Both these grading programmes are consumer-oriented with the aim of making available the pretested and AGMARK certified quality products to them.

4. Grading at Producer's level : In addition to these, the state marketing authorities also implement a grading programme for the benefit of the producer-sellers, *viz.*, grading at producer's level. Under this programme, free grading services are provided to the farmers for sorting the produce before offering for sale. This, in turn, enables them to realise prices commensurate with the quality of the produce. Grading units manned with grading personnel have been set up in several regulated markets and warehouses with the central assistance.

CRITERIA FOR GRADE STANDARDS

The criteria which determine the adequacy of standards are:

(i) Standards should be built on the characteristics which the users consider important, and these characteristics should be easily recognizable. More weightage should be given to the user's opinion.

(ii) Grade standards should be built on those factors which can be accurately and uniformly measured and interpreted. The grade standards based on subjective measurement will be difficult to apply uniformly, particularly by different graders. There will be a lot of variation in the subjective measurement of grade factors, which will reduce the usefulness of the grade itself.

(iii) The grade standards terminology should be uniform at all levels of the marketing channel.

(iv) The cost of operating the grading system must be reasonable.

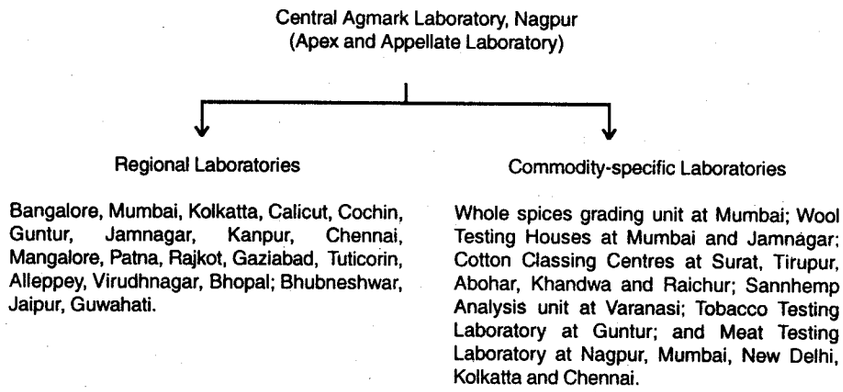
The best practical test of the adequacy of grade standards is their acceptance and use by various market functionaries. If these grade standards are widely used, it means that they are fairly adequate and meaningful; but, if the large segment of the market functionaries does not use the standards, it may be assumed that some of the criteria to satisfy the consumers have not been adequately met.

INSPECTION AND QUALITY CONTROL

To ensure the confidence of consumers, it is essential that grading is done in accordance with the standards that have been set. For this purpose, the inspection of the goods at regular intervals by a third party is essential.

Inspection involves the testing of the graded goods with a view to determining whether they conform to the prescribed standards. It ensures quality control. For purposes of inspection, samples of the product are drawn at various stages—from the manufacturers, the market middleman or the consumer at his doorstep—and are tested in the laboratory. These inspections are carried out by inspectors appointed by the government, and not by a producer or a buyer.

The network of Agmark laboratories in the country is shown below:



Regular inspection creates confidence among the buyers. Producers, too, know that there is someone who checks the standards of the produce graded by them. This avoids the temptation of adopting such malpractices in the grading as mixing of inferior grade produce, etc. After laboratory tests, if the produce is found to be below standards, the licence of the grader is cancelled and legal action is initiated against him.

There were 566 approved grading and/or testing laboratories in the country at the end of March, 1984. Their number increased to 633 in 1990–91 and further to 700 in 1991–92. Presently, there are 111 state-owned grading laboratories, 549 laboratories of the licensees (private packers), nine laboratories in co-operative sector and 49 private and commercial laboratories with a total of 718 approved grading and/or testing laboratories in the country which are engaged in the analysis and determination of AGMARK grades.

LABELLING

The graded products, according to the standard fixed by the Agricultural Marketing Advisor, Government of India, bear the label 'AGMARK', as shown in Figure 4.1.

AGMARK is the abbreviation of Agricultural Marketing. It is a quality certification mark under the Central Agricultural Produce (Grading and Marking) Act, 1937. This label indicates the purity and quality of the product on the basis of the standards that have been laid down. The labels of different colours are used to indicate the grade of the product. The AGMARK labels are printed on special quality paper and issued by the Agricultural Marketing Advisor. They are serially numbered, and the firm is required to maintain the account of the labels, which are issued to the grader, in a register. It is a voluntary scheme. Interested traders and manufacturers are given licence to grade their products under AGMARK quality certification mark.

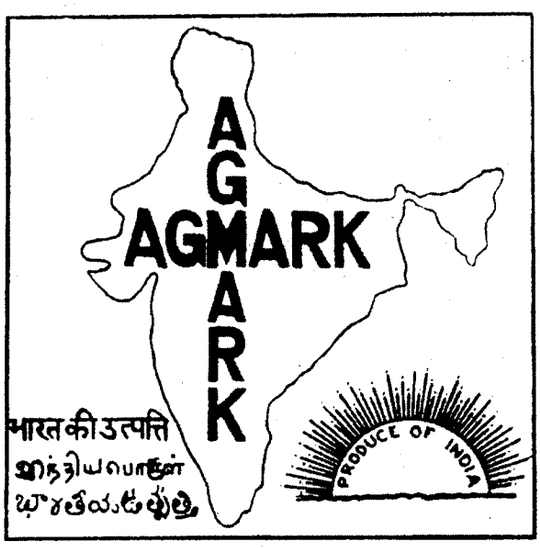


Fig. 4.1 Agmark Label

AGMARK label is attached to the container of the product in such a way that it will not be possible to remove the contents of the package without tampering the AGMARK labels. Each AGMARK package bears the date of packing and date of expiry of the product. AGMARK products are pretested and certified for their quality. AGMARK products are of assured quality and different from adulterated and spurious goods. If any AGMARK product purchased by the consumer is found defective, the consumer gets the product replaced or gets the money back as per the procedure laid out. There are about 14,000 licencees manufacturing and marketing their products under AGMARK quality certification marks.

ADVANTAGES OF GRADING

Grading offers the following advantages to different groups of persons:

(i) Grading before sale enables farmers to get a higher price for their produce. Studies during sixties and seventies revealed that on an average, the producers obtained a premium of 12 paise per kg of tobacco at Ongole (AP) and Rs. 9.40 per quintal of kapas at Hubli (Karnataka)[6]. Graded apple fetched a premium price of 11.27 percent over that of ungraded apple[7]. Graded dasheri and desi mango fetched a premium of Rs. 31.50 and Rs. 32.50 per quintal over the price of ungraded mangoes[8]. Grading also serves as an incentive to producers to market a produce of better quality.

(ii) Grading facilitates marketing, for the size, colour, qualities and other grade designations of the product are well known to both the parties, and there is no need on the part of the seller to give any assurance about the quality of the product.

(iii) Grading widens the market for the product, for buying can take place between the parties located at distant places on the telephone without any inspection of the quality of the product.

(iv) Grading reduces the cost of marketing by minimizing the expenses on the physical inspection of the produce, minimizing storage losses, reducing its bulk, minimizing advertisement expenses and eliminating the cost of handling and weighing at every stage.

(v) Grading makes it possible for the farmer—

(a) To get easy finance when commodities are stored;

(b) To get the claims easily settled by the railways and insurance companies;

(c) To get storage place for the produce;

(d) To get market information;

(e) To pool the produce of different farmers;

(f) To improve the "keeping" quality of the stored products by removing the inferior goods from the good lot; and

(g) To facilitate futures trading in a commodity.

(vi) Grading helps consumers to get standard quality products at fair prices. It is easier for them to compare the prices of different qualities of a product in the market. It minimizes their purchasing risk, for they will not get a lower quality product at the given price.

(vii) Grading contributes to market competition and pricing efficiency. The product homogeneity resulting from grading can bring the market closer to perfect competition, encourages price competition among sellers, and reduces extraordinary profits.

Thus, the grading of product is beneficial to all the sections of society; *i.e.*, the producers, traders and consumers of the product.

GRADE SPECIFICATIONS FOR AGRICULTURAL COMMODITIES

The Directorate of Marketing and Inspection, Government of India, has fixed grade standards for a number of agricultural commodities for domestic consumption as well as for export. The grade standards specified for some of the agricultural products are given in Tables 4.4 to 4.10.

PROGRESS OF GRADING IN INDIA

To improve the quality of agricultural products in India, grading and marking were introduced under an Act—The Agricultural Produce (Grading and Marking) Act, 1937. The act authorises the Central Government to frame rules relating to the fixing of grade standards and the procedure to be adopted to grade the agricultural commodities included in the schedule. The

Act of 1937 was amended from time to time to widen its scope, so that more number of commodities may be included under the changed circumstances. Initially, only 19 commodities were included for grading purposes; but now there are 165 commodities in the schedule for which grade standards are available. The commodities included in the schedule are foodgrains, fruits and vegetables, dairy products, tobacco, coffee, oilseeds, edible oils, oilcakes, fruit products, cotton, sannhemp, edible nuts, jaggery, lac, spices and condiments, essential oils, honey, besan, suji, atta and maida.

The Agricultural Marketing Advisor to the Government of India (AMA) is the authority empowered to implement the provisions of the Act, and suggest suitable modifications. The Central Agricultural Marketing Department (Directorate of Marketing and Inspection) maintains some staff for the inspection of

Table 4.4
Grade Standards for Eggs (Hen)

Grade	Agmark Label Colour	Minimum Weight (Ounce)	Other Conditions
Special	White	2.00	1. Eggs should not have been preserved by any method.
'A' Grade	Red	1.75	2. Eggs should be spot free and without blemishes.
'B' Grade	Blue	1.50	3. Yolk of eggs should be central.
'C' Grade	Yellow	1.25	4. Eggs should be solid.
			5. Eggs should be transparent.
			6. There must be air space of size less than 3/8".

Table 4.5
Grade Standards for Oranges

Grade	Agmark Label Colour	Minimum Size (Inches)	Other Conditions
Special	White	3.50	1. Oranges should be ripened so that they may not get spoiled in transportation.
Grade I	Red	3.00	2. The colour of oranges should be as per variety but should not be green.
Grade II	Blue	2.75	3. There should not be wrinkles on oranges.
Grade III	Yellow	2.50	4. Oranges should be free from cuts, infestation of insects and diseases.
Grade IV	Green	2.25	5. Tolerance limit is 10 percent of the next lower grade.

Table 4.6
Grade Standards for Alphonso Mango
(for Export)

Grade	Weight (Grammes)		Other Conditions
	Minimum	Maximum	
Grade I	280	338	1. Mangoes should be solid, free from cuts, blemishes and spots.
Grade II	222	280	2. The shape and size of mangoes should be as per quality.
Grade III	163	222	3. The colour should be green and not yellow.

the grading premises and the collection of the samples of graded products from different points in the marketing process. The collected samples are examined and analyzed either at the Central Agmark laboratory or at other laboratories set up in different parts of the country to test whether the graded products conform to the standards of quality laid down in the Act. If the sample is below standard, the necessary legal action against the party is taken, and the graded product is removed from the market. The licence of the party, too, is cancelled.

PROCEDURE FOR FORMULATION OF INDIAN STANDARDS FOR PROCESSED PRODUCTS

Standards for processed products are formulated in a very systematic manner. The Committee consisting of experts drawn from industry, educational institutions, research organizations, consumer bodies and Government officials connected with the field of preparing standards is entrusted with the task of formulation of standards for the product. The members formulate the standards based on the available international standards, analytical study carried out and data on the quality of produce. The draft of the standards is circulated to interested and concerned persons in India and abroad for inviting comments. The comments received are again considered by the Committee and then finalised for printing as an Indian Standard. The standards so formulated are reviewed from time to time and necessary amendments are made as per emerging needs. The standards, in general, cover the physical, sensory, chemical, hygienic, micro-biological and packaging requirements, which vary from product to product.

There are special grade designations of blended edible vegetable oils. Blended oil means a mixture of any one of the conventional edible vegetable oils with any one of the non-conventional edible vegetable oils. The grade designations for blended edible vegetable oils as notified on October 31, 1991 are given in Table 4.10.

Table 4.7
Grade Designations of Cumin Seeds (Unpowdered)

Grade Designation	Special Characteristics Maximum weight percent					General Characteristics
	Extraneous matter	Other seeds	"Jeeralu" content	Damaged, discoloured and weevilled seeds	Shrivelled and immature seeds	
Cumin Special	1.5	0.5	1.0	1.5	1.5	1. Cumin seeds shall be dried fruit of the plant Cuminum Cyminum L.
Cumin Good	2.5	1.0	3.0	2.5	3.0	2. They shall have the characteristics, shape, colour, taste and aroma normal to the species.
Cumin Fair	3.5	1.5	3.5	3.5	4.0	3. They shall be reasonably dry with moisture not exceeding 10 percent.
Cumin Average Non-specified	5.0	2.0	5.0	5.0	5.0	4. They shall be free from visible mould or insect infestation and musty odour. 5. They shall also be free from any harmful foreign matter.

Source: Rajasthan State Agricultural Marketing Board, "Seed Spices in Rajasthan" Bulletin, Jaipur, 1997, pp. 67–69.

The General requirements for blended oil are as follows:

(i) The blended oil constituents shall conform to the respective standards prescribed under the Prevention of Food Adulteration Rules, 1955.

(ii) The blend shall be clear, free from rancidity, suspended or insoluble matter, other foreign matter, separated water, added colouring matter and flavouring substances.

(iii) The blend shall be free from mineral oil, argemone oil, castor oil or any other oils/fats; and

(iv) The blend shall not contain hydrocyanic acid.

Recently, the government, with a view to creating a more integrated domestic market, has permitted the blending of any two edible oils. Some 86 companies have been given this permission.

The grading and marking of goods for domestic consumption was first started in ghee (1938), followed by vegetable oils (1939), creamery butter

1942–43. Total value of commodities graded for exports increased to Rs. 902.58 crores in 1990–91. During the nineties with liberalization of exports, grading function was undertaken by other organizations. Therefore, grading under AGMARK reduced.

The scheme of grading at producer's level was started in year 1963–64 with the sole object of helping the farmers in getting a price commensurate with the quality of their produce. Agricultural commodities worth Rs. 14.99 crores were graded under this scheme in the first year (1963–64). This increased overtime and reached Rs. 5693.91 crores in 1998–99 which accounts for 61.4 percent of the total value of agricultural commodities graded. The state-wise status of grading at producer's level shows that the five states, namely Tamil Nadu, Maharashtra, Uttar Pradesh, Andhra Pradesh and Karnataka accounted for 92 percent of total grading at producer's level in the country. Facilities for grading at producer's level exist in 1321 regulated markets (18.4 percent of total regulated markets) of the country.

The progress of grading at producer's level based on total value of agricultural commodities marketed in the regulated markets is dismal. The value of agricultural commodities graded at producer's level accounted for only a small fraction. Out of Rs. 62,000 crores worth of agricultural produce sold through the regulated markets during 1992-93, only 7.3 percent was graded products. Among the commodities graded at producer's level, cereals accounted for 50.7 percent, pulses 10.5 percent, oilseeds 18.3 percent, cotton 3.4 percent and spices 1.2 percent in the total value of graded products.

Total value of agricultural commodities graded under various types increased from Rs. 17.91 crores in 1950-51 to Rs. 9267.97 crores in 1998-99 due to phenomenal increase in the value of commodities graded at producer's level.

The Directorate of Marketing and Inspection (DMI), Government of India, runs training centres for persons engaged in grading. There are four Grading Training Centres, one each at Lucknow, Chandigarh, Chennai and Hubli. There is one special training centre at Surat, where training is imparted in cotton grading, and another at Guntur for tobacco grading. There is a grading supervisor's training centre at Nagpur.

The grading of agricultural produce has not made much headway. Most producers are not interested in grading their produce. Consumers, too, were not particular about buying graded agricultural products. The possible reasons for this apathy have been dealt with in the paragraphs that follow:

CONSUMER'S PERCEPTION

Grading is not liked by consumers because:

(i) It is too complicated to be understood by the majority of the ordinary consumers;

(ii) There is little faith on the part of consumers even in graded products.

In some cases, the grade is not marked on the product but on the container. There is, therefore, no guarantee for the genuineness of the graded product. It is also difficult to create confidence in the quality of the graded product which is sold in a loose form;

(iii) There is deterioration in the quality of the product, specially in the quality of perishable commodities, during the time of grading and the sale of the graded product. Consumers then lose confidence in it;

(iv) Grade designations, such as C, D or III, IV give a psychologically poor impression about the quality of the product to the consumers although, basically, the difference between grades B and C or between the third and fourth grades is only marginal; and

(v) The prescribed range of grade standards is very wide. Consumers are cheated when the product with the lower range limit is supplied to them.

Table 4.11
Value of Agricultural Commodities Graded in India

(Rs. crores)

Year	Compulsory grading	Voluntary grading	Grading at producer's level	Total value of graded products
1938–39	—	0.15	—	0.15
1942–43	0.29	1.03	—	1.32
1950–51	14.00	3.91	—	17.91
1955–56	24.93	15.96	—	40.89
1960–61	29.03	40.35	—	69.38
1963–64	53.60	63.00	14.99	131.59
1965–66	56.70	80.00	64.16	201.16
1970–71	92.83	223.00	120.97	436.80
1975–76	237.22	201.92	375.72	814.86
1980–81	333.69	287.06	627.86	1248.61
1985–86	707.69	388.35	1221.93	2317.97
1990–91	902.58	1338.02	4450.53	6691.13
1998–99	90.34	3483.72	5693.91	9267.97
1999–00	NA	NA	6710.37	NA

Source: Reports of Directorate of Marketing and Inspection, Ministry of Agriculture, Government of India, Faridabad.

PRODUCER'S DIFFICULTIES IN GRADING

Producers of agricultural products also face difficulties and are not interested in grading their produce. Some of the difficulties are:

(i) In some agricultural products the basis of the grade standard is sensory taste. The sensory taste varies from person to person, and the best product may not be liked by consumers;

(ii) Agricultural products (like ghee, fruits, etc.) are perishable/semi-perishable commodities and deteriorate in quality after having been graded and

down the standards of quality for vegetable oils.

(vi) For the purpose of minimum price support operations, the central nodal agencies have also laid down quality standards for various commodities. This is necessary as the minimum support price fixed by the government is applicable to the fair average quality (FAQ) of the produce and FAQ needs to be defined properly. The central nodal agencies for this purpose are as follows:

a) Food Corporation of India – For Cereals.
b) NAFED – For Pulses and Oilseeds including Copra.
c) Cotton Corporation of India – For Raw Cotton.
d) Jute Corporation of India – For Raw Jute.

(vii) The Central/State Warehousing Corporations lay down standards for agricultural commodities for accepting them for storage.

(viii) The Bureau of Indian Standards (BIS) under the Indian Standards Institution (Certification Marks) Act, 1952, enables the manufacturers having requisite production and testing facilities to use ISI mark on the products if these conform to the specifications laid down by the BIS.

(ix) In addition, the domestic manufacturers, particularly those who are entering the export trade have obtained international grade certificates under ISO (International Standards Organisation) series.

INTERNATIONAL ORGANISATION FOR STANDARDIZATION

International Organisation for Standardization (ISO) and the Codex Alimentarious Commission (CAC) are the two prominent international organisations engaged in standardization of agricultural products.

International Organisation for Standardization (ISO) came into existence formally on 25th February, 1947. The objective of ISO is to promote the development of standards in the world with a view to facilitating international exchange of goods and services and to develop cooperation in the spheres of intellectual, scientific, technological and economic activities. At present, 89 countries are members of ISO and 117 countries are corresponding members. India is a founder member of ISO. The ISO is presently engaged in the formulation of standards for a large number of agricultural commodities, covering spices and condiments, lac, essential oils, cereals and pulses, food products and stimulant foods. The results of ISO technical work are published as International Standards (ISO standards). This work is carried out by a setup of 191 technical committees covering different commodities traded internationally. One of the ISO Technical Committee (ISO/TC 34) deals with agricultural food products. This technical committee has 15 sub-committees dealing with various food commodities groups such as fruits and vegetables; milk and milk products; meat and meat products; and spices and condiments. The subcommittees have participating members, observer members and liaison members. The ISO standards published for different commodities are subject

to periodical review every five years with a view to keeping the standards up-to-date under the working procedure of ISO. The ISO-9000 is a series of international standards for a quality oriented system and is applicable both to manufacturer and service industry.

The Codex Alimentarious Commission (CAC) was established in 1963 by the Food and Agriculture Organization of the United Nations and the World Health Organisation. The CAC establishes food standards which are termed as Codex Alimentarious. The words codex alimentarious in latin mean food law or food code. The primary objective of the commission is to offer protection to consumers and facilitate world trade by establishing uniform international standards. The codex standards can play a vital role in every aspect of food security system, *i.e.*, production, storage and transportation. These standards include guidelines, code of practices and other advisory provisions that aim at promoting the purpose of these standards. At present, there are 144 members (countries) of this commission. The establishment of the international food standards under CAC is a long-drawn process. The commission appoints Subsidiary bodies or committees to prepare preliminary proposed draft standards. The standards so formulated are circulated to all member countries for getting their comments. Finally, the draft standards are circulated for implementation. The commission meets periodically to review these standards.

STORAGE AND WAREHOUSING

STORAGE

MEANING AND NEED

Storage is an important marketing function, which involves holding and preserving goods from the time they are produced until they are needed for consumption. Storage is an exercise of human foresight by means of which commodities are protected from deterioration, and surplus supplies in times of plenty are carried over to the season of scarcity. The storage function, therefore, adds the time utility to products.

Agriculture is characterized by relatively large and irregular seasonal and year-to-year fluctuations in production. The consumption of most farm products, on the other hand, is relatively stable. These conflicting behaviours of demand and supply make it necessary that large quantities of farm produce should be held for a considerable period of time.

