A

Packaging

This section of the chapter throws light upon the importance of packaging in the physical distribution system. Further, the packaging materials used for vanaspati packaging are described. Lastly, this part of the study deals with the packaging system in the selected companies.

A. Packaging as a Physical Distribution Function

In the different aspects of warehousing, transportation and material handling, packaging plays a vital role to ensure safety of the commodities in the physical distribution system. Improved packaging system and methods

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1 Material handling and packaging because of their interrelationship are considered under the same activity centre:


b) Christopher, M, Total Distribution, Grwer Press Essex 1971,
contribute to the overall economy. Thus, there is a need to bring in new material and technology in the packaging front.

Packaging solves a number of problems of producers, consumers, marketers, and other persons concerned with the product. The main objectives served by a suitable packaging are as under:

i) Protecting the product against damages in transit and spoilage.

ii) Providing convenience during handling, transport, and storage.

iii) Selling may be promoted by using attractive packaging.

B. Packaging of Vanaspati

Packaging plays an important role in the distribution of vanaspati. Vanaspati is a product of relatively high cost, hydrogenated properties and of acidic (Chemical) nature. It is a liquid medium of cooking. Due to direct usable nature of vanaspati for food cooking, its packaging should be given due consideration. Packing material used for vanaspati packaging should not only be cheap but also be strong enough to prevent damages during transportation, handling and stocking of filled packages. Vanaspati should be packed in such a way that it must remain unaffected by the chemical reaction over a period. Recently, following changes may be said to have taken place in connection with vanaspati packaging.

1) Literisation of Vanaspati: -

Earlier, vanaspati was packed in tin containers of 15 Kg. However, with effect from July 1992, packaging of vanaspati has been converted into literisation. The government of India vide order dated 15 July 1992, under the Standards of Weights and Measures (Packed Commodities) Rule, 1977
granted specific permission to 'National Diary Development Board' (NDDB) and 'Gujerat Co-operative Milk Marketing Federation Limited' to pack vanaspati in tetra packs by volume i.e., by litre in quantities of 200 Ml., 500 Ml, and one litre instead of packing by weight. Thus permission was for a period of 3 years. To avoid confusion in the minds of the consumers on the availability of commodity in two different incomparable packs and prices, the industry pleaded with the government to accord the same facility to other vanaspati manufacturers as well. On various representations from the industry, the permission was granted against the provisions of packed commodity rules. The ministry of Civil Supply Consumer Affairs and Public Distribution to review the packing of vanaspati constituted an expert committee.

2) Uniform Measure for Packing Vanaspati:

The problem, which was troubling the vanaspati industry since July 1992, was the special dispensation given only to NDDB and Gujerat Co-operative Milk Marketing Federation Ltd. to pack vanaspati in litres. The units in the private sector were at a great disadvantage in the market place and as such IVPA was representing to the government at all levels to provide and allow the private sector also, to pack vanaspati by volume measures in order to avoid confusion and misunderstanding amongst the consumers.

In response to the association's repeated written and personal representations, a decision was taken and a gazette notification was issued by the government in December 1994 amending the provisions of the Standards Weights and Measures (Packed Commodities) Rule 1977 to allow packaging and sale of vanaspati ghee either in volume or in weight to the industry in the private sector also. The government subsequently allowed this.
3) Bureau of Indian Standard (BIS) Specification Containers: -

Consequent to the above notification, there was a need for redrawing up the BIS specification in view of the modified container size. A representation was sent to the joint secretary and VOP controller by the BIS, that the permission might be granted to vanaspati manufacturers for packing vanaspati in non-BIS marked containers of suitable sizes obtained from the market.

The matter was also personally discussed with the VOP Controller and Directorate of Vanaspati, and members were advised to make an application for necessary permission, which was duly granted individually.