The storage function is as old as man himself, and is performed at all levels in the trade. Producers hold a part of their output on the farm. Traders store it to take price advantage. Processing plants hold a reserve stock of their raw materials to run their plants on a continuous basis. Retailers store various commodities to satisfy the consumers day-to-day needs. Consumers, too, store foodgrains, depending on their financial status.

local names in various regions. In Rajasthan the underground storage structures for foodgrains are known as 'khai'. The advantages of underground storage structures are:

(i) Foodgrains in an underground storage structure are more free from the seasonal variations in temperature and humidity provided that adequate precautions are taken against the seepage of water in the structures, especially in areas where the water table is high;

(ii) Underground storage structures are safer from threats from various external sources of damage, such as theft, rain or wind. However, they are not good when the quantity available for storage is small, and there are a number of varieties to store;

(iii) The underground storage space can temporarily be utilized for some other purposes with minor adjustments; and

(iv) The underground storage structures are easier to fill up owing to the factor of gravity. However, it becomes cumbersome to take out the grains from these structures.

Surface Storage Structures

The advantages of surface storage structures are:

(i) They can be maintained in more hygienic conditions by cleaning or whitewashing them;

(ii) They are more convenient for inspection and the performance of various operations during storage, such as spraying and dusting, fumigation and turning of the grains; and

(iii) The danger of heating up of grain due to internal heat is less.

However, the cost of storage in terms of the maintenance of storage structure, handling costs, and losses due to external factors are higher in surface structures. Vertical silos on the ground are often constructed for storage; but these have a limited application because of their cost and the requirements of energy for their operation. The losses are low; but the absence of bulk transport facilities, and the use of traditional handling and marketing methods make them unsuitable in larger numbers. Their utility for storage is at the ports for the export/import of foodgrains. The Food Corporation of India has undertaken the construction of vertical silos (on the ground) at a few places.

Foodgrains in a ground surface structure can be stored in two ways–bag storage or bulk storage.

(a) *Bag Storage:* Farm products are stored after placing them in gunny bags made of jute. Storage in bags has following advantages:

(i) Each bag contains a definite quantity which can be bought, sold or despatched without difficulty;

(ii) Bags are easier to load or unload;

(iii) It is easier to keep separate lots with identification marks on the bags;

(iv) The bags which are identified as infested on inspection can be removed and treated easily; and

(v) The problem of the sweating of grains does not arise because the surface of the bag is exposed to the atmosphere.

(b) *Bulk or Loose Storage:* Farm products are sometimes stored in surface structures in a loose form. The advantages of this method are:

(i) The exposed peripheral surface area per unit weight of grain is less. Consequently, the danger of damage from external sources is reduced; and

(ii) Pest infestation is less because of almost airtight conditions in the deeper layers.

These two points in favour of bulk storage are significant. The only precaution necessary for bulk storage is to avoid the sweating of grains.

The storage structures used in villages are very faulty, leading to high storage losses. The structures adopted in a village for the storage of farm products in India are made of the raw materials available in the area. Some common structures are:

a) Kothi or Mud pots – These are cylindrical in shape and are made up of unburnt clay mixture with straw and cowdung or cowdung, mud and bricks. The capacity of these varies from one to 50 tonnes.

b) Kuthla – These are cylindrical bins of mud-brick mixed with straw and cowdung.

c) Thekka – These are rectangular in shape and are made up of gunny or cotton wound around wooden support.

d) Metal Drums – These are cylindrical in shape and are made up of iron sheets.

e) Gunny Bags – These bags are made up of jute and are used for storing foodgrains and oilseeds.

The Government of India has made efforts to promote improved storage facilities at the farm level. Realising the importance of a scientific storage of grains, the Department of Food at the Centre has launched a programme to impart scientific knowledge to farmers. This programme is known as the Save Grain Campaign. Indian scientists and agriculturists, working together with UNDP/FAO experts, have designed and fabricated improved storage bins for the use of farmers which are moisture resistant and rodent-proof. The drive to improve grain storage facilities resulted in the establishment of the Indian Grain Storage Institute (IGSI) in 1958 at Hapur (Uttar Pradesh). Two Field Stations at Ludhiana (Punjab) and Bapatala (A.P.) were also established to assist the Institute in field research and testing. The institute tries to design and develop suitable structures of all materials, capacities and types for various grains to suit different regions.

Essentials of a Good Foodgrains Storage Structure

Foodgrain storage structures must have the following specific characteristics:

(i) There must be enough strength in the walls and floor to support the weight of the grain to be stored;

(ii) The structure should be inaccessible to insects, birds, rodents, unauthorised persons and moisture to save quality and quantity losses;

(iii) The structure should be free from excess heat or rapid changes in temperature; and

(iv) The structure must provide for the easy entry and removal of the grain as well as for the application of insecticides and pesticides, if there is any need for them.

IMPROVED GRAIN STORAGE STRUCTURES

Keeping these points in view, various institutions engaged in research have evolved improved storage structures for farm as well as for large-scale storage. These improved grain storage structures are:

1. *For Small-scale Storage*

(a) *PAU bin :* This is a galvanized metal iron structure designed by the Punjab Agricultural University, Ludhiana. Its capacity ranges from 1.5 to 15 quintals.

(b) *Pusa bin :* This is a storage structure designed by the Indian Agricultural Research Institute (IARI), New Delhi, and is made of mud or bricks with a polythene film embedded within the walls. The polythene acts as a moisture barrier.

(c) *Hapur Tekka :* This is a storage structure designed by the Indian Grain Storage Institute, Hapur. It is a cylindrical rubberised cloth structure supported by bamboo poles on a metal tube base, and has a small hole in the bottom through which grain can be removed.

2. *For Large-scale Storage*

(a) *CAP Storage (Cover and Plinth) :* This has been developed by the Food Corporation of India. It involves the construction of brick pillars to a height of 14" from the ground, with grooves into which wooden crates are fixed for the stacking of bags of foodgrains. The whole unit is then covered with a thick polythene sheet. The structure can be fabricated in less than 3 weeks. It is an economical way of storage on a large scale.

(b) *Warehouse :* These are scientific storage structures constructed on a large scale. Warehouse facilities in several areas have been created by the Food Corporation of India, the Central Warehousing Corporation, the State Warehousing Corporations and Co-operative Marketing Organizations.

(c) *Silos :* The Food Corporation of India has constructed a few scientific silos for storage of foodgrains in main surplus producing areas like Punjab. In these structures, the grains in bulk are unloaded on the conveyor belts and, through mechanical operations, are carried to the storage structure. The storage capacity of each of these silos is around 25,000 tonnes.

In order to develop facilities for applied research and apex level training in the field of storage and preservation of foodgrains, a Grain Storage Research and Training Centre was established at Hapur in 1958, which was later on expanded into Indian Grain Storage Institute (IGSI) with two field stations at Ludhiana and Bapatala (later shifted to Hyderabad) with the financial assistance from UNDP in 1968. Three field stations at Jabalpur, Jorhat and Udaipur were subsequently established in 1981. In 1996, the IGSI was renamed as Indian Grain Storage Management and Research Institute (IGMRI). While the research, development and training activities are taken by IGMRI, the work of popularizing scientific methods of foodgrain storage developed by IGMRI, among farming community is implemented through the Save Grain Campaign Scheme.

The IGMRI located at Hapur functions under the supervision of Ministry of Consumer Affairs, Food and Public Distribution. Attached to the Institute are five field stations. These field stations are primarily established for conducting intensive studies on the problems of handling and storage of wheat, rice, millets, pulses and oilseeds and are located in different agro-climatic zones of the country.

The main objectives of the IGMRI are:

(i) To investigate the nature, extent and degree of losses due to various factors in storage of agricultural commodities under different agro-climatic conditions.

(ii) To develop code of practices for proper grain storage and handling by recommending cost-effective techniques for control of insects, rodents, birds and microorganisms.

(iii) To develop improved types of storage structures, grain dryers, grain handling, cleaning and grading equipments, besides improvement in traditional storage structures using locally available and eco-friendly materials.

(iv) To develop suitable publicity material and semi-technical literature on grain storage and quality control in foodgrains.

(v) To train personnel from various organizations *viz.*, FCI, CWC, SWC, Civil supplies Corporations etc., as well as those from other developing countries sponsored by FAO, UNDP and Common Wealth Secretariat on grain storage management practices.

COST AND RETURNS ON STORAGE

The gross return on storage may be defined as the increase in the price of the stored product at the time of storage till it is "de-stored" and either sold or consumed. The cost of storage should include the following:

(i) The cost of the maintenance of the storage structure, *i.e.*, depreciation, repairs, insurance and interest on sunk capital; or, alternatively, the rent paid for hiring the storage structure;

(ii) Interest on the value of the stored goods;

(iii) Value of the quantitative and qualitative loss during storage;

(iv) Risk premium for a possible price fall and damage during storage;

(v) The cost of protective materials; for example, insecticides, pesticides, rodenticides, fumigation, gunny bags, electricity, polythene covers; and

(vi) Tax payments, payments to labour, etc.

These items of costs may be grouped into fixed or variable costs, depending on whether they vary with the quantity of goods stored or not. For example, for a professional warehouse owner, the maintenance and repair of the storage structure, the salaries of the permanent staff, depreciation on the building, taxes, record keeping, etc., are fixed costs. For a farmer, however, who is trying to decide whether to sell or store the grains for some time for later sale, all the costs are variable.

Whether it pays a farmer to store his farm produce may be worked out with the help of the following formula:

$$NR = GR - C$$

where

NR = Net returns to storage

$GR = P_1 - P_0$

P_0 = Purchase price or market price at the time of storage

P_1 = Selling or market price at the time of de-storing

C = Cost involved in storage

$NR > 0$, implies positive returns on storage

$NR < 0$, indicates negative returns on storage

The percentage margin (Ms) from storage may be calculated as:

$$Ms = \frac{P_1 - P_0 - C}{P_0 + C} \times 100$$

where all notations have meanings as defined earlier.

Let us understand this with the help of an example. Let there be a farmer who has the option of selling his wheat immediately after harvest in the month of April or of putting his produce in a warehouse for selling at a later date (say, in the month of December). The market price in the month of April is, say, Rs. 800 per quintal. Assume that his produce is lying on the auction platform in a regulated market yard, implying that in April, he gets a net price of Rs. 800 per quintal. The transportation of the produce to the warehouse will cost him (say) Rs. 10 per quintal. The loading and unloading charges prescribed by the Market Committee are (say) Rs. 4.00 per bag or per quintal. The charge of the warehouse is Rs. 10 per quintal per month. There is likely to be a loss of one percent of grains during loading, unloading and storage. The farmer can earn an interest of (say) 10 percent per annum. Using this information let us work out the minimum price that should be expected in December to make some profit from the storage of wheat. The answer to this ques-

tion requires estimating the costs of storage as also the return to be foregone. The details for a quintal of wheat are as follows:

	Items	*Rs.*
(i)	Charges of loading at the auction platform and unloading in the warehouse	8.00
(ii)	Transportation charges from the auction platform to the warehouse	10.00
(iii)	Warehouse charges for 9 months @ Rs. 10 per month	90.00
(iv)	Loss during storage and transit @ 1 percent of grains	8.00
(v)	Interest on Rs. 800 foregone for 9 months @ 10% per year	60.00
(vi)	Transportation charges from warehouse to the auction platform	10.00
(vii)	Loading at the warehouse and unloading at the auction platform	8.00
	Total	194.00

Using the notations given earlier, P_0 = 800, C = 194, NR will be positive only if P_1 or price of wheat in the month of December is expected to be more than the sum of P_0 and C, *i.e.*, Rs. 994.00

WAREHOUSING

Meaning and Functions

Warehouses are scientific storage structures especially constructed for the protection of the quantity and quality of stored products. Warehousing may be defined as the assumption of responsibility for the storage of goods. It may be called the *protector of national wealth*, for the produce stored in warehouses is preserved and protected against rodents, insects and pests, and against the ill-effect of moisture and dampness.

The warehousing scheme in India is an integrated scheme of scientific storage, rural credit, price stabilization and market intelligence and is intended to supplement the efforts of co-operative institutions. The important functions of warehouses are:

1. *Scientific Storage*: Here, a large bulk of agricultural commodities may be stored. The product is protected against quantitative and qualitative losses by the use of such methods of preservation as are necessary.

2. *Financing*: Warehouses meet the financial needs of the person who stores the product. Nationalized banks advance credit on the security of the warehouse receipt issued for the stored products to the extent of 75 to 80 percent of their value.

3. *Price Stabilization*: Warehouses help in price stabilization of agricultural commodities by checking the tendency to making post-harvest sales among the farmers. Farmers or traders can store their products during the post-

harvest season, when prices are low because of the glut in the market. Warehouse helps in staggering the supplies throughout the year. They thus help in the stabilization of agricultural prices.

4. *Market Intelligence*: Warehouses also offer the facility of market information to persons who hold their produce in them. They inform them about the prices prevailing in the period, and advise them on when to market their products.

This facility helps in preventing distress sales for immediate money needs or because of lack of proper storage facilities. It gives the producer holding power; he can wait for the emergence of favourable market conditions and get the best value for his product.

TYPES OF WAREHOUSES

Warehouses may be classified on two bases:

1. *On the Basis of Ownership*

(a) *Private Warehouses*: These are owned by individuals, large business houses or wholesalers for the storage of their own stocks. They also store the products of others.

(b) *Public Warehouses*: These are the warehouses which are owned by the government and are meant for the storage of goods of any member of the public against a prescribed storage charge. The method of operation and the charges for storage are regulated by the government.

(c) *Bonded Warehouses*: These warehouses are specially constructed at a seaport or an airport and accept imported goods for storage till the payment of customs by the importer of goods. These warehouses are licensed by the government for this purpose. The owner of the warehouse gives an undertaking to the government that customs duty will be collected from the person before he is allowed to remove the goods from the warehouse. In other words, the goods stored in this warehouse are bonded goods. They may be owned by the dock authorities or privately-owned; but they have to work under the close supervision and control of the customs authorities. The following services are rendered by bonded warehouses:

(i) The importer of goods is saved from the botheration of paying customs duty all at one time because he can take delivery of the goods in parts.

(ii) The operation necessary for the maintenance of the quality of goods—spraying and dusting, are done regularly.

(iii) Entrepot trade (re-export of imported goods) becomes possible. The importer may take delivery of the goods without paying the customs duty if they are to be re-exported. He is thus saved from the botheration of first making the payment of customs duties on imported goods and then getting a refund on re-exported goods.

2. *On the Basis of Type of Commodities Stored*

(a) *General Warehouses* : These are ordinary warehouses used for storage of most of foodgrains, fertilisers etc. In constructing such warehouses no commodity-specific requirement is kept in view.

(b) *Special Commodity Warehouses* : These are warehouses which are specially constructed for the storage of specific commodities like cotton, tobacco, wool and petroleum products. They are constructed on the basis of the specific requirements of the commodity.

(c) *Refrigerated Warehouses* : These are warehouses in which temperature is maintained as per requirements and are meant for such perishable commodities as vegetables, fruits, fish, eggs and meat. The temperature in these warehouses is maintained below 30° to 50°F or even less, so that the product may not get spoiled by high atmospheric temperature.

COSTS AND RETURNS OF A WAREHOUSING ENTERPRISE

The costs incurred in storage and warehousing can be divided into two groups:

(i) *Fixed costs*: These costs are of permanent nature and remain the same irrespective of the quantity stored in the warehouse. The main components of fixed costs are:

(a) Depreciation on building and machinery, if any;
(b) Insurance premium paid to the insurance company;
(c) Taxes, licence fees etc.;
(d) Repair and maintenance cost of the warehouse;
(e) Interest on the investment in construction of the warehouse;
(f) Salary of the permanent staff;
(g) Cost of records and book-keeping;
(h) Fixed part of the electricity charges (meter rent and minimum fixed charges).

(ii) *Variable Costs* : These costs are of varying nature, *i.e.*, they vary with the quantity stored in the warehouse. The main components of variable costs are:

(a) Cost of protective material used, *viz.*, insecticides, pesticides, rodenticides, gunny bags, polythene cover, wooden slabs etc.;
(b) Cost of electric power;
(c) Wages of temporary labour.

A young entrepreneur has constructed a warehouse with a storage capacity of 3000 quintals at a cost of Rs. 5.60 lakhs. The owner has to incur following expenditure on the operation of the warehouse:

(i) Interest on capital @ 15% per annum;
(ii) Repair and maintenance cost — Rs. 4000 per annum;
(iii) Cost of records and book-keeping — Rs. 2000 per annum;
(iv) Taxes and insurance premium — Rs. 5000 per annum;

(v) Wages of the manager and permanent labour — Rs. 60,000 per annum;
(vi) Electricity bill —Rs. 24,000 per annum;
(vii) Cost of protective material —Rs. 8,000 per annum;
(viij) Wages of temporary labour —Rs. 20,000 per annum.

Assuming 50 years as the life of the warehouse and 90 percent capacity utilization, the cost structure of the warehouse emerges as follows:

Particulars		Rate	Rs. per annum
Fixed Cost			
(i)	Depreciation on the building	2 per cent of Rs. 5.60 lakhs	11200
(ii)	Interest on the capital	15 per cent of Rs. 5.60 lakhs	84000
(iii)	Repairs and maintenance cost		4000
(iv)	Cost of account books & records		2000
(v)	Taxes and insurance premium		5000
(vi)	Wages of manager and permanent labour		60000
		Total fixed costs	166200
Variable Costs			
(vii)	Eleclricity bill		24000
(viii)	Cost of protective material		8000
(ix)	Wages of temporary labour		20000
		Total variable costs	52000

Total costs of storage per annum = 166200 + 52000 = 218200

Assuming a capacity utilization of 90 percent, the cost of warehousing for a month works out to Rs. 6.74 per quintal. This cost includes the return on capital investment. In case the entrepreneur has borrowed the capital, the interest that has been charged on the capital investment has to be repaid to the lender. He will be able to repay six-monthly instalment of Rs. 28000 and retain a sum of about Rs. 6000 a month as his profit, only if he is able to charge the users a rate of Rs. 10.70 per quintal per month.

WAREHOUSING IN INDIA

In 1928, the Royal Commission on Agriculture underscored the need for a warehousing system in India. The Central Banking Enquiry Committee, 1931, too, drew attention to this need. The Reserve Bank of India emphasized the need for warehouses as early as in 1944, and proposed that every State Government should enact legislation to regulate the functioning of warehouses. The All-India Rural Credit Survey Committee of the Reserve Bank of India (set up in 1951 and submitted its report in 1954) also made comprehensive recommendations for the development of warehousing as an integrated scheme of rural credit and marketing. As a result of the recommendations of the Committee, the Government of India enacted the Agricultural Produce

(Development and Warehousing) Corporations Act, 1956. The Act provided for:

(a) The establishment of a National Co-operative Development and Warehousing Board (which was set up on 1st September, 1956);

(b) The establishment of the Central Warehousing Corporation (which was established at Delhi on 2nd March, 1957); and

(c) The establishment of State Warehousing Corporations in all the States in the country (which were established in various states between July 1957 and August 1958).

In 1962, the Government of India decided to break up the Act of 1956 into two separate Acts—the National Co-operative Development Corporation Act, 1962, and the Warehousing Corporations Act, 1962. The Warehousing Corporations Act came into operation on 18th March, 1962. The Act defines the specific functions and the area of operations of Central and State Warehousing Corporations. It enlarged the list of the number of commodities meant for storage.

(a) *National Co-operative Development and Warehousing Board*

This board was set up on 1st September 1956 to perform the following functions :

(i) To advance loans and grants to State Governments for financing co-operative societies engaged in the marketing, processing or storage of agricultural produce, including contributions to the share capital of these institutions;

(ii) To provide funds to warehousing corporations and the State Governments for financing co-operative societies for the purchase of agricultural produce on behalf of the Central Government.

(iii) To subscribe to the share capital of the Central Warehousing Corporation and advance loans to State Warehousing Corporations and the Central Warehousing Corporation;

(iv) To plan and promote programmes through co-operative societies for the supply of inputs for the development of agriculture; and

(v) To administer the National Warehousing Development Fund.

In March 1963, the Board was converted into the National Co-operative Development Corporation (NCDC), and its functions were limited to co-operative development.

(*b) Central Warehousing Corporation (CWC)*

This Corporation was established as a statutory body in New Delhi on 2nd March, 1957. Under the new Act, the Central Warehousing Corporation was formally re-established on March 18, 1963. This Corporation which made a modest start with seven warehouses, with 7,000 tonnes capacity, in December 1957, had set up 458 warehouses in different places in the country, with

a total storage capacity of 78.87 lakh tonnes at the end of March 2001. Of this, the present utilization is nearly 85 percent of the total available capacity. The Central Warehousing Corporation provides safe and reliable storage facilities for about 120 agricultural and industrial commodities. The areas of operations of these central warehouses include centres of all-India and interstate importance.

The functions of the Central Warehousing Corporation are:

(i) To acquire and build godowns and warehouses at suitable places in India;

(ii) To run warehouses for the storage of agricultural produce, seeds, fertilizers and notified commodities for individuals, co-operatives and other institutions;

(iii) To act as an agent of the government for the purchase, sale, storage and distribution of the above commodities;

(iv) To arrange facilities for the transport of above commodities;

(v) To subscribe to the share capital of State Warehousing Corporations; and

(vi) To carry out such other functions as may be prescribed under the Act.

While foodgrains, sugar and fertilizers occupy 78 percent of the total utilized storage capacity, in the remaining 22 percent are stored cement, chemicals and other commodities. Warehouses of the corporation are fairly full all through the year.

Besides the conventional storage godowns, the Central Warehousing Corporation is running air-conditioned godowns at Kolkata, Mumbai and Delhi, and provides cold storage facilities at Hyderabad. Special storage facilities have been provided by the Central Warehousing Corporation for the preservation of hygroscopic and fragile commodities. The Corporation has been able to evolve a technique for a proper and scientific preservation of jaggery during the hot and rainy seasons by selective aeration and controlled conditions. It has set up special warehouses at some centres for the storage of jaggery. The jaggery stored in warehouses fetches a premium price in the market. The Corporation has also evolved techniques for the storage of spices, coffee, seeds and other commodities.

The Corporation is operating a number of customs bonded warehouses at important centres in Delhi, Amritsar, Ludhiana, Kolkata, Kandla, Ahmedabad, Baroda, Surat, Bhopal, Cochin, Ernakulam and Mumbai to enable exporters/importers to keep their commodities in a good condition, pending their shipment. It has also undertaken the storage and handling of export and import cargo at the international air-port at Palam, New Delhi. At this complex, all the facilities, including inspection and clearance by customs, the payment of duty into the bank, and space for clearing agents, have been provided by the corporation. It has put up a similar air cargo complex at Amritsar for the export/import of goods. It has been expanding its capacity at the port towns

to serve the industry and co-operative bodies. It has already established a sizeable capacity at Mumbai, Kolkata, Cochin, Chennai, Mangalore, Paradeep, Kandla, Haldia and Vizag.

The Corporation has introduced a scheme, called the Farmers Extension Service at selected centres to educate farmers in the benefits of a scientific storage and use of public warehouses. The Central Warehousing Corporation also provides a package of services, such as handling and transport, safety and security of goods; insurance, standardization, documentation, and other connected services and facilities.

(c) *State Warehousing Corporations (SWCs)*

Separate warehousing corporations were also set up in different States of the Indian Union. The first state warehouse was set up in Bihar in 1956. At the end of March 2001, State Warehousing Corporations were operating 1440 warehouses with a total capacity of over 131.38 lakh tonnes.

The area of operation of the State Warehousing Corporations are centres of district importance. The total share capital of the State Warehousing Corporations is contributed equally by the concerned State Governments and the Central Warehousing Corporation. The SWCs are under the dual control of the State Government and the Central Warehousing Corporation.

WORKING OF WAREHOUSES

Acts: The warehouses (CWC and SWCs) work under the respective Warehousing Acts passed by the Central or State Governments. They are licensed under the provisions of the Act.

Eligibility: Any person may store notified commodities in a warehouse on agreeing to pay the specified charges. The person is required to bring his produce to the warehouse for storage. The commodity is inspected, and the quality of the product is determined.

Warehouse Receipt (Warrant): This is a receipt/warrant issued by the warehouse manager/owner to the person storing his produce with them. This receipt mentions the name and location of the warehouse, the date of issue, a description of the commodities, including the grade, weight and approximate value of the produce based on the present price.

The warehouse warrant is a negotiable instrument and can be transferred by a simple endorsement and delivery. A delivery of part of the goods may be taken through this warrant by the depositor. Sometimes, the warrant may be non-negotiable.

Use of Chemicals: The produce accepted at the warehouse is preserved scientifically and protected against rodents, insects and pests and other infestations. Periodical dusting and fumigation are done at the cost of the warehouse in order to preserve the goods.

Financing: The warehouse receipt serves as a collateral security for the purpose of getting credit. Commercial banks advance up to 75 percent of the value of the produce stored in the warehouse.

Delivery of Produce: The warehouse receipt has to be surrendered to the warehouse owner before the withdrawal of the goods. The holder may take delivery of a part of the total produce stored after paying the storage charges.

The main provisions of the Act governing the grant of a licence to run warehouses were:

(a) Any person, including a company, association or corporate body may apply to the State Government for the grant of a licence to carry on the business of warehousing.

(b) The government grants the licence after examining the warehouse building and the financial soundness of the party, and after the realization of the prescribed fees.

(c) The licence has to be renewed periodically on payment of prescribed fees.

(d) The warehouse owner is authorized to receive only notified commodities for storage in his warehouse and issue receipts in a prescribed form.

(e) It is the responsibility of the warehouse owner to keep the premises clean, keep different lots of goods separately in the warehouse, and carry on such operations as are necessary to protect the goods against losses from damage and pilferage.

Number and Capacity of Warehouses

Table 4.12
Number and Capacity of Warehouses in India (including hired)

Year	Number			Capacity in Lakh Tonnes		
(end)	CWC	SWC	Total	CWC	SWC	Total
1957–58	7	–	7	0.07	–	0.07
1960–61	40	266	306	0.79	2.78	3.57
1970–71	102	601	703	8.36	18.11	26.47
1980–81	330	1050	1380	37.89	50.00	87.89
1990–91	495	1331	1826	66.48	93.54	160.02
1992–93	465	1350	1815	64.41	90.74	155.15
1993–94	458	1364	1822	63.73	95.58	159.31
1994–95	457	1370	1827	64.31	101.72	166.03
1995–96	458	1371	1829	69.24	114.71	183.95
1999–00	451	1440	1891	74.79	123.74	198.53
2000–01	466	1639	2105	83.91	148.99	232.90
2001–02	475	1540	2015	89.17	185.49	274.66

Source: a) Central Warehousing Corporation of India; quoted in Fertilizer Statistics, Various issues, Fertilizer Association of India, New Delhi, December 1994, p. III-64, and Economic Surveys, Various Issues, Government of India, New Delhi.

b) Government of India, Annual Report, 1995–96, and Foodgrains — Monthly Bulletin, July 1996, Ministry of Food, New Delhi.

The Government, the Food Corporation of India, Co-operative Marketing Societies and Central and State Warehousing Corporations have taken important measures for the creation of warehousing facilities in the country. As a result, a large number of warehouses/godowns have been built throughout the country in all important rural and urban centres, metropolitan cities, ports and railway stations.

(a) *Central and State Warehousing Corporations (CWC and SWC)*

The number and capacity of warehouses of CWC and SWC in the country at different points of time have been given in Table 4.12.

Considerable efforts were made to increase the storage capacity in the country. The number of warehouses, which had increased from only seven during 1957–58, to 306 during 1960–61, and 703 during 1970–71, went up to 1380 during 1980–81 and further to more than 2000 during 2001–02. The total capacity of warehouses which was almost negligible during 1957–58 went up to 275 lakh tonnes at the end of March 2002. Out of the total storage capacity of 275 lakh tonnes, nearly 89 lakh tonnes was with the Central Warehousing Corporation and remaining 186 lakh tonnes with State Warehousing Corporations.

The number of commodities stored in the warehouses has steadily increased. These include foodgrains, fibre crops, fertilizer, cement, rubber, cotton yarn, textiles, paper and leather.

(b) *Food Corporation of India*

Apart from CWC and SWCs, the Food Corporation of India has also created storage facilities. The Food Corporation of India has a storage capacity of 21 million tonnes. Most of the capacity is of covered type which include

Table 4.13
Storage Capacity of Food Corporation of India

(Lakh Tonnes)

At the end of		Covered	Cover and Plinth (CAP)	Total
1990–91	Owned	119.97	10.42	130.39
	Hired	75.95	14.74	90.69
	Total	195.92	25.16	221.08
1995–96	Owned	168.24	57.66	225.90
	Hired	40.29	–	40.29
	Total	208.53	57.66	266.19
2001–02	Owned	126.10	83.38	209.48
	Hired	141.07	–	141.07
	Total	267.17	83.38	350.55

Source: Food Corporation of India, New Delhi and Ministry of Food, Government of India, New Delhi.

conventional but scientifically designed godowns and silo complexes but a part of the storage capacity is of covered and plinth (CAP) type. The CAP storage capacity consists of cemented floor as the base and tarpaulins or other similar sheets as the cover (Table 4.13).

(c) *Co-operative Sector*

The co-operative sector has also built a storage capacity of 13.55 million tonnes up to March 2002. The co-operatives have also constructed 175 cold storage warehouses with a total capacity of 2.14 lakh tonnes. The National Co-operative Development Corporation had helped in constructing 55988 rural godowns and 9363 cooperative marketing godowns by the end of March, 2002. These co-operative godowns are used by the Food Corporation of India in times of need, and provide a readily available cushion when the procurement of foodgrains is at peak.

The *spatial* distribution of CWC, SWC, FCI and Cooperative marketing societies godowns constructed in the country is uneven across states with relatively poor storage facilities in the eastern states of the country. The available storage facility is also poor in the hilly and desert areas.

Table 4.14
Storage Capacity Available in India 2000–01

(Million Tonnes)

Storage Capacity Created by the Agency	Storage Capacity (owned)	
	1969	March 2001
1. Food Corporation of India and Department of Food	3.86	15.0
2. State Governments	2.66	–
3. Central Warehousing Corporation (CWC)	0.96	6.5
4. State Warehousing Cooperations (SWCs)	0.83	11.2
5. Cooperatives	2.60	13.6
6. Rural Godowns and Godowns Created by Marketing Societies	–	13.5
7. Others	–	10.3
Total Storage Capacity	10.91	70.1

Source: (i) Government of India, Planning Commission, Fourth Five-Year Plan 1969–74, New Delhi, 1969, p. 131 Quoted in the Book "Indian Foodgrains Marketing by Moore, John R; Johl, S.S. and Khusro, A.M., Prentice Hall of India, New Delhi, 1973, p. 127.

(ii) Report of the Expert Committee on Strengthening and Developing of Agricultural Marketing, Ministry of Agriculture and Cooperation, Government of India, New Delhi, June 2001.

(iii) Planning Commission, Tenth Five Year Plan (2002–07), pp. 548.

(d) ***Total Storage Capacity in India***

There are three main agencies, which are involved in the creation of storage facility in the public sector in the country *viz.*, Food Corporation of India, Central Warehousing Corporation and State Warehousing Corporations. Cooperative Marketing Societies also provide storage facilities at the primary marketing level. Recently rural godowns have also been constructed in rural areas under the Gramin Bhandaran Yojana initiated by the Government of India.

Total storage capacity available in India is shown in Table 4.14.

Total storage capacity available in the country in 1969 was only 10.9 million tonnes. This has increased to 70.1 million tonnes in 2000–01. However, this is considerably short of the requirements. The available storage capacity is sufficient only for 30 percent of total foodgrains production provided cent percent of the available capacity is utilized only for the storage of foodgrains.

Private sector has also created facilities for storage of agricultural commodities nearby their place of business but most of these storage structures are unscientific and are located in the congested lanes of cities/towns.

UTILIZATION OF WAREHOUSING CAPACITY

The utilization of warehousing capacity of the Central Warehousing Corporation was only 42 percent in 1959–60, which increased over time to 96 percent in 1970–71. The utilization of the capacity of State Warehousing Corporations increased from 64 percent in 1960–61 to 75 percent in 1968–69. At present, about 85 percent of their storage capacity is being utilized. Of the total storage capacity with CWC, 57 percent is utilized for foodgrains, seven percent for fertilizers and 36 percent for other purposes. But the available storage capacity, is mostly utilized by traders or public agencies. A study has indicated that only 29 percent of the warehousing capacity of the Central Warehousing Corporation and six percent of that of State Warehousing Corporations was utilized by farmers or their cooperatives.

The main reasons for the very low utilization of warehouses by farmers are:

1. Lack of knowledge about the facility of warehousing available for the farmers;
2. Locational disadvantages for warehouses to most of the cultivators located in villages;
3. Complicated and time-consuming procedure of depositing and withdrawing the produce from the warehouses;
4. Non-existence of nationalized banks in villages and the problem of arranging finance at the time of taking delivery of the receipt from the bank; and
5. Small quantity of surplus produce available with most farmers, and the pressing need for finance.

These apart, there are some fundamental factors responsible for lower use of warehouses and consequent slow progress in rural areas.

Development for going into the problem of storage of agricultural produce in rural areas. Based on the recommendations of this Committee, a scheme for the establishment of rural godowns, *viz.*, National Grid of Rural Godowns was launched by the Government of India in July, 1979. The scheme was aimed at the creation of a network of rural godowns in the country primarily to take care of storage requirements of agricultural producers particularly of small and marginal farmers in the rural areas. The scheme of rural godowns is intended to achieve the following specific objectives:

(i) Prevention of distress sale of foodgrains and other agricultural commodities immediately after harvest;

(ii) Reduction in quantity and quality losses arising at present by storage in sub-standard places;

(iii) Reduction in pressure on transport system in the post-harvest period;

(iv) Creation of employment opportunities in rural areas;

(v) Helping the farmers in getting loans against the stored produce; and

(vi) Helping in easy procurement of foodgrains by Food Corporation of India.

Rural godowns have been constructed with capacity ranging from 200 to 1000 tonnes depending upon the produce expected for storage in the area. The cost of construction of these godowns have been subsidized to the extent of 50 percent (shared equally by state and central government) and remaining 50 percent capital is to be arranged by the implementing agency (Cooperative Marketing Society) in the form of loan from the commercial banks. These rural godowns are constructed as per specifications and designs approved by the state warehousing corporations and are managed by the cooperative marketing societies. The state warehousing corporations provide technical guidance and supervision to the implementing agencies in the maintenance and management of rural godowns. The receipts issued by the managers of rural godowns on the basis of stocks is a negotiable instrument. On the basis of this receipt, farmers can get loan upto 80 percent of the value of the produce stored from the commercial banks.

The progress of rural godowns and marketing societies godowns constructed in India for creation of storage facilities in rural areas are shown in Table 4.15.

The scheme was modified from time to time. The construction of rural godowns got momentum in Gujarat, Maharashtra, Karnataka, Madhya Pradesh and Rajasthan.

To boost up the scheme of construction of rural godowns further, the Finance Minister in the budget speech, 2001 had announced a Credit Linked Capital Investment Subsidy Scheme for the construction of rural godowns. The main objectives of this scheme include the creation of scientific storage capacity with allied facilities in rural areas to meet the requirements of the farmers for storing farm produce, processed farm produce, consumers articles and agricultural inputs; promotion of grading, standardization and quality

Table 4.15
Progress of Rural Godowns in India

Year	Rural Godowns Number	Marketing Societies Godowns (Number)	Capacity (Million Tonnes)
1984–85	1494	NA	NA
1990–91	50555	8710	12.07
1995–96	54898	9363	15.00
1999–2000	68876	9414	13.74

Source: (i) Status paper on the Scheme regarding Establishment of Rural Godowns, Department of Rural Development, Government of India, New Delhi, 1986.
(ii) Status and Potential of Storage in Maharashtra, Pagire, B.V., D.V. Kasar; D.S. Nawadkar and H.R. Shinde, National Seminar on Rural Godowns held at NIAM, Jaipur on April 12–13, 2002.

control of agricultural produce to improve their marketability; prevention of distress sale; providing facility of pledge financing to strengthen agricultural marketing infrastructure in the country and to reverse the declining trend of investment in agricultural sector by private and cooperative sector. The main striking features of this new scheme were:

(i) Promotors for construction of rural godowns can be individual farmers, groups of farmers, partnership/proprietary firms, self-help groups (SHGs), non-government organizations (NGOs), companies, corporations, cooperatives, Agricultural Produce Market Committees, State Marketing Boards and Agro-Processing Corporations.

(ii) The subsidy component in this scheme was 25 percent of the capital cost as back-ended subsidy to be provided by the central government, 50% is the institutional loan and rest 25% is the owner's contribution.

This scheme of creation of rural godowns in the initial stage was approved for two years (2001–03) for creation of new rural godowns/renovation of existing godowns of the capacity of 2.0 million tonnes. The subsidy under this scheme is being released only for the godowns constructed outside the limits of the municipal corporation area and have a minimum capacity of 100-metric tonnes. The scheme has now been extended for the Tenth Five Year Plan (2002–07).

COLD STORAGES

The term cold storage refers to a refrigerated chamber for the storage of such perishable commodities as fruits, vegetables, fish, eggs, meat, dairy products, etc. In these storage structures, the temperature is controlled and maintained so that the stored perishable products may not deteriorate in quality. In a cold storage, the temperature is maintained in the range of–1.1°C to 10°C (30° to 50°F). The other form of cold storage is the freezer storage, in which the temperature is kept below 1.1°C (30°F), and the product remains in

The sector-wise distribution of cold storage facility available in India is shown in Table 4.17. Private sector has played the crucial role in providing cold storage facility. Nearly 89 percent of total cold storage units are privately owned which account for 95 percent of the total cold storage facility. The direct involvement of the government is negligible in cold storage sector. Most of the cold storage units are fully used for atleast four to five months of the year.

Table 4.17
Sectorwise Distribution of Cold Storage Facilities in India

Sector	Number of Cold Storage Units	Capacity of Cold Storage Units (Lakh Tonnes)
Private	3739 (89.04)	146.13 (94.98)
Cooperative	310 (7.39)	6.80 (4.42)
Public	150 (3.57)	0.91 (0.60)
Total	4199 (100)	153.85 (100)

Note: Figures in parentheses are percentages of the total number and total capacity of storage units.

Source: Report of Expert Committee on Strengthening and Developing of Agricultural Marketing, Ministry of Agriculture and Cooperation, Government of India, June, 2001.

Potato is the main product which is stored in the cold storage. Out of the total capacity utilisation, 88 percent is used for storing potato. Commodity-wise utilization of cold storage units in India can be seen in Table 4.18.

The construction of a cold storage requires heavy investment in terms of building and machines. Similarly, to run the cold store, the cost on electricity input is very high and it amounts to 50 percent of total running or variable cost. As such there is need to develop low cost and energy saving cold storage units.

For promotion of cold storage units in the private sector to meet their increasing needs, a capital investment subsidy scheme for construction/expansion/modernization of cold storages/storages for horticultural produce has been initiated by Government of India. This scheme is implemented by National Horticulture Board. Under this scheme, the promoters of cold storage units are provided 25% back-ended capital investment subsidy, 50% is provided as term loan and 25% is promoter's contribution. The proposals are considered and sanctioned by National Cooperative Development Corporation (NCDC) under cooperative sector. This scheme is implemented in those States/Union Territories, which do not control rentals for cold storages under any statutory or administrative order.

The available capacity of cold storage is much less than the country's requirements. It is barely sufficient for 15 percent of potato production and for less than one percent of fruits, vegetables and fish production. The cold storage requirement has further increased in view of the need to promote exports of processed foods.

Table 4.18
Commodity-wise Percentage Distribution of Cold Storage Units in India

Commodity	Number of cold storage units (%)	Capacity utilization (%)
Potato	63.0	88.3
Fruits & Vegetables	1.1	0.4
Milk & Milk Products	6.9	0.7
Meat	0.8	0.1
Fish	11.3	0.9
Meat and Fish	2.1	0.4
Multi-purpose	9.7	8.0
Others	5.1	1.2
Total	100.0	100.0

Source : Agricultural Marketing, XXIX (1), April–June, 1986.

There is a considerable scope for expansion of the cold storage industry in India. However, due to large capital requirements, lack of proper technical guidance, inadequate and fluctuating power supply and lack of appreciation for stored products, the entrepreneurs are not attracted to establish cold storage units. The lack of cold storage facilities is leading to heavy losses and violent fluctuations in prices of fruits and vegetables. There is a need to encourage cold storage industry in several regions of the producing areas as well as in large urban centres.

In India, the production patterns, dietary habits and economic considerations warrant long period of storage in large quantities of onion and potato. The conditions required for the storage of potato and onions are distinctly different. While the potato requires low temperature and high relative humidity, onions require low temperature and low relative humidity. Most of the cold storages in the country meet the storage requirements of these two vegetables. For other vegetables, temporary storage structures for short period usually not exceeding a week are needed along the route of their movement from producing areas to consuming centres.

As per the estimates of the Expert Committee on Strengthening and Developing of Agricultural Marketing (Government of India, June 2001), there is a need for construction of 15000 cold storage units with 45 lakh tonnes capacity in the next ten years for storage of increased output of horticultural products. There is also need for technological upgradation for cost effective refrigeration machinery and improvement in the methods of scientific preservation of perishable commodities.

The country would also need reefer containers/vans for transport of perishable commodities for domestic and export marketing. Their availability was nil in fifties but increased in recent years to 400. During the next 10 years, it

is estimated that atleast 3000 reefer containers/vans each of 8 tonnes capacity would be needed to handle the available surplus of perishable agricultural products (Government of India, June 2001).

Considering the fact that an average farmer may not need and have access to mechanical refrigerated cold stores; ventilated storages like direct evaporation cooled structures; energy cool chambers; cool homes and forced evaporation cool stores have been developed. These structures provide relatively lower temperature and high humidity as compared to ambient conditions because of natural/forced evaporative cooling. These can be constructed with locally available materials. The zero energy cool home, AADF CIP design cool home and two-tier structures can be afforded by the farmers on their farms. However, other improved structures can be constructed by growers co-operatives or owners of large size farms.

PROCESSING AND VALUE ADDITION

Processing is an important marketing function in the present-day marketing of agricultural commodities. A little more than 100 years ago, it was a relatively unimportant function in marketing. A large proportion of farm products was sold in an unprocessed form, and a great deal of the processing was done by the consumers themselves. At present, consumers are dependent upon processing for most of their requirements. Many technological changes have occurred in the recent past, such as the introduction of refrigeration, modern methods of milling and baking foodgrains, new processing methods for dairy products, and modern methods of packing and preservation. These technological changes have had a significant impact on the standard of living of the consumers, on the economic and social organizations of society, and on the growth of trade in the country. Value addition in food in India is only seven percent as against 23 percent in China, 45 percent in Phillipines and 188 percent in U.K.

MEANING

The processing activity involves a change in the form of the commodity. This function includes all of those essentially manufacturing activities which change the basic form of the product. Processing converts the raw material and brings the products nearer to human consumption. It is concerned with the addition of value to the product by changing its form.

The processing of agricultural commodities can take any of the following forms:

1. Food Processing

i) Milling of grains: Wheat flour milling, rice milling and pulse milling;
ii) Manufacture of edible oils and oilcakes from oilseeds;

iii) Manufacture of hydrogenated and vanaspati oils;
iv) Manufacture of sugar, gur and khandsari from sugarcane;
v) Manufacture of dairy products like ghee, butter, khoa, milk powder and cream from liquid milk;
vi) Canning and preservation of fruits and vegetables;
vii) Manufacture of juices and other products from fruits and vegetables;
viii) Slaughtering of animals and preparation of meat;
ix) Canning and preservation of fish;
x) Manufacture of bakery and confectionary products;
xi) Tea processing;
xii) Coffee curing and roasting;
xiii) Cashewnut processing;
xiv) Manufacture of starch;
xv) Manufacture of prepared animal feed.