The materials used for vanaspati packaging by different vanaspati manufactures in India are generally: HDPE containers/jars, HDPE film pouches and tin containers. Tins are the oldest forms of vanaspati packing in India. Plastic based packing materials have made their appearance in recent years and their growth as a packaging material has increased substantially in the last two decades with the establishment of petrochemical based industries in India. The chart on the next page shows the comparative analysis of different types of packaging materials used for vanaspati packaging. The detailed discussion of the different types of packaging material for vanaspati packaging used in India is as under.

i) Tin Containers: -

Tin jar is the oldest type of packing used by the Indian vanaspati producers. This was the only packaging material used by the Indian vanaspati producers when the first vanaspati factory in India came into existence/being. Tin containers are commonly used media of flexible bulk packaging. Tin
## CHART
Comparative Study of Different Type of Packaging Material for Vanaspati

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Type of Material</th>
<th>Strength</th>
<th>Hygroscopicity</th>
<th>Printing and Marking</th>
<th>After use Benefit</th>
<th>Weight of Empties</th>
<th>Stacking</th>
<th>Handling</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Tin container</td>
<td>Moderate Strong</td>
<td>Low resistance to water and air</td>
<td>Difficult</td>
<td>Numerous</td>
<td>Minimum</td>
<td>Very easy</td>
<td>Damaged by rough Handling</td>
</tr>
<tr>
<td>2.</td>
<td>HDPE Containers</td>
<td>Very Strong</td>
<td>Highly resistant to water &amp; air</td>
<td>Easy &amp; Distinct</td>
<td>Numerous</td>
<td>Moderate</td>
<td>Less easy</td>
<td>Less Prone to damage by slightly rough handling</td>
</tr>
<tr>
<td>3.</td>
<td>HDPE Pouches</td>
<td>Less strong</td>
<td>Moderate resistant to water</td>
<td>Easy &amp; distinct</td>
<td>No use</td>
<td>Minimum</td>
<td>Less Easier</td>
<td>difficult in handling</td>
</tr>
<tr>
<td>4.</td>
<td>Corrugated boxes (Secondary)</td>
<td>Less strong</td>
<td>Very low resistant to water</td>
<td>Easy &amp; distinct</td>
<td>Fewer</td>
<td>Moderate</td>
<td>Very easy</td>
<td>Difficult and need more care</td>
</tr>
</tbody>
</table>

Source: Field Survey
Containers are generally light in weight, amenable to handling system and facilitate high stacking. This type of packaging also suffers from a number of disadvantages due to its sensitive nature, which reduce its strength over a period due to its chemical reaction with moisture in air. Tin containers usually suffer from leakage when they collide with each other and with any other solid material. This type of packaging result in loss, if it is slightly mishandled by the workers.

The major advantage of the tin container packing is that it has an after use value. A used container of 15 litre capacity may be sold from Rs. 20 to 30 in the open market.

(ii) HDPE Containers:

This type of material came into use about two decades ago when a number of petrochemical-based industries were established over the country to produce plastic based material. The advantage of using HDPE container in vanaspati packing is that it gives better protection against hydroscopicity/ zinc because the material is highly resistant to water. HDPE packaging also increases the shelf life of the product. Further, it has the clearance and amenability to better marking and printing. The other advantage of HDPE containers is the after use value of the containers. A used container of HDPE of 15 litre capacity can be sold up to Rs. 30 to 40 in the open market. Due to the multiple nature of their use, the customers and dealers usually prefer HDPE containers. HDPE containers are also having a longer shelf life.

(iii) HDPE Pouches

HDPE pouches are widely used for vanaspati particularly for one litre, half litre and 200 millilitre sizes. Being a consumer product of daily use the
ultimate consumer prefers to purchase it in small quantities e.g. half litre one litre or 200 millilitre. So, this type of packing is more suitable to the product like vanaspati. The pouch film packing is also cheaper than container. Further, this kind of packaging is more suitable to retailers for handling.