2. Agro-related Processing (Other than food processing)

i) Processing of tobacco leaves and manufacture of tobacco products;
ii) Brewing and manufacture of beverages;
iii) Manufacture of yarn, cloth and made ups (cotton & jute);
iv) Leather processing and manufacture of leather and fur products;
v) Manufacture of wood products, furniture and fixtures;
vi) Manufacture of paper and paper products.

There are several methods of processing agricultural commodities. But they continually undergo a change because of—

(i) A change in technology;
(ii) A change in capital-labour price ratio;
(iii) A change in managerial skill;
(iv) A change in the demand for product quality in the market; and
(v) A change in the volume to be processed.

ADVANTAGES

The processing of agricultural products is essential because very few farm products—milk, eggs, fruits and vegetables—are consumed directly in the form in which they are obtained by the producer-farmer. All other products have to be processed into a consumable form. Processing is important, both for the producer-sellers and for consumers. It increases the total revenue of the producer by regulating the supply against the prevailing demand. It makes it possible for the consumer to have articles in the form liked by him. The specific advantages of the processing function are:

1. It changes raw food and other farm products into edible, usable and palatable forms. The value added by processing to the total value produced at the farm level varies from product to product. It is nearly 7 percent for rice and wheat, about 79 percent for cotton and 86 percent for tea. It is generally

higher for commercial crops than for food crops. Examples of the products in this group are: the processing of sugarcane to make sugar, gur, khandsari; oilseeds processing to make oil; grinding of foodgrains to make flour; processing of paddy into rice; and conversion of raw mango into pickles.

2. The processing function makes it possible to store perishable and semi-perishable agricultural commodities which otherwise would be wasted and facilitates the use of the surplus produce of one season in another season or year. Examples of the processing of the products in this group are: drying, canning and pickling of fruits and vegetables, frozen foods, conversion of milk into butter, ghee and cheese and curing of meat with salting/smoking.

3. The processing activity generates employment. The baking industry, the canning industry, the brewing and distilling industry, the confectionary industry, the sugar industry, oil mills and rice mills provide employment to a large section of society.

4. Processing satisfies the needs of consumers at a lower cost. If it is done at the door of the consumer, it is more costly than if it is done by a firm on a large scale. Processing saves the time of the consumers and relieves them of the difficulties and botherations experienced in processing.

5. Processing serves as an adjunct to other marketing functions, such as transportation, storage and merchandising.

6. Processing widens the market. Processed products can be taken to distant and overseas markets at a lower cost.

VALUE ADDITION AND PROCESSING OF AGRICULTURAL COMMODITIES

Agricultural products are processed by employing different types of machinery and technology. The type of processing ranges from simple drying, parboiling, husking, polishing, and grinding to the complex form of producing an altogether new product. Hydrothermal treatment is one of the most common steps in the processing of foodgrains. Hydrothermal treatment of grains refers to the addition of moisture and heat to the grains for improving the quality and quantity of their product or to facilitate different milling operations for the desired products. This treatment is also called conditioning of grains and is a pre-milling treatment. This treatment is used for such purposes as:

(i) Improving shelling efficiency;

(ii) Improving nutritional quality;

(iii) Improving milling quality in paddy;

(iv) Facilitating dehulling of corn and wheat;

(v) Facilitating de-husking and splitting of kernels during milling of pulses;

(vi) Reducing toxic effect by soaking into hot water, as in the case of Kesari dal;

(vii) Removing disagreeable odour as in case of soyabean.

The methods used in processing wheat, paddy, pulses, oilseeds, fruits, vegetables, cashewnuts and milk have been given in the paragraphs that follow.

Processing of Wheat

In India, about 90 percent of the wheat is consumed in the form of chapatis and 10 percent as bread, biscuits, buns and other bakery products. Irrespective of the form of consumption, wheat grains are required to be milled to convert them into flour or other forms of brokens (like *dalia*). Wheat grain consists of 85 percent endosperm, 12 percent bran and 3 percent germ.

Milling

Wheat milling involves grinding the kernel into a whole wheat flour and separating the bran from the white flour (endosperm). The milling of wheat in India is done in the following ways:

1. *Stone Grinding by Hand*: This method is used to grind wheat in most of the rural households. A housewife, by using stone *chakkis* which are operated by hand, mills 0.5 to 1 kg of wheat per hour.

2. *Chakkis*: This is a low capacity power-operated grinding device used in villages. The cost of miling is high; but because of their convenience, they are widely prevalent in Indian villages. In recent years, several companies have come out with small electric-operated milling sets which are being used by several middle and high income families to make flour for their domestic use.

3. *Roller Mills*: Most of the wheat flour in India is produced by roller flour mills. The steps involved in roller flour milling are:

(a) *Cleaning*: Wheat is first cleaned of stones, dirt, weeds and foreign matter by separators, aspirators, scourers, magnets and washers.

(b) *Tempering*: The cleaned wheat is moistened and held in tempering bins for 8 to 24 hours to toughen the outer coat and mellow the endosperm.

Table 4.19
Number of Rice Mills and Roller Flour Mills in India
(As on January 1)

Year	Rice					Wheat Roller Flour Mills
	Hullers	Shellers	Huller cum Shellers	Modern Rice Mills	Total	
1970	51888	2302	4832	–	59022	206
1975	80077	3676	7240	340	91333	232
1980	73306	4283	8065	5071	90725	232
1985	79197	4484	6654	17826	108161	454
1988	84485	4678	7845	26753	123761	NA
1996	91801	4538	8365	34163	138867	812

Source: Ministry of Food Processing, Quoted in Bulletin on Food Statistics 1987–89, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, New Delhi, pp. 99–101 and Annual Reports.

(c) *Blending*: Wheat grains of various protein content are mixed to produce flour of the desired quality.

(d) *Grinding and Separating*: Wheat grain is first broken by a pair of corrugated rollers. The whole wheat flour is repeatedly rolled, sifted and purified till a complete separation of the bran has been achieved.

The first roller flour mill in India was set up in 1880. The number increased to 40 in 1940 and 111 in 1958. By 1970, the number of roller flour mills went up to 206. Since then, the trend in the number of roller mills is shown in Table 4.19. By 1980, the number of roller flour mills increased only marginally to 232. But there has been a sharp increase in their number during the later period. The number increased to 454 in 1985 and further to 812 in 1996. At present, around 10.5 million tonnes of wheat is converted to various wheat products by these roller flour mills.

The state-wise distribution of roller flour mills shows wide variation. The leading flour-producing states, as reflected from the number of roller flour mills, are Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, Bihar, Andhra Pradesh, West Bengal, Haryana and Punjab.

In India till 1991, the roller flour mills were regulated by the government through licensing. However, since July 1991, licensing has been abolished for setting up of new roller flour mills or for expansion in the capacity of existing units. No licence is required for the manufacture of wheat products. There are no controls on price and distribution of wheat products either. The mills are free to obtain their requirement of wheat from any source, including that from the Food Corporation of India.

Costs and Margins in Processing of Wheat

The costs and margins of flour mills in the processing of wheat into flour as estimated by Malik *et al.*[10], can be seen in Table 4.20.

The cost of processing of wheat in late eighties was estimated as Rs. 17 to Rs. 18.80 per quintal depending on the size of the mill. The unit cost of processing is less and the net return per unit is more in the case of a mill with higher capacity as compared to a mill with lower capacity.

Baking

India has a large baking industry, which is engaged in the manufacture of biscuits, bread, bun, cakes and pastries. This industry is growing rapidly because of the increase in urbanization, in population, in the per capita income of the masses, and the changes in tastes. In urban areas, a large number of bakeries, both small and large, are functioning.

Bread and biscuit manufacturing in India is reserved for small-scale sector. The production of bread and biscuits, both in the organised and unorganised sectors is estimated to be 14 lakh tonnes and 10 lakh tonnes respectively. Out of the total biscuits manufactured in India, nearly one-third is in the

Table 4.20
Average Cost of Processing of Wheat into Wheat Flour

Particulars	20 H.P. Flour mill		10 H.P. Flour mill	
	Rs.	percentage	Rs.	percentage
I. Fixed Cost				
(i) Depreciation	2032	8.3	1372	6.8
(ii) Interest on fixed capital @ 14% per annum	2624	10.7	1740	8.6
Total Fixed Cost	**4656**	**19.0**	**3112**	**15.4**
Quantity of wheat processed (Quintals)	1440	–	1080	–
Fixed Cost per Quintal	**3.20**	–	**2.90**	–
II. Variable Cost				
(i) Labour charges	8400	34.2	8300	40.9
(ii) Electricity charges	5040	20.6	3780	18.6
(iii) Repairs and maintenance	1252	5.1	1210	6.0
(iv) Rent of the building	2250	9.2	1700	8.3
(v) Loss in processing	2880	11.7	2160	10.6
(vi) Interest on working capital @ 14% per annum for one month	46	0.2	44	0.2
Total Variable Cost	**19868**	**81.0**	**17194**	**84.6**
Variable Cost per Quintal	13.80	–	15.90	–
III. Total Cost (I + II)	24524	100.0	20306	100.0
IV. Cost of processing per quintal	17.0	–	18.80	–
V. Charges of the processor per quintal of wheat	20.00	–	20.00	–
VI. Net return per quintal	3.00	–	1.20	–

Source: Malik, H.S., Sriniwas and A.C. Gangwar, Comparative Efficiency of Processing Units and Marketing Channels of Wheat Flour in Hisar Market of Haryana, Indian Journal of Agricultural Marketing, IV (2), July–December, 1990, p. 211.

organised sector and remaining two-thirds in the small-scale and unorganised sector.

Processing of Paddy

Paddy-rice milling is one of India's largest industries, for the output of this industry exceeds the total of all the other foodgrain processing industries. Paddy consists of about 20 percent husk, 6 percent bran, 2 percent germ and 72 percent endosperm.

There are six major steps in the processing of paddy, depending upon the method used for processing.

(i) *Drying* : Drying refers to the reduction of the moisture content in paddy to about 14 percent. At the time of harvesting, paddy contains 16 to 18 per-

Table 4.21
Comparison of Different Rice Milling Methods

Particulars	Rice Milling Methods			
	Hand Pounding	Huller Mill	Sheller Mill	Rubber Mill
When introduced in India	Oldest	1920	Quite popular	1965
Quantity of paddy milled in India through the method	Over 40 per-cent	31% of paddy crop and over 50% of the paddy not hand pounded	25% of paddy crop and 45% of that not hand pounded	About 4% (balance)
Capital cost (Rs.)	75	3,750 to 4,000	37,500 to 45,000	65,000* (Rs. 25 lakh for complete unit)
Paddy intake per day of 8 hours	60 kg	2 tonnes	8–16 tonnes	8–16 tonnes
Yield of processed rice from paddy (remaining is bran, brokens and husk)	60–65 percent	65 percent	65–68 percent	70–72 percent
Cost of milling per tonne of rice (Rs.)	37.50 to 45.75	9.25 to 15.50	6.25 to 12.50	NA

*For milling equipment only. This does not include mechanical drying, parboiling and *silo* storage.
Source : Moore, J.R., S.S. Johl and A.M. Khusro: *Indian Foodgrain Marketing*, Prentice-Hall of India Private Limited, New Delhi, 1973, p. 148.

cent moisture. Drying can be done either in the sun or by means of a mechanical drier (forcing heated or unheated air through the paddy in a bin or a thin moving stream). Mechanical drying was introduced in India in 1965.

(ii) *Cleaning* : Cleaning is done to remove the foreign matter present in the paddy.

(iii) *Parboiling* : Parboiling involves soaking and steaming paddy to impart a desired flavour to it and to increase the out-turn. It reduces breakage in milling, improves storage life, and helps in the preservation of vitamins and protein in the rice grains.

(iv) *Husking* : Husking refers to the removal of husk from the rice grain. Rice milling is undertaken to remove the husk and a specified percent of bran from the seeds and endosperm.

Four principal rice milling methods are employed in India. These are :

(a) *Hand Pounding* : This method involves the pounding of paddy with poles or a pestle and mortar.

(b) *Huller Mills* : The heart of a huller rice mill is a fluted metal cylinder rotating with 500 to 600 rpm within a hollow stationary cylinder. Husk and bran are removed in one operation by abrasive action. The rice is polished by a second and third pass through the machine.

(c) *Sheller Mills* : An under-run disc sheller consists of two stones or composition wheels, each 18" to 56" in diameter, and laid on top of one another. Between these two stones, paddy is husked by the rotation of the adjustable lower wheel. The bran is removed by polishing cans or rice hullers. The husk, bran and rice are separated mechanically.

(d) *Rubber Roller Mills* : Each mill consists of a pair of rotating rubber rollers between which paddy is poured at one to four tonnes per hour, depending on the design of the mill. Shelling results from the abrasion created by the two rollers turning at slightly different speeds. Soft rollers minimize breakage.

A comparison of the four rice milling methods is given in Table 4.21. In 1969, there were 52192 mechanized rice mills of all types in India. This number increased to 123761 in 1988 and further to 138867 in 1996. The increase in the number of different types of rice mills in India between 1969 and 1996 is shown in Table 4.19. The relatively much sharper increase in the modern rice mills is due to their much superior milling efficiency at 70 to 72 percent as compared to a meagre 60 to 65 percent for hand pounding, 61 to 65 percent for hullers, and 62 to 63 percent for sheller and huller–cum–sheller mills.

(v) *Polishing*: Polishing is the removal of bran and germ from the rice grain.

(vi) *Separating*: This means separation of the parts of broken grain from whole grain.

(vii) *Grading*: Grading is separation of rice by size. Head rice are the grains that are 3/4th of a whole grain and larger brokens are smaller grains.

PROCESSING OF PULSES

Pulses are rich in protein (lysine) and constitute 10 to 15 percent of India's foodgrain diet. Pulses are main source of protein in vegetarian diet. They are mainly consumed in the form of de-husked split pulses. The important pulses are gram (Bengal gram), arhar or tur (red gram), moong (green gram) and urad (black gram). It has been estimated that more than 75 percent of the pulse crops are consumed as dal (split grain). The other uses of pulse crops are parched gram, besan (dal flour) and cattle feed. Pulse processing is generally known as milling. There are 10,000 pulse milling units in the country.

Milling of pulses means removal of the outer husk and splitting of the grain into two equal halves. Generally, the husk is more tightly held by the kernel of some pulses than most cereals. Therefore, dehusking of some pulses, poses a problem. The method of alternate wetting and drying is used to facilitate dehusking and splitting of pulses. In India, the dehusked split pulses are produced by traditional method of milling. In traditional pulse milling methods, the loosening of husk by conditioning is insufficient and as such a large abrasive force is applied for the complete dehusking of the grains. This results in high losses in the form of brokens and powder. The yield of split pulses in traditional milling method is only 65 to 70 percent in comparison to 82 to 85 percent potential yield.

There is no common processing method for all types of pulses. Dal is made in a series of steps, both at home and in the mills. The important steps involved in dal-making are:

(i) *Cleaning*: Removing foreign matter from the main pulse grains.

(ii) *Dampening*: Soaking the grains in water for the desired period of time.

(iii) *Tempering*: Keeping the soaked grains after removal from water for drying in the sun.

(iv) *Splitting*: Grinding the grain to-make *dal.*

(v) *Husking*: Removing the husk from the *dal.*

Dal may be further processed by grinding it into flour (besan). *Dal* processing plants are located in the main pulse-producing and trading States of India. They range in size from cottage industries to multi-storeyed plants, using pneumatic conveyors.

Processing of Oilseeds

Oilseeds are a group of farm products which are consumed only after they have been processed. They contain oil and cake. The following methods are generally used in processing oilseeds. The method depends on the type of oilseed to be processed and the availability of power.

(i) *Bullock-driven Ghani Method*: *Ghani* is a traditional method of oilseed processing. A ghani consists of a wooden vessel in which oil is collected and which is attached to a wooden log rotated by a single bullock. The quantity of

oilseeds to be processed at a time is about 10 kg, and the process takes about 2 hours. The oil and cake extracted by this method are of better quality than those extracted by other methods.

(ii) *Electric-driven Ghani Method* : This is similar to the traditional bullock-driven *ghani* except that, here electric, instead of bullock power is used to rotate the *ghani*. The process take less time. The quantity of oilseed processed per day is higher than that processed by the bullock-driven method.

(iii) *Expeller Method* : This method has become very popular and is generally used nowadays. Expellers of different sizes are available. The capacity and time taken by each expeller vary with its size. The oil recovery percentage is higher by this method than by the *ghain* method.

(iv) *Solvent Extraction Method* : By the above methods, 5 to 12 percent oil is left in the cakes. To remove this extra quantity of oil, the solvent extraction method is used. The oilcake is treated with hexine to dissolve the oil present in it. The solution containing the oil and the solvent is then passed through condensers, where oil is distilled. The distilled oil is non-edible and is used mainly in the soap industry. The solvent-extracted meal is used as a feed for dairy cattle because of its high protein content. This methods is also used for extracting oil from soyabean seeds.

The number of oilseeds processing units and their installed capacity in India are given in Table 4.22.

Table 4.22
Number and Capacity of Oilseed Processing Units in India

Type of Processing Plant	Number of Units	Installed Capacity (Million tonnes)	Capacity Utilization (%)
Ghanis	1,31,600	10.0	10.0
Oil Mills (Expeller)	20,000	25.0	30.0
Solvent Extraction Plants	761	13.0	34.0
Refineries	130	0.8	50.0
Vanaspati Plants (hydrogenation)	145	1.6	37.0

Most of the oil mills have processing capacities of 1 to 5 tonnes per day. Nearly 10 percent of the oil mills in the country have the capacity of more than 25 tonnes per day. Number of oil mills with a capacity of more than 50 tonnes per day is only around one percent of the total mills.

The returns and costs of an oilseeds processing unit can be worked out easily. Suppose an entrepreneur has installed a unit consisting of two oil expellers for processing of groundnut in a major groundnut growing district. He has borrowed a sum of Rs. two lakhs from a commercial bank at an interest rate of 15 percent per annum. Out of this loan he invested Rs. one lakh each

on the construction of the building and on the purchase of expellers and other necessary accessories. The capacity of each expeller is 7.50 qtls. of groundnut per day. The expeller remained in use for 200 days during the year. He purchased groundnut at price of Rs. 1000 per quintal and could sell oil and cakes at average prices of Rs. 33 and Rs. 5 per kg. respectively. The recovery of oil was 28 percent of the groundnut-in-shell. He paid Rs. 40,000 per annum as salary of the permanent workers. His electricity bill was Rs. 24,000 and repairs and maintenance cost during the year was Rs. 20,000. Based on this information, the cost of processing and the profit of the entrepreneur are as follows:

Particulars	Rate	Rs. per annum
Fixed cost		
1. Depreciation on building	@ 2% per annum on Rs. 100,000	2,000
2. Depreciation on expellers	10% per annum on Rs. 100,000	10,000
3. Interest on the capital	@ 15% on Rs. 2 lakh	30,000
4. Salary of permanent workers		40,000
	Sub Total	82,000
Variable costs		
1. Electricity charges		24,000
2. Repairs and maintenance		20,000
3. Other petty expenses		20,000
4. Wages of casual labourers		36,000
	Sub Total	1,00,000
	Total Costs	1,82,000
Purchase value of groundnut-in-shell (15 x 200) = 3,000 quintals @ Rs. 1,000		30,00,000
Returns		
Sale of Oil (840 quintals @ Rs. 3300		27,72,000
Sale of Oilcakes (42% of groundnut-in-shell, *i.e.*, 1260 quintals @ Rs. 500)		6,30,000
	Total Returns	34,02,000
Net Profit (34,02,000 – 30,00,000 – 1,82,000)		2,20,000

PROCESSING OF FRUITS AND VEGETABLES

Although fresh fruits and vegetables are still a delicacy, but with the increase in surpluses and the need to carry the surpluses from producing areas to the consumption centres, commercial processing of fruits and vegetables has gained importance in the recent years. The fruits are converted into such items as jam, jellies, squash, syrups and canned fruits through simple processing methods. Fresh vegetables are converted into pickles, sauces, dehydrated vegetables and frozen foods. The shelf life of such processed foods is more than that of fresh fruits and vegetables. Though the share of the farmers in the price paid by the consumer of such processed foods continues to be low, the processing industry has helped in providing market clearance to the growers of fruits and vegetables. Earlier, some processing of these was a common practice at the household level.

The growth of fruits and vegetables processing industries in India is shown in Table 4.23

Table 4.23
Growth of Fruits and Vegetables Processing Industries in India

Year	No. of Units	Installed Capacity ('000 tonnes)	Utilization ('000 tonnes)	Percentage Capacity Utilization
1980	2026	275	69.6	25.3
1985	3100	405	179.2	40.8
1990	3846	894	260.0	29.0
1995	4368	1760	850.0	48.3
1996	4674	1910	960.0	50.3
1998	NA	2080	940.0	45.2
2000	NA	2110	990.0	46.9

Source: (i) Indian Journal of Agricultural Marketing, Vol.14(3), Conference Special, September–December, 2000, p. 78.
(ii) Economic Survey, 1999–00, Ministry of Finance, Government of India, New Delhi.

Half of the installed capacity of fruits and vegetables processing units in the country remains under utilized as majority of these processing units (72 percent) are in the cottage sector which are constrained by the technological backwardness. According to one estimate, only 2 percent of total fruits and vegetables are processed in the country and 98 percent is consumed in raw form. There is a wide inter-state variation in the spread of fruits and vegetables processing units. About 20 percent of the units are located in Maharashtra followed by Uttar Pradesh (10 percent), Tamil Nadu (9 percent) and Kerala (8 percent). Further the distribution of fruits and vegetable units are not directly correlated with the availability of raw material in the state. For example, the State of Bihar, which contributes 13 percent of the total produc-

tion of fruits and vegetables, accounts for only 1.28 percent of total processing units in the country.