In actual practice, the Directorate of Vanaspati controls packaging of vanaspati. As per the direction of the government, vanaspati manufacturers are obliged to comply with certain requirements relating to packing and marking of vanaspati containers/pouches; size and shape of containers/pouches, information to be printed etc. Also, vanaspati industry has been using ISI marked packing (containers and pouches) only. The packing sizes usually used by the vanaspati producers are of varying size say; 15 litre, 10 litre, 5 litre, 2 litre, 1 litre, half litre and 200 milliliter etc. The information regarding brand name of the product, contents, net weight, gross weight, name and address of manufacturers etc. are to be printed on each container. The Indian vanaspati producers generally prefer HDPE pouches/ containers, because of their suitability to the product like vanaspati, easy availability, uninterrupted supply, lower price, longer shelf life, and requirement of lesser storage space for empty pouches. But, pouch packaging also suffers from some defects like; need of secondary packaging in corrugated boxes, problem in handling and counting, problems in stacking etc. But, inspite of all these defects, this type of packing is the most suitable and hence mostly used by the vanaspati producers in India.

(iv) Corrugated Box Packaging (Secondary packaging): -

HDPE pouch packing needs secondary packaging in corrugated boxes for convenient handling, counting and distribution. This kind of secondary
packaging of pouches and small containers is most suitable for retailership, stacking, handling, loading and unloading and from the cost point of view.

C. Packaging of Vanaspati in Selected Companies

The companies selected under the present study (i.e. HVOC, MARKFED, and ABC) are also using the same material and pack sizes for packing their products. All these companies are using BIS (Bureau of Indian Standard) marked containers of suitable sizes obtained from different manufacturers. Nowadays, it has been made compulsory by the government of India for the vanaspati producers to use only ISI marked containers and pouches. The rules regarding weights and measures of the packed material are governed by the Standard of Weight and Measure (Packed Commodities) Rules 1977. At present, HVOC is using only two sizes of packaging i.e. 15 litre tin container and one-liter pouch for marketing its product. They are not using HDPE container. But, both ABC and MARKFED are using packing of varied sizes of different packing materials. The packing sizes and material used by the selected companies are shown in the following chart.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Size</th>
<th>Type of Material used</th>
<th>ABC</th>
<th>MARKFED</th>
<th>HVOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>15Kg.</td>
<td>Tin container</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2.</td>
<td>15Kg.</td>
<td>HDPE*</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3.</td>
<td>10Kg.</td>
<td>HDPE*</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4.</td>
<td>5ltr.</td>
<td>HDPE*</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5.</td>
<td>2 ltr.</td>
<td>HDPE*</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>6.</td>
<td>1ltr.</td>
<td>HDPE*</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>7.</td>
<td>1ltr.</td>
<td>HDPE film Pouch</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>8.</td>
<td>1/2 ltr.</td>
<td>HDPE film Pouch</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>9.</td>
<td>200 ml</td>
<td>HDPE*</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>10.</td>
<td>Corrugated boxes Secondary Packing</td>
<td>Corogated Boxes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Filed Survey
All the three companies sell their products at their factory gates also. From the chart, it is clear that HVOC product is available in few sizes only but, in case of ABC and MARKFED, the product is available to the consumers in a variety of packs.

Due to a radical increase in the demand of empty containers for packing vanaspati, a close look on the total aspect of vanaspati packing has become necessary. The need becomes more urgent when one finds that some of the individual vanaspati units require around 40,000 containers per day for packing their products. Thus, a continuous development resulting in production of more suitable and more economical packing is needed under the present conditions. Selection of packaging material must also take into consideration, the after use benefits as well as the re-sale value of the packing material.