The size-wise growth of food processing units is presented in Table 4.24. More than one-third units are in the home sector (Processing less than 10 tonnes fruits and vegetables per annum) followed by cottage sector. The low capacity utilization of the processing units is on account of their existence in home, cottage and labeller (72 percent) sector, which are constrained by technological backwardness. One general observation for processing sector units is that there exists vast untapped potential for agro-processing in India, which should be explored to provide employment to the educated youth and save losses in the marketing chain.

Table 4.24
State-wise Distribution of Food Processing Units in India

Scales	Size (Tonnes per Annum	1980–81	1990–91	1994–95
Large	> 250	218 (10.8)	442 (11.5)	497 (11.4)
Medium	100–250	263 (11.6)	331 (8.6)	343 (7.9)
Small	50–100	163 (8.0)	323 (8.4)	371 (8.5)
Cottage	10–50	398 (19.6)	768 (20.0)	854 (19.6)
Home	1–10	763 (37.7)	1303 (33.9)	1520 (34.8)
Labeller	< 1	248 (12.3)	679 (17.6)	783 (17.8)
Total	–	2026(100.0)	3846(100.0)	4368(100.0)

Note: figures in parentheses are percentage of the column totals.

PROCESSING OF MILK

Liquid milk is not only highly perishable, but is also difficult to carry long distances. Therefore, markets for milk were normally local markets. It is the introduction of the function of processing in the milk marketing chain which has lead to the evolution of milk markets from purely localised ones to the national market. The milk which is surplus in the villages is collected at specified centres, tested for quality, transported to chilling plants, pasteurised, chilled, stored under low temperature, packed as pasteurised milk in suitable containers, converted into such milk products as butter, ghee, milk powder and cheese and sold to the consumers located far away from the milk-producing areas. Milk processing activity enables the consumers to get liquid milk and milk products at a time and place desired by them on the one hand and makes it possible for the milk producers to get a reasonable price for their produce on the other.

Dairy processing received major impetus in the country during the Operation Flood Programme. By the end of the first phase of the operation flood

programme, raw milk processing rose to 31.90 lakh litres per day from only 6.55 lakh litres per day in 1970, *i.e.*, before the start of the operation flood programme. The milk processing has been further strengthened during the second phase of operation flood programme.

The number of liquid milk plants (dairy) has gone up to over 500 with per day milk handling capacity of 56 million litres. There are around 80,000 dairy cooperative societies, which is an essential part of milk handling and processing network. .

However, bulk of the milk is still handled by the unorganized sector without commensurate value addition to raw milk. Only about 15 percent of the milk produced in the country is converted into milk products through processing and value addition.

PROCESSING OF CASHEWNUTS

Cashewnuts are converted into finished kernels by a simple process. Processing of cashewnuts can be conveniently divided into following eight stages:

(i) *Drying of nuts* – Procured raw nuts are spread on the floor for sun-drying.

(ii) *Roasting of nuts* – Roasting of cashewnuts is done by drum roasting method. A specific temperature is provided by burning cashewnut shells. Roasting is done for one to two minutes.

(iii) *Shelling* – Roasted nuts are cooled for sometime and are broken by beating them with wooden mallets. It is a time-consuming process and each labourer can shell 10 kg of nuts per day of eight hours.

(iv) *Drying of shelled kernels* – The shelled kernels are dried to loosen the kernel coat which facilitates easy peeling. A tray drier is used for this purpose.

(v) *Peeling* – Kernel coat is peeled off by hand or by bamboo sticks.

(vi) *Grading* – The kernels are sorted out according to their size and nature. Prevailing grades in cashewnuts are special Jumboo, Jumboo, American, standard, splits, pieces and other wastes.

(vii) *Conditioning* – Conditioning is done only for export purposes. The kernels packed in tins are given carbon-dioxide treatment to avoid breakage. Cashew kernels are heaped on mesh bottom plates on the ground, sand is spread out and water is sprinkled on it. Fans are run overhead which evaporate the moisture in the sand and it is absorbed by kernels.

(viii) *Packing* – The conditioned kernels are packed in 11 kg tins.

India imports unprocessed cashewnuts and exports cashew kernels after processing. The processing cost of 80 kg of raw cashewnuts (which yield 22 kg of kernels) has been estimated as Rs. 125. Out of the total cost of processing, nearly 60 percent is the labour cost. The cashewnut processing is thus, a labour-intensive activity (Srinivas and Raju).[11]

BUYING AND SELLING

MEANING

Buying and selling is the most important activity in the marketing process. At every stage, buyers and sellers come together, goods are transferred from seller to buyer, and the possession utility is added to the commodities.

The number of times the selling-and-buying activity is performed depends on the length of the marketing channel. In the shortest channel where no middleman is involved, this activity takes place only once, *i.e.*, the producer or farmer sells and the consumer purchases. But, usually, in the case of farm commodities, selling/buying activities are undertaken each time when the produce moves from the farmer to the primary wholesaler, from the wholesaler to the retailer, and from the retailer to the consumer.

The buying activity involves the purchase of the right goods at the right place, at the right time, in the right quantities and at the right price. It involves the problems of what to buy, when to buy, from where to buy, how to buy and how to settle the prices and the terms of purchase.

The buying function seems to be a very simple function. But it involves the following subsidiary functions before the actual buying takes place:

(i) *Planning the Purchase of Goods*: Deciding the quantity of each good to be purchased

(ii) *Contractual Function*: Determining the sources of supply and establishing contacts with them.

(iii) *Negotiation of Price and Terms and Conditions of Buying.*

(iv) *Final Agreement and Transfer of Goods.*

The selling activity involves personal or impersonal assistance to or persuasion of, a prospective buyer to buy a commodity. The objective of selling is to dispose of the goods at a satisfactory price. The prices of products, particularly of agricultural commodities vary from place to place, from time to time, and with the quantity to be sold. Selling, therefore, involves the problems of when to sell, where to sell, through whom to sell, and whether to sell in one lot or in parts. The selling function thus includes the following subfunctions, the performance of which enables one to get a good price for the produce:

(i) *Product Planning and Development*: This sub-function includes the activities of determination of the variety/quality of the product to be produced, grading it, and deciding about the trade or brand names to be adopted for the product.

(ii) *Contractual Function*: This involves the determination of potential buyers of the product and of entering into contracts with them.

(iii) *Demand Creation*: This includes the activities which are designed to stimulate an already existing desire for the satisfaction of the want of a given product. In other words, it means selling the products with which potential consumers are not familiar.

(iv) *Negotiating the Prices and Settling the Terms and Conditions of Sale with the Buyers*: At the time of buying and selling, the following terms and conditions must be settled to avoid future problems:

(a) Whether the cost of packing material (gunny bag) is included in the price;

(b) The total quantity negotiated;

(c) The terms of payment—whether it will be in cash or after a grace period;

(d) The delivery of the produce whether it is "on spot" or "on arrival", or "forward" delivery;

(e) The final agreement and transfer of ownership of the product.

METHODS

The following methods of buying and selling of farm products are prevalent in Indian markets:

(i) *Under Cover of a Cloth (Hatha System)*

By this method, the prices of the produce are settled by the buyer and the commission agents of the seller by pressing/twisting the fingers of each other under cover of a piece of cloth. Code symbols are associated with the twisting of the fingers, and traders are familiar with these. The negotiations in this manner continue till a final price is settled. When all the buyers have given their offers, the name and offer price of the highest bidder is announced to the seller by the commission agent.

This system provides opportunities for cheating the seller, for the seller is not aware of the price that has been offered by other buyers; the commission agent may not communicate the various prices to the seller; and may strike a deal in favour of one who offers a somewhat lower price. This method has been banned by the government because of the possibility of cheating, though it continues to be used in some markets.

(ii) *Private Negotiations*

By this method, prices are fixed by mutual agreement. This method is common in unregulated markets or village markets. Under this method, the individual buyer come to the shops of commission agents at a time convenient to the latter and offer prices for the produce which, they think, are appropriate after the inspection of the sample. If the price is accepted, the commission agent conveys the decision to the seller, and the produce is given, after it has been weighed, to the buyer.

In villages too, private negotiations take place directly between buyer and sellers. The sellers take the sample to the buyer and asks him to quote the price. If it is acceptable to the buyer, a verbal contract is executed. This however is a slow and time-consuming process and is not suitable when either

large quantities have to be sold or a large number of buyers exist in the market. The advantage of this method is that the seller gets a good price, for buyers are not aware of the price offered by other buyers. Each buyer, therefore, tries to bid the highest possible price to get the produce.

(iii) *Quotations on Samples taken by Commission Agent*

By this method the commission agent takes the sample of the produce to the shops of the buyer instead of the buyer going to the shop of the commission agent. The price is offered, based on the sample, by the prospective buyers. The commission agent makes a number of rounds of prospective buyers until none is ready to bid a price higher than the one offered by a particular buyer. The produce is given to the one whose bid has been the highest.

(iv) *Dara Sale Method*

By this method, the produce in different lots is mixed and then sold as one lot. The advantage of this method is that, within a short time, a large number of lots are sold off. The disadvantage is that the produce of a good quality and one of a poor quality fetch the same price. There is, therefore, a loss of incentive to the farmer to cultivate good quality products. This method is common for such crops as *zeera* (cumin) in many markets of the country.

(v) *Moghum Sale Method*

By this method, the sale of produce is effected on the basis of a verbal understanding between buyers and sellers without any pre-settlement of price, but on the distinct understanding that the price of the produce to be paid by the buyer to the seller will be the one as prevailing in the market on that day, or at the rate at which other sellers of the village sold the produce. This method is common in villages, for farmers are indebted to the local moneylenders. Often the buyer pays less than the prevailing market rate on the plea of the poor quality of the produce.

(vi) *Open Auction Method*

By this method, the prospective buyers gather at the shop of the commission agent around the heap of the produce, examine it and offer bids loudly. The produce is given to the highest bidder after taking the consent of the seller-farmer. This method is preferred to any other method because it ensures fair dealing to all parties, and because the farmers with a superior quality of produce receive a higher price. In most regulated markets, the sale of the produce is permissible only by the open auction method.

The following are the merits of the open auction method:

(a) A sale by this method inspires confidence among the buyers and sellers. The seller is able to follow the bidding easily.

(b) The auction serves as a meeting place for the supply of, and demand

for, goods.

(c) It disposes of the market supply promptly.

(d) A wide variety of goods are available to buyers for selection.

(e) The auction method reduces the number of salesmen needed in the process.

(f) The buyers of small lots are not put to a disadvantage against the buyers of large lots.

(g) All the sections interested in the sale and purchase are well informed about the prevailing prices and can take judicious decisions about the sale and purchase of agricultural commodities.

(h) The payment of the price of the goods is made immediately after the sale if an auction has been completed.

The disadvantages of the open auction method are:

(a) The auction method requires more time on the part of both the buyer and the seller, for they have to wait for the day and time of the auction. An open auction is a very time-consuming process because of the variation in the quality of the various lots.

(b) In big market centres, specially in the peak marketing season, the time allotted for auction is short. Both the buyers and the sellers are in a hurry. As a result, sellers may receive a low price.

(c) In an open auction, buyers sometimes join hands. Active participation in it is then reduced.

(d) The auction leads to a "buyers' market", for buyers have full information about the supply of, and demand for, the product.

Some of the problems arising out of the open auction method may be overcome if the grading of agricultural produce is adopted by the cultivators. This will reduce the time involved in inspection and bidding for each lot separately, and will result in increasing the overall efficiency of the marketing system.

Three types of open auctions are prevalent in different markets. These are:

(a) *Phar System of Open Auction*: By this method, one bid is given for all the lots in a particular shop and all the lots are sold at that price. One extreme case of this method is when one bid is given for the product in the whole market.

(b) *Random Bid System of Open Auction*: By this method, the commission agent invites a few buyers when the produce is brought to his shop for sale. All the prospective buyers are not informed. As a result, the competition is poor. Sometimes, the commission agent informs only those buyers who are either his relatives or whom he wants to oblige. Bidding may continue simultaneously at a number of places to reduce competition.

(c) *Roster Bid System of Open Auction*: This is a systematic method of open auction. Bidding starts from a point in the market at a notified time about which the prospective buyers are given information in advance. This overcomes the defects existing in the previous two methods of open auction. The

bidding party, after the auction of the produce at one shop, moves to the next in a clockwise or anti-clockwise direction till the auction of the produce at all shops is over, or the scheduled auction time expires. On the following day, the auction starts from the next point, and so on. This method is in vogue in most of the regulated markets. The auction is supervised by the auction clerk or the person nominated by the market committee.

(vii) *Close Tender System*

This method is similar to the open auction method, except that bids are invited in the form of a close tender rather than by open announcement. The produce displayed at the shop of the commission agent is allotted lot numbers. The prospective buyers visit the shops, inspect the lots, offer a price for the lot which they want to purchase on a slip of paper, and deposit the slip in a sealed box lying at the commission agent's shop. When the auction time is over, the slips are arranged according to the lot number, and the highest bidder is informed by the commission agent that his bid has been accepted and that he should take delivery of the produce.

Some of the regulated markets have adopted this method of sale, which is time-saving and involves the minimum physical labour. There is no possibility of collusion among the buyers because each has quoted the price on the basis of his individual assessment of profit margins, taking into consideration the price prevailing in terminal and other secondary markets. The smooth functioning of this method depends on the efficiency of, and the supervision exercised by, the market committee officials.

The methods employed for the sale of agricultural commodities in Indian markets differ from market to market and also from commodity to commodity. However, in regulated markets, either the open auction or the close tender system is prevalent. In Tamil Nadu, the buyers have adopted the close tender system which, it is claimed, is quicker and tends to give a higher price to the farmer than in the open auction system.

Demand Creation

Demand creation is a sub-function of the selling function in the marketing of products. It includes all the special efforts that are made to stimulate the desire for the goods of prospective buyers, with the ultimate objective of sale at a profit. The seller uses various techniques to arouse the desire for the product by dwelling on its beneficial qualities, of which the prospective buyers are not aware.

Demand creation is an important function in the present day marketing of processed agricultural products. The demand for most of the agricultural products arises automatically, for these commodities are basic necessities. With the increasing modernization of the processing techniques for various agricultural products, the importance of demand creation has increased in the

agricultural sector.

Some of the common methods, which may be used to create a demand for the products, are:

(i) *Personal Solicitation by Salesman* : By this method, the salesman personally demonstrates the good points of the product to the buyers and answers their queries by giving them the information sought for. In this way, sales are effected.

(ii) *Advertisement* : By this method, a message about the product is conveyed to the buyers by the seller who uses various media (non-personal method) for the purpose — such as written or printed material; pictures and diagrams, speeches and announcements. These may generate a demand and result in immediate sale or sale at some time in the future. The media used for these advertisements are hand-bills, posters, calendars, circular letters, newspapers, magazines, radio, television, and slides.

(iii) *Other Methods*: The other methods employed for the creation of demand are:

(a) Display of goods in stores, at railway stations and other important public places;

(b) Arrangement of trade fairs and exhibitions and presentation of the goods;

(c) Distribution of free samples among the prospective buyers; and

(d) Offers of various types of facilities, such as an extensive credit facility, the home delivery facility, the facility of guarantee againt a price fall in the future, combination offers (giving one article free on purchase of another article), free deals (giving 13 pieces if a dozen are purchased), price reductions, a trade-in allowance (taking old used articles and giving concessions on the new purchase), etc.

The practices used in the creation of demand add to the cost of marketing. Whether the advertisement pays should be judged by the *added cost-added return* principle. If an increase in the sales revenue is higher than the advertisement cost, it pays to advertise the sale of goods. The converse, too, holds true.

PRICE DISCOVERY AND PRICE DETERMINATION

Under the marketing system, there is the responsibility of realising the value of the goods delivered to the final consumers and distributing it to various marketing agencies and farmers. This process is accomplished by a system of pricing the products at each stage as they move through the marketing channels. The system of pricing is important, for prices perform the following functions:

(i) They guide the allocation of resources in the marketing activities over time, space and form;

(ii) Prices guide the allocation of goods and services among prospective buyers; and

(iii) The level of prices forms the basis of the distribution of incomes or gains among producers, middlemen and consumers.

Middlemen do not determine the prices, for they do not determine the consumer's demand or quantum of market supplies. They merely discover the prices based on their evaluation of the supply (quantities available); and the prospects of what the buyers are likely and willing to pay for these quantities at each stage of marketing.

Prices are discovered in an individual market place by the traders whereas price determination takes place in the total market and not in an individual market place. Prices are determined by the forces of demand and supply in the total market.

CHARACTERISTICS OF PRICES DISCOVERED

(i) The price discovered should clear the available supply from the market and help in the distribution of the product among the persons who need it;

(ii) The price discovered should act as an incentive for the producers; and

(iii) The price discovered should be such as to ensure the continuance of the marketing agencies in the business, *i.e.*, it should provide a reasonable profit for the market functionaries.

PROCESS OF PRICE DISCOVERY

In the days of, primitive trading, large markets and sources of price information were not in existence. Buyers and sellers were forced to make a price determination on the spot. Buyers offered as low a price as possible and sellers demanded as high a price as possible. The final price was determined by negotiation. Even today, for some commodities, this method of price discovery is in operation. However, this is a time-consuming method. The growth of primary and secondary wholesale markets has brought buyers and sellers together; and they can now observe price-affecting conditions in a better way. Market news helps in this process. The bargaining between buyer and seller over a particular lot takes place, with a full knowledge of the level of prices prevailing not only in the nearby primary or secondary wholesale market, but also in the terminal markets. Sometimes, the factors operating in international markets also figure in their calculations. One way of price discovery in local markets is that dealers take a round of the market in the early morning and collect information on the total supplies for the day, the quantity demanded, and the views of the competitors or fellow-traders. They keep track of the prices in other markets and make their offers. As the day progresses, when the sellers find that their stocks are not moving satisfactorily, they lower their sale price to clear the available supply. Price discovery is a continuous proc-

ess, for information about the market conditions continues to flow regularly.

The process of price discovery has two phases:

(i) Evaluating the conditions of demand and supply, and determining the general level of prices for the commodity; and

(ii) Determining the price of the specific lot of the commodity being exchanged relative to the general price level.

MARKET INFORMATION

Market information is an important marketing function which ensures the smooth and efficient operation of the marketing system. Accurate, adequate and timely availability of market information facilitates decision about when and where to market the products. Market information creates a competitive market process and checks the growth of monopoly or profiteering by individuals. It is the lifeblood of a market.

Everyone engaged in production, and in the buying and selling of products is continually in need of market information. This is more true where agricultural products are concerned, for their prices fluctuate more widely than those of the products of other sectors. Market information is essential for the government, for creating a policy environment for a smooth conduct of the marketing business, and for the protection of all the groups of persons associated with this. Market information is essential at all the stages of marketing, from the sale of the produce at the farm until the goods reach the last consumer.

MEANING

Market information may be broadly defined as a communication or reception of knowledge or intelligence. It includes all the facts, estimates, opinions and other information which affect the marketing of goods and services.[12]

IMPORTANCE

Market information is useful for all sections of society which are concerned with marketing. Its importance may be judged from the point of view of individual groups. These groups are:

(a) *Farmer-Producers*: Market information helps in improving the decision-making power of the farmer. A farmer is required to decide when, where and through whom he should sell his produce and buy his inputs. Price information helps him to take these decisions.

(b) *Market Middlemen*: Market middlemen need market information to plan the purchase, storage and sale of goods. On the basis of market information, they are able to know the pulse of the market, *i.e.*, whether the market is active or sluggish, the temperature of the market (whether prices are rising or falling), and market pressure (whether supply is adequate, scarce or

abundant). On the basis of these data, they project their estimates and take decisions about whether to sell immediately or to stock goods for some time, whether to sell into the local market or to go in for import or export, whether to sell in their original form or process them and then sell, and so on. The failure of a business may partly be attributed to either the non-availability of market information or its inadequate availability and interpretation. Co-operative marketing societies operating as commission agents make use of market information for advising their members so that they may take decisions about when to sell their product. Processors make use of market information to plan their purchases of raw material so that they may run their plant continuously and profitably.

(c) *General Economy*: Market information is also beneficial for the economy as a whole. In a developed economy, there is need for a competitive market process for a commodity, which regulates the prices of the product. The competitive process contributes to the operational efficiency of the industry. However, a perfectly competitive system is difficult to obtain, but the availability of market information leads towards the competitive situation. In the absence of this system, different prices will prevail, leading to the profiteering by specialized agencies. The business of forward trading is based on the availability of market information.

(d) *Government*: Market information is essential for the government in framing its agricultural policy relating to the regulation of markets, buffer stocking, import-export, and administered prices.

TYPES OF MARKET INFORMATION

Market information is of two types—

(i) *Market Intelligence*: This includes information relating to such facts as the prices that prevailed in the past and market arrivals over time. These are essentially a record of what has happened in the past. Market intelligence is, therefore, of historical nature. An analysis of the past helps us to take decision about the future.

(ii) *Market News*: This term refers to current information about prices, arrivals and changes in market conditions. This information helps the farmers in taking decisions about when and where to sell his produce. The availability of market news in time and with speed is of the utmost value. Sometimes, a person who gets the first market news gains a substantial advantage over his fellow-traders who receive it late. Market news quickly becomes obsolete and requires frequent updating.

CRITERIA FOR GOOD MARKET INFORMATION

Good market information must meet the following criteria so that it may be of maximum advantage to the users:

(i) *Comprehensive*: Market information must be complete and compre-

hensive. It must cover all the agricultural commodities and their varieties, and all the geographical regions. It must cover prices, production, supply movements, stocks and demand conditions.

(ii) *Accuracy*: The accuracy of market information is essential. The collection of accurate market information is a tedious and expensive task under changing market situations. There must be honesty in the collection of the information. Constant efforts should be made to improve its accuracy. The information reporter must be thoroughly acquainted with the market and the product so that he may collect accurate information about them.