PART -B

Material Handling

This part of the chapter considers the material handling as an important distribution function. In this section, the objectives of material handling and the criteria for measuring the efficiency of material handling function are highlighted. Further, this section throws light upon the importance of material handling function in shipping and the storage processes. The section subsequently looks at the status of material handling in the Indian vanaspati industry in general and in the selected units in particular.
A. Material Handling and the distribution function

Material handling is one of the important responsibilities of the marketing department. The improved material handling techniques are not confined to production only but apply to all phases of physical distribution of the product. To the marketing department, material-handling techniques should be arranged in such a way that the consignee should avoid the damages during handling of material. Material handling function is an integral part of the other elements of logistic activities. The efficiency of material handling function has an important bearing on cost and flow of goods. By improving material handling techniques, it would be possible to cut-down the material handling cost and consequently, profitability of the concern may be increased by reducing the cost of the product. Thus, a proper care of material handling system is required for each individual element of physical distribution function. This would ensure the reduction in cost and increase the efficiency of the physical distribution function.

B. Objectives of Material Handling Function

The main objectives of material handling function in the process of physical distribution of goods are:

i) Reduction in labour cost;

ii) Increase in storage capacity,

iii) Improvement in storage layout,

iv) Reduced fatigue and improved human comforts;

v) Improvement in routing facilities, and
vi) Increase in product availability.

Through the application of improved material handling techniques, the cost of movement and storage of material can be reduced to a considerable extent.

a) Material handling to facilitate loading and unloading for shipping and receiving:

The loading and unloading of products should be examined from the viewpoint of speed, convenience and saving in damages. Generally, material handling is done manually, but when the volume of material handling becomes large the manual system becomes insufficient. Thus, in order to speed-up loading and unloading of material and to make it convenient and cheaper, handling equipment can be used. There are a variety of material handling equipments such as forklifts; conveyors, cranes, pay loading etc. which may be used for loading and unloading of materials depending upon the type and nature of the product. The use of material handling equipment is generally depends upon the factors like; type and amount of material to be handled, availability of properly designed dock or platform to be used for loading and unloading, distance to be travelled by the product from the dock, method and type of packaging and the type of carrier (truck, rail, ship etc.) to be used.

In order to speed-up loading and unloading of material, material handling machinery may be installed on truck, dock, railway platform etc. Basically, material handling equipments are of two types; 'fixed' and 'moving'. Fixed equipments such as gentry' cranes or fixed cranes are installed at a particular place and cannot be moved from one place to another. This type of
equipments has a certain reach. It requires the truck or vehicle to come close to it for loading and unloading. So, this type of material handling equipments as curtain limitations. On the other hand, moving equipments can move from one place to another and near to the vehicle. This type of machinery is more suitable for loading and unloading of material. To speed-up the operations, different types of conveyors may also be installed.

b) Material handling in the Warehouse/Storehouse/Depot or Plant: -

The material handling activity in a warehouse or depot plays a significant role. The major work performed in a warehouse is the handling of goods that it contains. A major part of material handling in a warehouse is performed manually as manpower is the most flexible and efficient mode of material handling. However, an attempt has been made to lighten-up the human efforts and increase its effectiveness by the mechanical aid. So, to provide mechanical aid to the manpower in the warehousing activity, the planning of equipment and facilities in the warehouse is important. This planning takes into consideration factors like; suitability for purpose, category of the warehouse (e.g. fast moving, slow-moving, combination of these two), nature of the products to be stored, degree of efficiency to be required, cost and physical characteristics of the product etc.

The framework for assessing the material handling system in the selected companies has been developed. One can now evaluate the material handling in these companies.

Material handling is one of the significant cost centre in the over all distribution system. It has its impact on order-cycle-time and therefore, on customer service. Thus, the objectives of material handling are to reduce
material handling cost and to increase space utilization. Improved material handling efficiency develops along these four lines: load utilization, space layout, storage equipment choice and movement equipment choice.