(iii) *Relevance*: Market information must be relevant in the sense that it must be collected, arranged and disseminated, keeping in view the user's interest. Generally, a lot of information that is collected is not used; the time and energy spent on its collection, therefore, become a colossal waste. It is not enough to simply collect a mass of data and report them through various media; the data must be accurate and useful.

(iv) *Confidentiality*: There must be a sense of confidentiality among the firms for whom the information has been collected. The information revealed under this situation of confidentiality will be more correct and may assist in drawing policy implications. The names of firms should not be leaked out.

(iv) *Trustworthiness*: Trustworthiness is another criterion of good market information. The agency that collects it must create faith, and the users must trust the organisation which is making this information available to them.

(vi) *Equal and Easy Accessibility*: Every person engaged in marketing, whether big or small, wholesaler, retailer, government or a private agency, must have equal and easy access to the available information. There should not be any sort of restriction on individuals in the use of this information.

(vii) *Timeliness*: Market information must be made available in time. For this purpose, a speedy transmission is necessary. Late dissemination of market information is of no use. Often, this information becomes stale, particularly when it is disseminated too late to be of any use. A system for speedy dissemination of information should be devised.

COLLECTION AND DISSEMINATION OF MARKET INFORMATION

There are three major steps in the collection and dissemination of market information:

(i) *Collection of Market Information*: Both official and non-official agencies collect market information. They may be public or privately owned agencies. Some private companies publish their findings in addition to sending information to clients. Dealers in inputs and trade associations collect market information. However, public agencies play a major role in India in the collection of this information. The main agencies collecting market information are the State Agricultural Marketing Departments, the State Agricultural Marketing Boards, the Food Department, and the Directorates of Economics and

Statistics of the State and Central Governments.

(ii) *Dissemination of Market information*: The collected information has no meaning until it reaches the persons who need it. The sources through which market information is disseminated are:

(a) *Personal Contacts*: This is the most important source of dissemination of market information. Information is given orally, *i.e.*, by one businessman to another businessman, by a businessman to a farmer, or by one farmer who has sold the produce to another farmer.

(b) *Post and Telephones*: Businessmen get information from other markets on the telephones. Commission agents convey the information on the prices of different commodities to their client-farmers in postcards. They fill the prices on these postcards and post them daily or at some time intervals.

Telecommunication is becoming increasingly important in dissemination of market information. There has been a phenomenal growth in the last two decades in the country. Both public and private sector companies have taken up the function of providing telephone services. Private sector companies have entered recently in this area and are providing information services in urban as well as in rural areas. The teledensity (number of telephone lines per 100 population), which was 2.86 in March 2000 has jumped to 5.72 in August 2003. The country now has 45.6 million fixed line connections and 1.48 million public call offices.

(c) *Newspapers*: The newspapers in English, Hindi and regional languages publish the wholesale prices of important agricultural crops in the selected markets of the country/State. In addition, the *Economic Times* and the *Financial Express* contain a lot of information on the various aspects of marketing and on prices. Almost all dailies carry a special section on trade and prices.

(d) *Magazines*: Magazines, such as the *Economic* and *Political Weekly* and *Business Today* are important weekly trade journals, which collect and disseminate a lot of information connected with trade.

(e) *Government Agencies Reports*: The regulated markets, the Agriculture Marketing Department in the States, the Directorates of Economics and Statistics in the States, the Directorate of Marketing and Inspection, Government of India, Reserve Bank of India, and the Directorate of Economics and Statistics, Ministry of Food and Agriculture, Government of India are some of the government agencies which disseminate the collected market information through their regular publications and broadcasts on All India Radio.

(f) *Price Bulletins*: These are issued daily, weekly, or every month. The important bulletins through which price information is disseminated are: *Bulletin of Agricultural Prices* (Weekly), *Agricultural Situation in India* (Monthly), *Agricultural Prices in India* (Annual) and *Bulletin on Food Statistics* (Annual). The monthly situation and outlook reports are published by the Directorate of Marketing and Inspection, Government of India.

(g) *Radio and Television*: Information on prices and related aspects is regularly relayed/telecast on various channels. Almost all channels have now reserved a slot on trade and business in their programmes. Several state governments and National Informatics Centre (NIC) of the Government of India have taken initiatives to inter-link the markets with NIC-NET with a view to ensuring quick flow and accessibility of information on prices and arrivals. The information on prices and trade is also available on Internet at several web-sites.

(iii) *Interpretation of Market Information*: The utility of market information varies with the user. One user, who is good enough in his interpretation of the available market information, gets the benefit from it; the other man, who is poor in the interpretation of the available information, is not able to get the same advantage. Educated businessmen, who are well-equipped with modern means of communication and have experts to guide them, take a better advantage of market information.

CRITICISM OF MARKET INFORMATION

The market information system is criticised by the users on the following grounds:

(i) Market information provided to the cultivators cannot be evaluated by them because of their illiteracy and poor communication ability.

(ii) Market reports are incomplete in many respects. Often, there is no mention of quality when the price is quoted, and the price quoted is other than a modal price. In many cases, the reported prices vary considerably from the actuals because of inaccurate field reporting, sampling errors and other factors.

(iii) There is manipulation in the collection of information for market reports, specially if the collector is biased and has pre-conceived notions.

(iv) Most of the time, the news reported is so late that it is of no use. There is a considerable time lag in the publication of the magazines and reports carrying such information. The information contained in the magazines, therefore, becomes obsolete from the practical utility point.

(v) Most of the, information pertains to wholesale marketing. Very little information on retailing is available.

(vi) The market information that is made available is of greater use to the buyers of farm products than to the farmers selling their products.

There is, therefore, a strong case for effecting improvements in the existing market information system.

SUGGESTIONS FOR IMPROVEMENT IN MARKET INFORMATION

There have been improvements in the collection and dissemination of market information during the past few years. Some of the suggestions for improvement in the existing market information system, for agricultural commodities for making it orderly and efficient, are:

(i) There should be a standardized system of quoting the prices of the different varieties of the commodity and units of quotations, so that the prices may be compared over time and space.

(ii) The price announced on All India Radio should be in the local language and should cover more local markets of the area rather than secondary and terminal markets located far from the area. The frequency of, and time allotted for the announcement should be increased so that the farmer may profit from the information. The broadcast time should be such that the farmers can listen to the announcement and take decisions about taking the produce to the market.

(iii) Arrangements for the display of prices on notice-boards at important public places like hospitals, schools, panchayatghars, etc., should be made.

(iv) The staff posted for the collection of market news should be knowledgeable and trained. There must be thorough and frequent check to ensure that guesswork, manipulation and bias are excluded.

(v) Market news should have no place for rumours. Rumours are harmful for the cultivators.

(vi) Market news should be provided as fresh as possible so that it may create confidence and trust among the users.

(vii) The information on the arrivals of the commodities in the market, on demand, market tone, etc., should be announced along with the information on prices.

(viii) A correct and intelligent interpretation of market information should be made and announced at the same time as market information. This is very important, for farmers may not be able to interpret it correctly.

(ix) There must be proper co-ordination between market intelligence and policy-making departments so that the latter may better understand the problem and can make such adjustments in the information as may be called for.

(x) In many markets, a price range is reported instead of a single price. This is so because of the variation in quality and the large number of transactions taking place in the market. The range is very wide, and may not serve the purpose of the users. Therefore, the price range should not be very wide or ambiguous.

(xi) There must be an educational programme for the users of market information so that they may evaluate it and take the best advantage of it.

MARKET INTELLIGENCE IN INDIA

Market intelligence is an essential function for the formulation of a sound price and trade policy and its successful implementation. The formulation of a sound price policy requires an analysis of long-term trends in the data on prices, arrivals, demand, supply, and other information. A market intelligence scheme provides the necessary data for such an analysis and for an understanding of the behaviour of relevant factors; and helps in the evolution of a proper price policy.

The role of market intelligence can be judged from its following objectives:

(i) To provide better understanding of the forces that are operating in a particular situation as well as anticipating the situation that is likely to develop.

(ii) To provide regular and continuous appraisal of market behaviour and of various factors that influence the market behaviour.

(iii) To offer a clue to the probable behaviour of the market and the forces that are likely to influence it in the near future.

(iv) To undertake evaluation of the functioning of the marketing organizations/institutions with a view to ensuring efficient and effective implementation of agricultural marketing and price policy.

(v) To offer advice on the measures needed for influencing the decisions of traders and market players (a) for ensuring remunerative prices to the farmers; (b) for assuring the supply of the products to the consumers at reasonable prices; and (c) for maintaining stability in the market prices.

Market intelligence is required by the government organizations, traders and their organizations, farmers, consumers and researchers as well. Government organizations need market intelligence for formulation of plans and policies and also for their effective application. Traders and their organizations require market intelligence for competitive sales, purchases and efficient commercial operations in order to carry out the functions of distribution efficiently. Farmers need market intelligence for proper adjustments in cropping pattern and to decide when, where and how much to sell. Consumer need market intelligence to understand market forces for making purchases in a rational manner. Researchers require market intelligence in order to assess the efficiency of the marketing system, identify the bottlenecks in marketing programme/projects and for suggesting future remedial steps and strategies.

The different committees which have been appointed from time to time—the Foodgrains Policy Committee, 1943, and the Prices Sub-Committee of the Policy Committee on Agriculture, Forestry and Fisheries, 1948—have emphasized the importance of data on market intelligence and of a market intelligence authority. Prior to 1953, a large mass of data on agricultural prices was collected by a variety of agencies at state and district levels. But there was no uniformity in the concepts and definitions of the terms, in the centres for which data were collected and in the coverage of data at various levels. To bring about uniformity in the collection of information necessary for market intelligence and also to remove difficulties experienced in the functioning of the then system, the Ministry of Food and Agriculture. Government of India appointed a committee in November, 1953 under the chairmanship of Shri P.N. Thapar. In pursuance of the recommendations of this Committee, an integrated scheme for Market Intelligence was prepared by the Directorate of Economics and Statistics, Government of India and launched during the Second Five Year Plan. This Integrated Scheme on Market Intelligence was implemented in all the states and union territories except Nagaland, Arunachal

Pradesh, Andaman & Nicobar Islands, Dadra & Nagar Haveli, Mizoram and Lakshadweep.

It may be mentioned here that the National Commission on Agriculture, 1976 also made several recommendations for improving the market intelligence system in the country. Some of these are:

(i) Efforts be made to issue periodical reports on outlook for future;

(ii) The scope of market intelligence should be enlarged to include pulses, oilseeds, important fruits and vegetables and spices crops;

(iii) The studies on costs and margins should also form a part of market intelligence;

(iv) The market intelligence should be extended to more centres and crops;

(v) All regulated markets should be made reporting centres for the purpose of market intelligence;

(vi) Whole-time technical reporting agencies should be set up in all the important wholesale markets;

(vii) The scope of the market news service should be extended; and

(viii) Foreign market intelligence should also be made an essential part of the market intelligence in the country.

MARKET INTELLIGENCE SCHEME IN INDIA

The market intelligence scheme in India provides for the collection of data on prices, arrivals, despatches and stocks of important agricultural commodities for the selected market centres of the country. These data are reported by technical persons such as market intelligence inspectors, market reporters, agriculture assistants, price inspectors, statistical investigators, market secretaries and/or action clerks posted in the selected markets of the country. Several changes have been brought about in the scope and coverage of the scheme from time to time. However, there is a considerable gap in the ideal system of market intelligence and the existing coverage.

The market intelligence scheme at present covered 137 agricultural commodities and 1300 markets of the country. The market intelligence centres set up under the scheme work under the supervision of Directorate of Agricultural Marketing or Directorate of Economics and Statistics of the states. In Rajasthan, at present there are 58 market intelligence centres, which collect the daily market price quotations from 58 selected markets and supply to the Directorate of Agricultural Marketing, Rajasthan and Directorate of Economics & Statistics, Government of India. The weekly review reports on retail and wholesale prices, arrivals, sale and stock position and fluctuations in prices of the selected commodities are also prepared and made available for wider use.

The importance of flow of market information has considerably increased in recent years. This is particularly so in the case of fruits and vegetables where fluctuations and inter-spatial price differences are considerably more. It is in this connection that the Market Planning and Design Centre (MPDC) in the

Directorate of Marketing and Inspection has developed a model of market information service for fruits and vegetables in India. In this system the market would be the basic information unit, responsible for collection and transmission of information relating to its own activities with a two-tier dissemination system – for distant as well as for local markets. This system has been established in Azadpur Wholesale Market, Delhi for apple, citrus, mango, potatoes and onion.

The National Horticulture Board set up under the Ministry of Agriculture, Government of India has also given emphasis on information service for fruits and vegetables. The Board has provided computers in 21 important fruits and vegetable markets. These markets are interlinked through computerized machines connected to a computer in Central Data Processing Unit at Delhi. The unit analyses the data received by it and the information regarding the prices and arrivals of different commodities in a particular market centre is flashed to other market centres. The National Horticulture Board is also disseminating the market information through publications in newspapers, relay from Radio Stations and telecasts on T.V. channels.

IT APPLICATIONS IN AGRICULTURAL MARKETING

Agricultural produce marketing requires connectivity between the markets, the growers/exporters/traders, industry and consumers through a wide network of national and international linkages so as to provide day to day information with regard to the commodity arrivals and prices; to provide links for on-line international market information; to provide export related documentation; to inform about the latest research in agricultural marketing, packaging and storage; and to provide connectivity with the World Trade Centers (WTC), National Horticulture Board (NHB), National Institute of Agricultural Marketing (NIAM), Agricultural and Processed Export Development Authority (APEDA), State Agricultural Marketing Boards (SAMBs), Universities and other such organizations.

Information Technology (IT) is being regarded as the fifth factor of production along with land, labour, capital and management. It has integrated the world by the use of Internet. Information technology is basically concerned with e-commerce, *i.e.*, on-line information facilitating transactions, future planning for purchases and selling of agricultural products and inputs; and various other aspects which World Wide Web provides. E-commerce has revolutionized trade in developed economies but is in the infancy stage in India.

IT in agricultural marketing comprises of the following tasks:

(i) Linking and networking of agricultural markets;

(ii) Computer aided auction displays;

(iii) Marketing information system;

(iv) Commodity information system;

(v) Highway Automation system.

There are atleast following four ways for making use of IT in improving agricultural marketing:

(a) With a view to fully utilizing the information technology, agricultural marketing information service system needs to be set up at the national level. This service will be an integrated service incorporating the farmers advisory service with Decision Support System (DSS). Such a system will help the farmers in taking intelligent decisions related to storage, pricing and marketing. One of the major problems in designing of agricultural marketing information service is that the information needs of the individual target groups are diversified. For evolving information system, assessment of the information needs of the diversified target groups is very important, so that the information management is holistic and integrated.

The information system should be broad based to cover information related to aspects such as storage, transport, weather forecasts and export potential. At the state level, marketing boards/Directorate should provide consolidated information to all the market users. The coordinating agency should take the stock of information available and its generation process and finally distribute it to the need based target groups.

(b) Electronic Auctioning System (EAS)

The Electronic Auctioning System (EAS) is the system to perform the bidding process electronically. The EAS can help in larger markets where number of lots for auction is large and the time allotted for biding is limited to 3 to 4 hours. During the peak season the biding work is so hectic that the biding for three to four lots has to be completed each minute. Hence the introduction of EAS is necessary. The main advantage of EAS are:

(i) Minimizes the paper work
(ii) Automates the billing and revert system
(iii) Improves the efficiency of the system
(iv) Increases the transparency
(v) Provides a disciplined structure which matches with typical functioning to manage the bidding system
(vi) Provides easy and efficient summarized information, and
(vii) Ensures security of the data/information.

The basic objective of the system is to promote trade transparency and help farmers by checking malpractice and ensure recording of each auction. This system of bidding has been implemented in the auction of fruits and vegetables in the biggest fruit and vegetable market of Azadpur (Delhi).

(c) E-Catalogue for Commodity Profiles

In the context of need to increase export competitiveness, each and every product needs to be publicized highlighting its characteristics on nutrition values, chemistry, quality standards, seasonality, quantity available for supply and prices. A brief commercial profile of the commodity on Internet can help the buyer in making comparative analysis of costs and margins. If for each commodity, commercial profiles giving these details are prepared and

transmitted to international markets through 'web-pages', it can greatly widen markets for such products.

(d) National Atlas of Markets

Mapping of the agricultural markets of the country is a pre-requisite for carrying any planning/developmental activity. All the regulated markets along with their classification on the national maps can give a synoptic view of the distribution of the markets. The infrastructural facilities, the volumes transacted, the area and population served, and the outflow and inflow of the commodities are the various aspects, which should be mapped out. Mapping of country's markets would also be useful for research, planning and policy formulation. The National Atlas of Agricultural Markets should be based on the application of GIS tools. Such mapping activity can also be put on the Internet for its greater usages.

FINANCING FOR MARKETING

There is a long interval between the time of production and consumption. Between these two points, the ownership of commodities shifts many times—a fact which necessitates financial arrangements. Middlemen need finance not only for the purchase of stocks, but for the performance of various marketing functions, such as processing, storage, packaging, transport and grading. The financing function of marketing involves the use of capital to meet the financial requirements of the agencies engaged in various marketing activities.

No business is possible nowadays without the financial support of other agencies because the owned funds available with the producers and market middlemen (such as wholesalers, retailers and processors) are not sufficient. The financial requirements increase with the increase in the price of the produce and the cost of performing various marketing services. In the words of Pyle: "Money or credit is the lubricant that facilitates the marketing machine."

FACTORS AFFECTING CAPITAL REQUIREMENTS FOR AGRICULTURAL MARKETING

The capital requirements of a marketing agency for its marketing business varies with the following factors:

(i) *Nature and Volume of Business*: Financial requirements for trading in high value crops like cumin, chillies, cotton and oilseeds are higher than for trading in foodgrains. For the wholesale business too, financial requirements are higher than for retail business.

(ii) *Necessity of Carrying Large Stocks*: It is essential to carry over large stocks throughout the year, of goods which are seasonally produced and marketed on a wholesale basis. Financial requirement is higher for trade in such goods.

(iii) *Continuity of Business during Various Seasons*: If business is continuous throughout the year, the financial requirements will be greater than if business is conducted only during a particular season.

(iv) *Time Required between Production and Sale*: Some goods are sold immediately after production—perishables, for example—while others are deposed off after a certain time—rice and cheese, for example. Financial requirements in the marketing of the latter goods are, therefore, higher.

(v) *Terms of Payment for Purchase and Sale*: The terms of transactions—whether payment will be in cash, on credit or by instalments—affect the financial requirements of the marketing middlemen.

(vi) *Fluctuations in Prices*: Financial requirements are higher for goods which suffer frequent price fluctuations than for goods that are subject to less frequent price fluctuations.

(vii) *Risk-taking Capacity*: The financial needs of the market middlemen vary with their risk-taking capacity. A middleman with a low risk-taking capacity often resorts to hedging, and needs less finance than a middleman who takes risks.

(viii) *General Conditions in the Economy*: During the period of price fall or recession, the financial requirements increase. The marketing agency has to hold stocks for a longer period in anticipation of a price rise. Moreover, the recovery of old bills tends to be slow. Whenever, therefore, a new product is introduced, the dealer needs more finance temporarily till the demand for it picks up in the economy.

TYPES OF MARKETING FINANCE

The marketing finance required by the marketing middlemen is of two types—fixed capital for land, buildings (shops and godowns); equipment and machinery (weighbridge, grading equipment, etc.), and working capital which is required to meet the marketing costs, purchase value, and salaries of the employees. The proportion of working capital is higher than that of fixed capital. It is also necessary to make arrangements for financing the farmers during the period between the production and sale of their produce. This is necessary to improve their holding capacity and to avoid the post-harvest sale of the produce when prices are low in the market. Because of their acute financial needs, many farmers market their standing crops—of fruits, for example—or borrow money in advance from local traders/commission agents against their crops, and bind themselves to sell the crop through the trader/commission agent. This checks their freedom to sell the produce in the open market.

To improve the financial position of the farmers and to strengthen their holding capacity, the following, steps have been taken by the government:

(i) Since July, 1969, with the nationalization, commercial banks have started financing the agricultural sector in a big way and meeting the increasing needs of the farmers for production purposes.

(ii) The co-operatives, too, have developed and entered the field of agricultural financing. An integrated scheme of credit and marketing has been introduced. Under this scheme, co-operative credit societies can realize their credit, together with the interest due on it, by the sale proceeds of the produce directly by intimation to Co-operative Marketing Societies. These may make the payments for the produce to the farmer after deducting their dues. A rapid progress has been made in this area.

(iii) With the development of warehousing facilities in the country, farmers can now meet 70 to 80 percent of their credit needs by placing the produce in the warehouses. Banks extend the financing facility to farmers against the mortgage of the warehouse receipt. This scheme has lessened the financial problems of the farmers and of market middlemen. As a result, the tendency to sell the produce immediately after the harvest have been checked to some extent. However, it has met with only limited success. So long as the interest rate continues to be more than the intra-year rise in prices, storage cannot be a profitable proposition.

NABARD IN AGRICULTURAL MARKETING FINANCE

The National Bank for Agriculture and Rural Development (NABARD) was set up as an apex organization in the sphere of rural finance on 12th July, 1982. It is a national institution for providing refinance, regulating credit, and extending other related facilities to agriculture, small scale industries, cottage industries, handicrafts and rural development sectors. It provides refinancing support to financial institutions for financing wide range of activities pertaining to agriculture and rural development. NABARD in addition to providing refinance facilities for agricultural production, also provides refinance facilities to financial institutions for development of infrastructure, co-operative marketing, construction of warehouses and cold storages, creation of transportation facilities, construction of market yards and processing of farm products.

The refinance facilities available from NABARD in the sphere of agricultural marketing are:

(i) Marketing of Produce—NABARD provides refinance support to the state co-operative banks by way of short-term credit limits for assisting the co-operative marketing societies to help the members in marketing of their produce at remunerative prices and also to enabling them to repay their dues to primary co-operative credit societies.

(ii) Construction of Godowns and Storage Facilities—NABARD provides refinance support for financing of godowns and cold storages.

(iii) Construction of Market Yards—NABARD provides refinance support for construction of market yards to co-operative and other banks. This also includes construction of various amenities in the market yards like construction of shops, platform, rest houses, canteen, bank and post-office premises.

(iv) For Means of Transportation—NABARD makes available the refi-

(d) Operation of speculation and hedging. The price risk associated with the commodities for which the facility of forward trading is available may be transferred to professional speculators through the operation of hedging. A detailed exposition of speculation and hedging follows.

SPECULATION AND HEDGING

Speculation and hedging are important ways of minimizing price risk in business. In the former, risk is taken by the person specializing in the business without much consideration of business trends, while in the second, a calculated risk is taken.

SPECULATION

The fundamental idea underlying speculation is the purchase or sale of a commodity at the present price with the object of sale or purchase at some future date at a favourable price. The speculator is normally concerned with profit-making from price movements. He purchases when prices are low. He is, therefore, not a normal or regular trader. The difference in the prices prevailing at two times constitutes his profit. Speculator may lose in this process. The essentials of a speculator are:

(i) He enters the trade at current prices;

(ii) The transactions of speculators are completed on some future date;

(iii) The speculators enter the trade with the sole object of making profit from price movements. Sometimes, they indulge in hoarding as well;

(iv) Except in a few cases, the physical delivery of produce is neither taken nor given. Only the difference in the prices is paid or taken; and

(v) Speculators are not regular buyers and sellers in the market. They do not conduct any regular business apart from speculative business.

Based on the legalities involved, speculation is of two types:

(i) *Speculation Proper*

Speculation proper refers to speculation on the part of a person who makes it his profession. Such professional speculators devote their whole time and energy to the collection of information about the future course of price movements. The decisions of the speculator are not hunch decisions. These are intelligent forecasts based on predicted trends. This type of speculation is beneficial for the economy as a whole and is usually accepted by the society.

(ii) *Illegitimate Speculation*

This is a gamble in business. The speculators adopt such manipulative practices as create conditions of artificial scarcity in the market and lead to a rise in prices. The main aim of the speculator is to earn a big profit. This type of speculation is not based on any rationale, though it influences the prices of

products. Such speculation is prohibited by the government in the best interest of the economy.

Economic Benefits of Speculation

(i) *Speculation Dampens Price Fluctuations*: Speculators buy at current prices in anticipation of a rise in prices in the future which results in pushing up the current prices. This encourages production and discourages consumption. Other speculators, who sell in the present period in the expectation of a fall in future prices, bring about a fall in the current prices, which encourages consumption and discourages production. The sum total of the effects of these speculative activities results in dampening price fluctuations.

(ii) The price differentials in different markets are bridged to some extent.

(iii) Speculation helps in the adjustment of the supply of, and demand for, commodities at normal prices.

Related Terms

(i) *Spot/Cash Transactions*: A transaction in which payment is made on the spot or within a prescribed short period, and delivery is taken on the same day or within a specific period are known as spot or cash transactions. Three things are essential in cash transactions:

(a) The purchaser has to take the delivery of the produce immediately after sale;

(b) The seller has to deliver the goods immediately; and

(c) Payment for the produce has to be made immediately.

(ii) *Futures Transactions*: This is a transaction in which prices of commodities are settled in cash but the commodities are delivered on some future date as agreed. Generally, in futures transactions, the loss or profit is paid or received on the expiry of the time instead of the physical handing over of the commodity.

In futures transactions, two groups of persons are involved, *i.e.*, the *bulls* and the *bears*. Persons who expect that prices will go up in future are *bulls*; but those who expect that prices will go down in future are *bears*. The futures transactions take place as a result of action on the part of these two groups of persons.

(iii) *Contract*: A contract is a promise to deliver or accept delivery of specific grade of a commodity at a specified time in future.

HEDGING

Meaning

Hedging is a trading technique of transferring the price risk. It protects traders from extreme crash in prices. Hedging has been defined as follows:

Shepherd: "Hedging is executing opposite sales or purchases in the futures market to offset the purchases or sales of physical products made in the

FUTURES TRADING

Meaning

Futures trading is a device for protection against the price fluctuations which normally arise in the course of the marketing of commodities. Stockists, processors or manufacturers utilize the futures contracts to transfer the price risk faced by them.

Futures trading includes both hedging and speculation. But since hedging is its *raison detre*, it is also known as hedge-trading. Futures markets are, therefore, known as "hedge" markets.

Widely divergent views exist on the effects of futures trading. A few are convinced that commodity futures trading tends to stabilize prices and reduce price variations. Others not only disagree with this view but vigorously allege that, more often than not, futures trading aggravates the price trends and increases both the magnitude and frequency of price variations. A third group denies that futures trading has any influence, either favourable or adverse, on commodity prices.

Futures trading in various groups of commodities was established about the end of 19th century. In cotton, futures trading was started in Bombay. The Europeans took a hand in founding the Bombay Cotton Traders Association in 1875 for the regulation of cotton trade, which was the first step in the evolution of an organized futures market. The futures markets were established for oilseeds at Bombay in 1900, for wheat at Hapur in 1913, for raw jute and jute goods at Kolkata in 1912, and for bullion at Mumbai in 1920. Subsequently, similar markets for these commodities were established at other places also. To provide against unhealthy speculation, forward trading in agricultural commodities was regulated under the Forward Contracts (Regulation) Act, 1952. The Act was enacted with a view to regulating forward contracts prohibiting options in goods and dealing with certain other related matters. This job has been assigned to the Forward Market Commission, which was established in September, 1953. The government has regulated or banned forward trading in several commodities in order to check unhealthy speculation. The Act has been amended from time to time to plug the loopholes.

The Forward Markets Review Committee, set up by the Government of India under the chairmanship of Prof. M.L. Dantwala, recognised the need for futures trading even in conditions of short supply, and upheld the view that speculations in futures markets should be recognised as a necessary factor for their proper working.

Commodities for Futures Trading

The commodities permissible under futures trading must satisfy the following conditions:

(i) Commodities should be in plentiful supply. If a commodity is in short supply, a few traders may corner the whole supply and charge any price they

like to the buyers.

(ii) The commodity must have a minimum degree of perishability, *i.e.*, it must be storable for futures delivery.

(iii) The commodity should be homogeneous and capable of being graded so that its future deliveries may be made without problems regarding quality.

(iv) The commodity should have a large demand from a number of independent consumers so that a single buyer may not be in a position to impose his terms for his purchase.

(v) The supply of the commodity should not be controlled by a few large firms. It should be available with a large number of suppliers.

(vi) The price of the commodity should be liable to fluctuations over a wide range, and

(vii) There should be free flow of the commodity to and from the market without any outside interference/control.

Services Rendered by a Forward Market

The forward market renders the following services to the economic system:

(i) It enables the merchants, stockists and processors to protect themselves against the risk of adverse fluctuations in the prices of the commodity. It reduces price fluctuations so that the margin of profit may be small;

(ii) The highly competitive character of the market smoothens out price fluctuations and ensures an even flow of goods from the purchaser to the consumer, avoiding gluts in the peak season and shortages in the slack seasons;

(iii) It brings about an integration of the price structure of commodities at different points of time in the same way as transportation and communications bring about an integration of prices in different parts of the market;

(iv) It facilitates large purchases and sales of the commodity at short notice in advance of delivery and in the absence of production; and

(v) It brings about a co-ordination of the current and future expectations by a continual revaluation of stocks of goods in the light of the changing supply and demand conditions.

DANGERS OF FORWARD MARKET

The dangers arising out of the forward market are:

(i) The forward market opens out the way for a large number of persons with insufficient means, inadequate experience and information to enter into commitments which may be beyond their means. In such conditions, market gets demoralized.

(ii) It enables unscrupulous speculators, with little interest in the actual supply of, and demand for, a particular commodity, to corner the supplies and organize *bear raids* and *bull raids* on the market in the hope of making easy money for themselves. This results in violent fluctuations in prices.

positive effect on income distribution because the low per capita infrastructure limits the access of small and marginal farmers to the market. The relationship between agricultural development and investment in infrastructure has been long recognized. A study conducted by Ahmed[15] while attempting to quantify the impact of investment in rural infrastructure concluded that improved infrastructure is a primary driving force under every condition for commercialization. The benefits of commercialization and specialization to a great extent depend upon infrastructure and both have push and pull relationship. The availability of infrastructure not only affects the choice of technology, reduces transportation costs and produces powerful impetus to production but also effects income distribution in favour of small and marginal farmers by increasing their access to the market. The expansion of different infrastructural facilities has been instrumental in increasing the integration of spatially separated markets. Studies have shown that market infrastructural facilities (transport and communication) have significantly increased horizontal and vertical integration of agricultural produce markets, which improved the process of price discovery and transmitting the price signals from deficit to surplus areas (Acharya[16], 2003).

The role of adequate infrastructure for accelerated growth of the agricultural sector and in turn of the entire economy has assumed great importance in recent years due to several developments *viz.*,

(i) Growth of agricultural production depends almost entirely on the growth of productivity of land and availability of modern technologies. Infrastructure development is necessary for transfer of technologies, supply of modern inputs and facilities for market clearance.

(ii) The creation of adequate infrastructural facilities in a liberalized and market driven economic environment is necessary particularly in rural area for minimizing economic disparities between rural and urban areas.

(iii) Creation of infrastructure in rural areas is justified for reducing the migration of people from rural to urban centers; and

(iv) Development of infrastructural facilities is also necessary to reduce the marketing costs for increasing the realization of farmers.

TYPES OF MARKETING INFRASTRUCTURAL FACILITIES

The infrastructural facilities for marketing can be classified in various ways:

One of the ways to classify marketing infrastructural facilities is into physical and institutional.

(a) Physical Marketing infrastructure includes roads, railways, transport vehicles, electrification, storage structures, cold stores and cold chains, telecommunication, grading, packing and processing units. Creation of physical infrastructures is a capital-intensive activity with a long payback period (PBP).

(b) Institutional Marketing infrastructure can be grouped into the following:

(i) Public sector organizations – Food Corporation of India, Cotton Corporation of India, Jute Corporation of India, Commodity Boards for tea, coffee, tobacco, spices, rubber, cardamom, aercanut etc; Commodity Export Councils; State Trading Corporation; Directorate of Marketing and Inspection; Commission for Agricultural Costs and Prices; Agricultural Produce Market Committees; State Agricultural Marketing Boards and Council of State Agricultural Marketing Boards are some of the marketing institutions which have been created in the country during the last 50 years.

(ii) Cooperative Sector Organizations – Primary, Central and State level marketing societies/unions/Federations; Special Commodities marketing societies *viz.*, for sugarcane, cotton and milk; Processing Societies *viz.*, for cotton, oilseeds, milk, sugarcane, fruits and vegetables; National Agricultural Cooperative Marketing Federation (NAFED); and Tribal Cooperative Marketing Federation (TRIFED) are the marketing institutions created in the country in the cooperative sector.

The other way to classify the marketing infrastructures is on the basis of capital requirements.

(a) Capital Intensive Marketing Infrastructure – Most of the physical infrastructures *viz.*, roads, storage structures and processing plants require large initial capital investment and are included under capital intensive marketing infrastructure.

(b) Capital Extensive Marketing Infrastructure – The institutional infrastructure falls in this category. They require limited initial capital investment but their operational and maintenance cost is quite substantial.

The difference between capital intensive and capital extensive marketing infrastructure is of degree rather than of kind.

ROLE OF PUBLIC VERSUS PRIVATE SECTOR IN MARKETING INFRASTRUCTURE

Till about the late eighties marketing infrastructure was created mainly in the public sector. Electricity, railways, roads, tele-communication, postal services and ports were among the marketing infrastructure, which remained reserved for the public sector. However, after 1991, virtually all sectors of infrastructure have been opened for private sector investment. However, the public sector even today continues to play an important role in creation of infrastructure in backward, remote and difficult desert and hilly areas because of their low utilization and poor returns to investment.

More details of physical and institutional marketing infrastructures are given in chapters 4 & 5.

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Chapter 5

Marketing Agencies, Institutions and Channels

In this chapter, we discuss marketing agencies, marketing institutions and marketing channels through which farm products move from producers to consumers. A very small proportion of farm produce moves directly from farmers to consumers. Most of the farm products move to consumers through several agencies/institutions and channels. The role played by marketing agencies and institutions in the marketing system in quite indispensable as these perform important marketing functions. They also help in expanding the markets for farm products and add value to the products.

The production of a produce is complete only when it reaches the hands of those who need it—the consumers. All the commodities cannot be produced in all the areas because of variations in agro-climatic conditions. Hence, the need for their movement from producers to consumers.

There are two main routes through which agricultural commodities reach the consumers:

(i) *Direct Route*: Sometimes, agricultural commodities directly pass from producers to consumers. There is a complete absence of middlemen or intermediaries. But it is only a very small proportion of the agricultural commodities which moves directly from producers to consumers.

(ii) *Indirect Route*: Agricultural commodities generally move from producers to consumers through intermediaries or middlemen. The number of intermediaries may vary from one to many. In the modern era of specialized production, both the horizontal and vertical distance between the producer and the consumer has increased, resulting in a reduction of direct sales. The role of market middlemen has increased in the recent past because a substantial part of the produce moves through them.

MARKETING AGENCIES

In the marketing of agricultural commodities, the following agencies are involved:

(i) PRODUCERS

Most farmers or producers, perform one or more marketing functions. They sell the surplus either in the village or in the market. Some farmers, especially the large ones, assemble the produce of small farmers, transport it to the nearby market, sell it there and make a profit. This activity helps these farmers to supplement their incomes. Frequent visits to markets and constant touch with market functionaries, bring home to them a fair knowledge of market practices. They have, thus, an access to market information, and are able to perform the functions of market middlemen.

(ii) MIDDLEMEN

Middlemen are those individuals or business concerns which specialize in performing the various marketing functions and rendering such services as are involved in the marketing of goods. They do this at different stages in the marketing process. The middlemen in foodgrain marketing may, therefore, be classified as follows:

(a) *Merchant Middlemen*

Merchant middlemen are those individuals who take title to the goods they handle. They buy and sell on their own and gain or lose, depending on the difference in the sale and purchase prices. They may, moreover, suffer loss with a fall in the price of the product. Merchant middlemen are of following types:

Wholesalers: Wholesalers are those merchant middlemen who buy and sell foodgrains in large quantities. They may buy either directly from farmers or from other wholesalers. They sell foodgrains either in the same market or in other markets. They sell to retailers, other wholesalers and processors. They do not sell significant quantities to ultimate consumers. They own godowns for the storage of the produce.

The wholesalers perform the following functions in marketing:

(a) They assemble the goods from various localities and areas to meet the demands of buyers;

(b) They sort out the goods in different lots according to their quality and prepare them for the market;

(c) They equalize the flow of goods by storing them in the peak arrival season and releasing them in the off-season;

(d) They regulate the flow of goods by trading with buyers and sellers in various markets;

(e) They finance the farmers so that the latter may meet their requirements of production inputs; and

(f) They assess the demand of prospective buyers and processors from time to time, and plan the movement of the goods over space and time.

Retailers: Retailers buy goods from wholesalers and sell them to the

consumers in small quantities. They are producers' personal representatives to consumers. Retailers are the closest to consumers in the marketing channel.

Itinerant Traders and Village Merchants: Itinerant traders are petty merchants who move from village to village, and directly purchase the produce from the cultivators. They transport it to the nearby primary or secondary market and sell it there. Village merchants have their small establishments in villages. They purchase the produce of those farmers who have either taken finance from them or those who are not able to go to the market. Village merchants also supply essential consumption goods to the farmers. They act as financers of poor farmers. They often visit nearby markets and keep in touch with the prevailing prices. They either sell the collected produce in the nearby market or retain it for sale at a later date in the village itself.

Mashakhores: This is a local term used for big retailers or small wholesalers dealing in fruits and vegetables. Earlier, the mashakhores used to deal only in one or two vegetables, purchasing from the commission agents or wholesalers in substantial quantities usually three to four quintals of vegetables like potato, onion, carrot, okra, tomato, and spinach. They usually sell to the bulk consumers like hotelwalas, para-miliary units or small retailers/vendors in lots of around 5 kg to 10 kg each. However, in recent years, mashakhores have started retailing to all types of customers without the condition of a minimum quantity. In other words, the mashakhores are now working more like ordinary retailers.

(b) *Agent Middlemen*

Agent middlemen act as representatives of their clients. They do not take title to the produce and, therefore, do not own it. They merely negotiate the purchase and/or sale. They sell services to their principals and not the goods or commodities. They receive income in the form of commission or brokerage. They serve as buyers or sellers in effective bargaining. Agent middlemen are of two types:

Commission Agents or Arhatias: A commission agent is a person operating in the wholesale market who acts as the representative of either a seller or a buyer. He is usually granted broad powers by those who consign goods or who order the purchase. A commission agent normally takes over the physical handling of the produce, arranges for its sale, collects the price from the buyer, deducts his expenses and commission, and remits the balance to the seller. All these facilities are extended to buyer-firms as well, if asked for.

Commission agents or arhatias in unregulated markets are of two types, *Kaccha arhatias* and *Pacca arhatias*: Kaccha arhatias primarily act for the sellers, including farmers. They sometimes provide advance money to farmers and itinerant traders on the condition that the produce will be disposed of through them. *Kaccha arhatias* charge *arhat* or commission in addition to the

eatables have to be cooked and packed properly before they reach the consumers. Processors play a dominant role in such societies. In developing countries like India, however, most foodgrains are purchased by consumers in the raw form and processing is done at the consumer's level. Again, the lots originating at small farms follow different route or channels from the one originating in large farms. For example, small farms usually sell their produce to village traders; it may or may not enter the main market. But large farms usually sell their produce in the main market, where it goes into the hands of wholesalers. The produce sold immediately after the harvest usualy follows longer channel than the one sold in later months.

With the expansion in transportation and communication network, changes in the structure of demand and the development of markets, marketing channels for farm products in India have undergone a considerable change, both in terms of length and quality.

MARKETING CHANNELS FOR CEREALS

Marketing channels for various cereals in India are more or less similar, except the channel for paddy (or rice) where rice millers come into the picture. For pulse crops, *dal* mills appear prominently in the channel. The flow chart in Fig 5.1 enables us to know the marketing channels for general foodgrains in India.

Some common marketing channels for wheat have been identified as follows:

(i) Farmer to consumers;

(ii) Farmer to retailer or village trader to consumer;

(iii) Farmer to wholesaler to retailer to consumer;

(iv) Farmer to village trader to wholesaler to retailer to consumer;

(v) Farmer to co-operative marketing society to retailer to consumer;

(vi) Farmer to a government agency (FCI, etc.) to fair price shop-owner to consumer;

(vii) Farmer to wholesaler to flour miller to retailer to consumer.

The channels for paddy-rice and pulses are broadly the same, except that the rice millers or *dal* millers come into the picture before the produce reaches retailers or consumers.

MARKETING CHANNELS FOR OILSEEDS

Marketing channels for oilseeds are different from those for foodgrains, mainly because the extraction of oil from oilseeds is an important marketing function of oilseeds. The flow chart in Fig. 5.2 reveals the movement of oilseeds from producers to consumers in India.

The most common marketing channels for oilseeds in India are :

(i) Producer to consumer (who either directly consumes the oilseeds or gets it processed on custom basis);

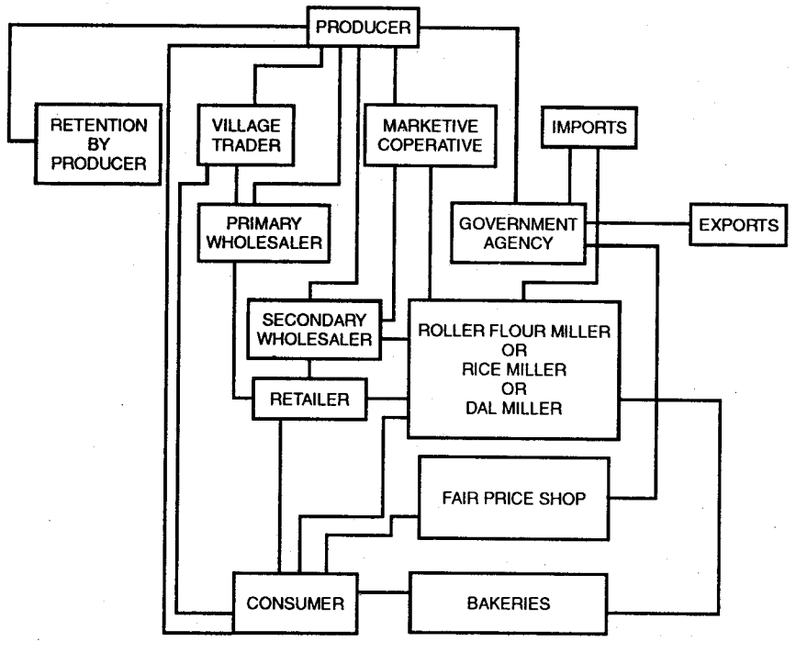

Fig. 5.1 Marketing Channels for Foodgrains.

(ii) Producer to village trader to processor to oil retailer to consumer;

(iii) Producer to oilseed wholesaler to processor to oil wholesaler to oil retailer to oil consumer;

(iv) Producer to village trader to processor to oil consumer;

(v) Producer to government agency to processor to oil wholesaler to oil retailer to oil consumer.

MARKETING CHANNELS FOR FRUITS AND VEGETABLES

Marketing channels for fruits and vegetables vary from commodity to commodity and from producer to producer. In rural areas and small towns, many producers performs the function of retail sellers. Large producers directly sell their produce to the wholesalers or processing firms. Some of the common marketing channels for vegetables and fruits are:

(i) Producer to consumer;

(ii) Producer to primary wholesalers to retailers or hawkers to consumer;

(iii) Producer to processors (for conversion into juices, preserves, etc.);

(iv) Producers to primary wholesalers to processors;

(v) Producers to primary wholesalers to secondary wholesalers to retailers or hawkers to consumers;

(vi) Producers to local assemblers to primary wholesalers to retailers or hawkers to consumers.