C. Material Handling in Selected Companies

In India, the vanaspati ghee is distributed in a variety of packing sizes; such as, 15 litre, 10 litre, 5 litre, 2 litre, one litre, half litre and 200 millilitres etc. as stated earlier. A particular packet of vanaspati is usually handled at five places from the plant to the ultimate customers. The number of handling involved in the process of distribution from the plant to the consumer depends upon the marketing channel used by the producers and are discussed below:

i) Five times handling at the plant, viz., receipt from the packing machine; putting the packed Jar/tin on the conveyor (moving chain), receiving the container from the end point of moving chain/conveyor and stacking it in the cold store, picking it from the cold store and stocking it in the factory godown, loading in trucks etc.

ii) Three times handling at the depot; viz. unloading, stacking into the godown and again loading in the trucks.

iii) Two times handling at the dealers/wholesaler or distributor's godown viz. unloading, stacking and again loading in trucks or other vehicle.

iv) Three times handling by retailers; viz. receiving from transporters, stacking it in the shop, handing it over to the customers.

v) Lastly, the consumer brings the products to their homes where the housewives make use of the product. At this stage, the product may be handled many times again up to the ultimate disposal of the packing.
From the foregoing analysis, it is clear that when carrier moves a vanaspati container; it has to suffer up to fourteen handling during loading, receiving, storage and unloading before it is delivered to the customers. The movement and handling pattern involved in the distribution of vanaspati from plant to the ultimate customers is shown in the figure on the next page. Indian vanaspati producers are using only the manual system for handling the material during transportation and storage. But, with the increase in production and consumption of vanaspati there is a need for an in-depth study of the material handling system involved in the transportation and storage of vanaspati to recommend the conceptual change in the system. As already stated, in India, vanaspati industry handles its material only through manpower and there is a need for the installation of mechanical devices to a considerable extent. Further, the number of material handling point can also be reduced.

In the present study, all the companies under study have attempted factory sales in bulk to the wholesaler. HVOC is using the conventional method of packing for its product i.e.15 kg. tin and one kilogram pouch. In all the selected companies, conventional manual system of material handling during unloading, and stocking is used. For secondary packing of pouches, all the companies are using CARTON packing (cardboard box containing ten pouches in each box) for facilitating counting and material handling during transportation and storage.

So to meet the challenges of the coming decade successfully, it is desirable to modernise the present material handling system of the Indian vanaspati industry by using specially designed vehicles with necessary
Figure 7.1
Movement and Material Handling
Pattern involved in Vanaspati Distribution

Source: Field Survey.
facilities of loading and unloading. HVOC also requires introducing different sized packing to attract the customers.

This chapter emphasised that in addition to improve the system of storage, transportation, packing and material handling ensures the safety and protection of commodities. The changing market situations like; competition, urbanisation, change in habits of customers has raised the demand for improved packaging. Basically, packaging plays a key role in the protection of the product during transportation, storage and sale. In the physical distribution process, packaging function starts with the design of the product and terminates with the ultimate disposal of the package. The negligible attention paid to this element of physical distribution system requires re-examination of the role of packaging in relationship with all the other activities of the distribution system. Like other activities, the balance between packaging cost and reliability must be sorted out. It has been found that the packing cost increases with increasing reliability. In a nutshell, we can say, that packaging cost must be compatible and appropriate to the value of the product.

Packaging requires a special attention in case of vanaspati as the product to be handled in a large quantity, is liquid in nature and is directly used for cooking. Generally, tin and HDPE containers are used for vanaspati packaging. Out of these two, HDPE containers are more suitable to the product like vanaspati. But, these types of containers are comparatively costlier than the tin containers. So, one must find trade-off between service and the cost.

Due to increasing trend in vanaspati consumption in India, an in-depth study of material handling system is recommended. Mechanized material
handling techniques are required to be used in order to meet the increased demand of vanaspati. Mechanization in the warehouses and at loading and unloading points is of urgent need in vanaspati industry in India. As proper attention for reduction of material handling cost has not been paid, it is also advisable to evolve criteria to measure these costs and standardize them. Use of work-study technique is suggested in this regard.