An important feature of marketing channels for fruits and vegetables is that these commodities just move to some selected large cities/centres and subsequently are distributed to urban population and other medium size urban market centres. The wholesale markets of these urban centres work as transit points and thus play an important role in the entire marketing channel for fruits and vegetables. Large wholesale markets for fruits and vegetables are concentrated in 10 major cities *viz.*, Delhi, Kolkata, Bangalore, Chennai, Mumbai, Jaipur, Nagpur, Vijayavada, Lucknow and Varanasi. These cities account for 75 percent of vegetables marketed in major urban areas in India. Further, the transit trade takes place through the cities with more than 20 lakh population which account for 68 percent of the fruits and vegetables grown in the respective regions. There are 65 urban wholesale markets for fruits and 81 for vegetables. Each market, on an average, serves a population of about 7 lakhs.

MARKETING CHANNELS FOR EGGS

The prevalent marketing channels for eggs are:

(i) Producer to consumer;

(ii) Producer to retailer to consumer;

(iii) Producer to wholesaler to retailer to consumer;

(iv) Producer to co-operative marketing society to wholesalers to retailers to consumers;

(v) Producers to egg powder factory.

Sometimes, the wholesaling and retailing functions are performed by a single firm in the channel.

MARKETING CHANNELS FOR LIVE POULTRY

A study conducted in the Punjab[3] has identified the movement path for live poultry as shown in Figure 5.3.

MARKETING CHANNELS FOR PULSES

Most of the studies on the identification of marketing channels for agricultural commodities have concentrated on a concept of marketing channel which defines the flow of the produce from the producer (farmer) to the consumer. But as the commercialization (market orientation) of agriculture is increasing and as the farmers and consumers are located in different states or different countries, the marketing channels that are emerging go across state or even national boundaries. This apart, unless quantities flowing into various channels are estimated, the relative importance of alternative channels cannot be assessed. Such an analysis was done by Acharya[4] for gram grains in

Rajasthan. According to this study, there are three points of entry of gram grain in the marketing channel, *viz.*, farmer level, wholesaler level (from outside the state) and processor level (also from outside the state). There are 28 marketing channels, village traders appear in 8 channels, grain wholesalers appear in 18 channels, processors appear in 15 channels, dal (split) wholesalers appear in 5 channels and retailers appear in 15 channels. Assuming the farmers' surplus entering the marketing channel as 100 units, the entry from

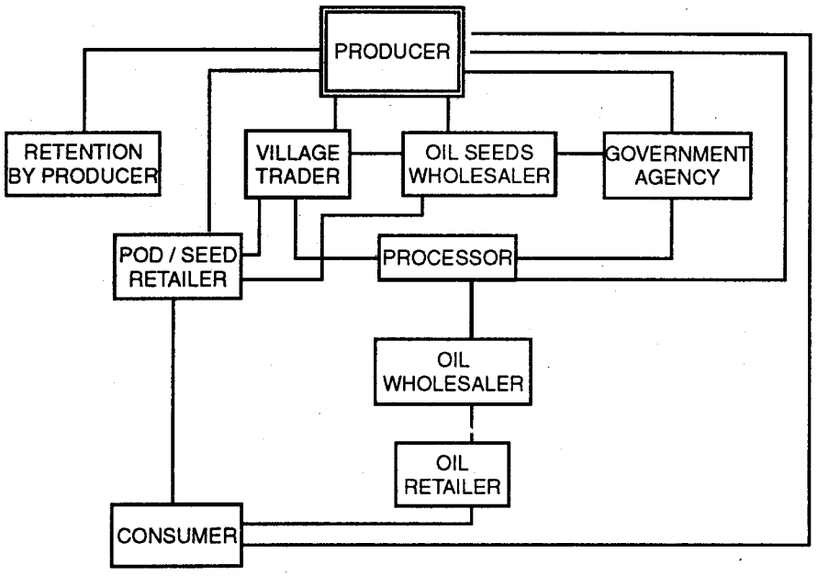

Fig. 5.2 Marketing Channels for Oilseeds.

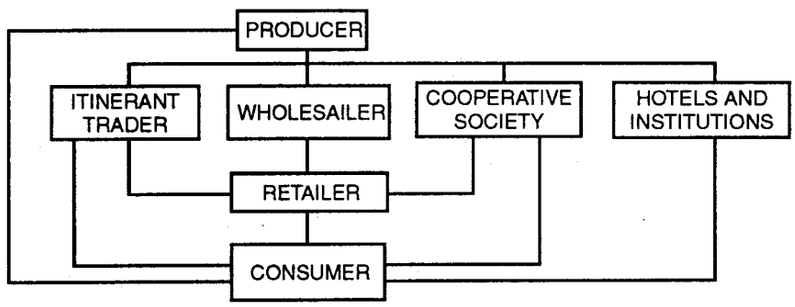

Fig. 5.3 Marketing Channels for Live Poultry.

Chandigarh in February, 1987. Punjab Mandi Board took the initiative with a view to providing small farmers around cities a direct access to consumers. Similarly, in Haryana, the first Apni Mandi was started at Karnal in 1988. In Rajasthan also, this scheme has been introduced in several district towns. The initiative is worth emulating.

Functioning

The market committee of the area where Apni Mandi is located provides space, water, sheds, counters, balances and other facilities to the farmers in Apni Mandis. The Market Committee Staff need to work hard with dedication for the success of Apni Mandis. The State Marketing Boards provide financial assistance to the Market Committees for these services rendered by them to the Apni Mandi. This scheme is being implemented with certain resistance from middlemen. Some farmers also have reservations about the success of the scheme as it assumes adequate skills of retailing on the part of farmers. However, farmers as well as consumers would benefit from the Apni Mandi Scheme and its popularity may pick up after sometime.

(ii) Hadaspar Vegetable Market

Hadaspar vegetable market is a model market for direct marketing of vegetables in Pune city. This sub-market yard is situated nine kms away from Pune city. This belongs to the Pune Municipal Corporation and the fee for using the space in the market is collected by the municipal corporation from the farmers. This is one of the ideal markets in the country for marketing of vegetables. In this market there are no commission agents/middlemen. The market has modern weighing machines for weighing the produce. Buyers purchase vegetables in lots of 100 kgs. or 100 numbers. The produce is weighed in the presence of licensed weighmen of the market committee and sale bill is prepared. The purchasers make payment of the value of produce directly to the farmer. The purchaser is allowed to leave the market place along with the produce after showing the sale bill at the gate of the market. Disputes, if any, arising between buyers and sellers are settled by the supervisor of the market committee after calling the concerned parties. The market committee collects one percent sale proceeds as market fee for the services and facilities provided by the committee to the farmers and buyers.

(iii) Rythu Bazars

Rythu bazars have been established in the major cities of Andhra Pradesh state with the prime objective to provide direct link between farmers and consumers in the marketing activity of fruits, vegetables and other essential food items. Both producers and consumers are benefited from Rythu Bazars as producer's share in the consumers rupee is more by 15 to 40 percent and consumer's get fresh vegetables, fruits and food items at 20 to 35 percent

less prices than the prevailing prices in nearby markets. Further, marketing costs are at the minimum level as middlemen are completely eliminated from the marketing activities in Rythu Bazars. The maintenance expenditure of Rythu Bazars is being met from financial sources of Agricultural Produce Market Committee (APMC) nearer to the Rythu Bazars.

Rythu Bazars started functioning in the Andhra Pradesh State from January 20, 1999. Presently there are 95 Rythu bazars operating in all the 23 districts of the state. There is no government involvement in price fixation. This function is left to farmers who organise themselves into committees and these committee are fixing sale prices daily after taking into consideration the wholesale and retail prices prevailing in the nearby towns. Generally, in the Rythu Bazar, prices are fixed 20 percent over the wholesale prices and 15 to 20 percent less than local market prices. Prices fixed are displayed at several places all over the Rythu Bazar for the benefit of the consumers.

The major highlights of Rythu bazars are:

- District collectors are making the land available for the Rythu Bazars.
- Permanent infrastructure with all support system are being constructed in the Rythu Bazars by the concerned Agricultural Produce Market Committee.
- The vegetable cultivators in the identified villages are provided the photoidentity cards and only these cultivators are permitted to sell vegetables in these bazars.
- State Government arranges special buses on most routes for transport of vegetables.
- Temporary storage facilities are on anvil.
- Coordination exists between revenue, marketing and horticulture departments for smooth functioning of these markets.
- A distinct and common identity of such markets across the state is being established.
- Other essential commodities like pulses and edible oils are also sold in these markets at reasonable prices.
- Vegetable production programme in the area is also undertaken by the horticulture department of the state to ensure regular supplies of vegetables to the consumers.

Rythu Bazars have generated a great deal of enthusiasm both among farmers and consumers as farmers get better prices for their produce due to curtailment of commission and overhead costs on account of the non-existence of middlemen and the consumers get vegetables at low prices compared to the prices in other markets.

(iv) Uzhavar Sandies

Uzhavar Sandies (Farmers' Market) were established in selected munici-

pal and panchayat areas of the Tamil Nadu by the state government. In these markets, farmers enjoy better marketing infrastructure free of cost and also receive considerably high prices for the products than what they use to receive from middlemen at village or primary markets of towns. Farmers are additionally benefited in the form of interaction with other farmers and with departmental personnel. Farmers also get good quality seeds and other inputs in the market yard itself. The consumers in these markets are benefited by getting fresh vegetables at relatively lower prices.

(v) Shetkari Bazar

On the lines of farmers' markets in other states *viz.*, Apni Mandi in Punjab, Haryana and Rajasthan since 1988, Rythu Bazar in Andhra Pradesh since January 26, 1999 and Uzhavar Sandies in Tamil Nadu, the Shetkari Bazars were established in the state of Maharashtra for the marketing of fruits and vegetables. The Shetkari Bazar, by eliminating intermediaries, links producers direct to the consumers, reduces price-spread (marketing margin of intermediaries) and enhances producer's share in consumer's rupee. Thus, these markets increase the farm income, well being of the farmers and bring stability in prices of horticultural and plantation crops[5].

(vi) Krushak Bazars

On the lines of Rythu Bazars in Andhra Pradesh and Uzhavar Sandies in Tamil Nadu, Government of Orissa has taken a programme of establishing Krushak Bazars in the state of Orissa in the year 2000–01 with the purpose to empower farmer-producer to compete effectively in the open market to get a remunerative price for his produce and to ensure products at affordable prices to the consumers[6].

The government provides following incentives for opening of the Krushak Bazars in the state:

(a) Provides 1 to 2 acres of land at suitable place, free of cost, for establishing the bazar.

(b) A cluster/group of villages within the proximity of market area and farmers growing vegetable are identified having the surplus produce for sale.

(c) The identified farmers are allowed to use marketing facilities so that there is no intervention of middlemen and farmers get better prices for their produce.

(d) Public utility facilities *viz.*, drinking water, electricity, toilet, canteen and rest house are provided to farmers by the Krushak Bazars.

(e) Identified farmers are provided inputs like seeds and fertilizer at the reasonable prices in the Krushak Bazars, and

(f) Storage facilities in the market area are also provided to the farmers in Krushak Bazars.

(vii) Mother Dairy Booths

Mother Dairy, basically handling milk in Delhi, was asked to try its hand in retail vegetable marketing by direct purchasing vegetables from the farmers, moving them in specially built vehicles, storing them in air conditioned godowns and distribute them to the consumers through its retail outlets in 1989 after the notorious onion and potato price crisis. Mother Dairy management has opened retail outlets in almost all important colonies of Delhi for providing vegetables to the consumers at reasonable prices.

CONTRACT FARMING/CONTRACT MARKETING

(Farmer - Processor Linkages)

MEANING

Contract farming or marketing essentially is an arrangement between the farmer-producers and the agri-business firms to produce certain pre-agreed quantity and quality of the produce at a particular price and time. It can only be a pure procurement transaction or can extend to the supply of inputs or even beyond.

Contract farming is emerging as an important mode of procurement of raw materials by agri-business firms in India due to the developments in the field of agricultural marketing, changes in food habits and in agricultural technology in the new economic environment. This is an important initiative for reducing transaction costs by establishing farmer-processor linkages in addition to the already existing methods of linking the farmers to the consumers.

The distinction between 'sales' and 'contract to sell' needs to be understood clearly. In the case of sale, the title or ownership of goods is transferred at once whereas in the 'contract to sell', the goods are transferred at a later date. A contract to sell is not in the true sense of the word a sale, rather it is merely an arrangement to sell. A contract is an agreement but an agreement is not necessarily a contract.

In contract farming, companies or organizations engaged in processing and marketing of agricultural products are entering into contracts with the farmers. They provide inputs to the farmers and buy back the product at a rate specified in advance. Following type of inputs and services are normally provided by the company to the farmers:

- Seeds of the variety they need for processing/marketing
- Guide lines to grow the crops
- Pesticides which do not result in residual toxicity
- Extension services
- Fertilizers/harmones required for the crop
- Other material if not locally available.

The contract may be entered into by parties anytime from the start of the sowing or planting to the harvesting, processing, packaging and marketing stage of the crop. Normally, the contract is entered before the start of the

sowing or planting because the buyer can then stipulate the conditions of cultivation, use of the seed variety needed by them, use of pesticides and insecticides, and requirement of onfarm grading, sorting, packaging and processing. The buyer of the product generally keeps the right to monitor the crop at every stage of its growth.

Following documents are obtained/given to selected farmers by the companies:

- Application/Registration form
- Contract farming agreement
- Issue of pass book
- Issue of ID Card

ADVANTAGES OF CONTRACT FARMING

Contract farming/marketing is beneficial both for the producer-farmers as well as to the processing company in several ways:

To the farmer, contract farming

(i) Reduces the risk of price/production

(ii) Ensures the price as market is assured

(iii) Increases the quality consciousness

(iv) Ensures higher production because of better quality seeds and pesticides

(v) Reduces marketing costs

(vi) Provides financial support in cash or kind

(vii) Ensures efficient/timely technical guidance almost free of cost.

To the processing company, contract farming—

(i) Ensures supply of quality agricultural produce at right time and at lesser cost to the company

(ii) Canalizes direct private investment in agricultural activities.

(iii) Ensures that the toxicity level is reduced as per requirement for export.

Government is increasingly looking towards the corporate sector to augment the rural incomes and employment through agro-processing. In this context, policy makers see the contract farming/marketing as an important avenue to ensure greater private sector participation in agriculture.

FLIP SIDE OF CONTRACT FARMING

The important weaknesses of contract farming are:

(i) Contract farming is involved mostly in cash crops which may lead to shift in area from food crops which, beyond a limit may endanger food security, biodiversity and agricultural crops cycle of the country.

(ii) Contract farming may create the danger of imposition of undesirable seeds.

(iii) The temptation of getting commercial profits from cultivation of a variety of the crop may cause permanent damage to the land.

(iv) Market making outside the country may cause market breaking inside the country.

However, contract farming is a welcome development. But the contract should be made under high scrutiny possibly because of exploitation of the farmers. The terms of the contract should be spelt out in advance and a consent letter is obtained both from the farmer and the company. The government should establish a monitoring mechanism and a dispute settlement body to ensure that both parties adhere to the terms of contract.

EXPERIENCE IN CONTRACT FARMING

The following companies are presently under the tie-ups in India for contract farming for the products specified:

Poultry –	Contract farming of broilers between the Coimbatore hatchery with farmers.
Pulpwood –	ITC/WIMCO/JK Papers and farmers in Andhra Pradesh, Orissa, Punjab and Uttar Pradesh.
Organic dyes –	Marigold farmers and extraction units in Coimbatore.
Dairy processing –	Chitale of Pune and small farmers in Maharashtra and Gujarat.
Tomato Pulp –	Pepsi Company and farmers of Punjab and Rajasthan for tomato growing.
Exotic vegetables –	Trikaya Foods/VST and small farmers of Maharashtra and Andhra Pradesh.
Mushrooms –	NAFED and Sonepat (Haryana) farmers.
Gherkins –	Exporters with farmers of Bangalore.
Edible oils –	ITO Agro-Tech and sunflower cultivators in Andhra Pradesh and Karnataka.

Other areas where farmer processor linkage (contract farming) are being practised in India are:

- Baby corn cultivation
- Tomatoes for manufacture of sauce and ketchup
- Chillies for manufacture of chilly paste
- Garlic and onion for manufacture of paste, powder and dehydrated products
- Special varieties of Banana
- Potato for making chips and wafers
- Barley in making of bears
- Onions and Mandarin Oranges
- Durum Wheat

Presently contract farming is confined to few selected crops in selected pockets. However, there is enormous scope for contract farming/marketing

because with the increasing income, consumers are becoming more health and quality consciousness and look for branded products.

INCENTIVES FOR PROMOTING CONTRACT FARMING

Contract farming is means of allocating/distribution of risk between processor and the farmers. It will succeed if both the parties share the risks and rewards.

The Ministry of Food Processing Industries of Government of India has launched a scheme entitled 'Grant Under Backward Linkages' to promote contract farming. Under this scheme, a grant of 10 percent of value of raw material purchased from the contract farmers (subject to a maximum of Rs. 10 lakhs per annum) is provided to food processing units upto three years. The Ministry has also prescribed a model agreement form. The criteria for the grant are:

(i) The processing unit should provide seed, insecticides, fertilizers and extension services to contract farmers at reasonable charges;

(ii) The number of contract farmers should be atleast 25;

(iii) There should be an agreement prior to the period of contract farming for a maximum period of one year;

(iv) The processing unit should give advance intimation about its contract with farmers to the Ministry as well as State Nodal Authority (One Month before the contract comes into operation).

(v) The claim for reimbursement should be recommended by the State Nodal Authority.

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Chapter 6

Marketing of Farm Inputs

Output marketing is an aspect of agricultural marketing which has been dealt with so far. Another equally important aspect is the marketing of farm inputs. A timely and adequate supply at fair prices of farm inputs—seeds, chemical fertilizers, plant protection chemicals, farm equipment and machinery, labour, electricity, diesel oil and credit—are of great importance in the production of farm output. The importance of purchased farm inputs has significantly increased in the recent past with the technological breakthrough in Indian agriculture.

The timely supply of modern farm inputs to the farmers of all categories at reasonable prices depends on the existence of an efficient marketing system for them. The importance of an efficient marketing system for farm inputs may be judged by the following:

(i) Farm products are produced in the countryside. The effect of change in production methods can, therefore, be realised only if the farm inputs reach the farmers in time at the least cost.

(ii) The use of modern inputs by farmers largely depends upon the spread of information about them. The marketing system has to perform this function. Marketing agencies have to adopt persuasive methods to induce even the most tradition-bound farmer to use modern farm inputs. Dynamic and efficient channels for marketing of farm inputs are, therefore, essential for the popularization of knowledge about modern inputs among the farmers.

(iii) An efficient marketing system for farm inputs is essential for the development of the inputs manufacturing and supplying industries in the country. These industries provide employment opportunities in manufacturing, selling and handling of farm inputs.

THEORY OF DETERMINATION OF INPUT PRICES

From the point of view of economic theory, the demand for an input is a derived demand, *i.e.*, derived from the demand for the product in whose production the input is used. But more than one inputs are usually required to produce a given agricultural product. To understand this, let the production of Q be expressed as a function of three inputs, x_1, x_2, x_3, as follows:

$$Q = f(x_1, x_2, x_3)$$

The first-order conditions for profit maximization are

$$\frac{\partial Q}{\partial x_1} = \frac{P_1}{P_q}$$

$$\frac{\partial Q}{\partial x_2} = \frac{P_2}{P_q}$$

$$\frac{\partial Q}{\partial x_3} = \frac{P_3}{P_q}$$

where, P_1, P_2, P_3 and P_q are prices of x_1, x_2, x_3, and Q respectively.

Simultaneous solution of these first-order conditions would give normative demand for all the inputs and this level of demand would depend on all the prices. In this sense, the demand for an input can be expressed as function of its own price; prices of other complementary and substitute inputs and price of the product. For a given level of prices of other inputs and product prices, the demand function for an input as a function of its own price can be obtained.

Another situation most commonly encountered on individual farms is that some inputs such as fertiliser and insecticides remain variable while others such as land and water are fixed. In such situations, the production (Q) can be expressed as a function of (say) three variable inputs (x_1, x_2 and x_3) and (say) three fixed inputs (Z_1, Z_2 and Z_3) as follows:

$$Q = f(x_1, x_2, x_3/Z_1, Z_2, Z_3)$$

In such situations, while the three first-order conditions remain the same as stated above, the simultaneous solution of these first-order conditions would give normative demand for three variable inputs which depends on the prices of variable inputs and that of output and on the levels of the three fixed resources.

Since it is a derived demand, the quantity of input demanded by an individual producer will depend on its marginal product. For a profit maximizing firm, the downward sloping portion of the marginal value product curve, is the relevant demand curve for the input. Similarly, for a profit maximizing input manufacturing firm, the rising portion of the marginal cost curve is the supply curve for the input. The intersection of these two curves indicates the market clearing price and quantity.

But the situation of supply curve for inputs like labour is different. The supply curve for labour is backward bending, *i.e.*, at some level of wages, the individual may decrease his supply. The exact point, of course depends on the relative weights attached by the individual to money income and leisure. For other inputs like irrigation water from public-owned canals, the supply

curve is a straight line, *i.e.*, required quantity at administratively fixed price.

The supply, demand, distribution, marketing pattern and price policy of important farm inputs have been discussed in the following paragraphs:

CHEMICAL FERTILIZERS

Fertilizer is decidedly the most important among all the inputs purchased by the farmer for use in present-day agriculture with a view to accelerating agricultural production. It has been estimated that 53 percent of the incremental foodgrain production in India during the seventies was due to fertilizer use, and its contribution is expected to have increased since then. The demand for chemical fertilizers has increased with the evolution of new hybrid and dwarf variety seeds, which are more responsive to chemical fertilizers.

The use of fertilizers increases land productivity, for the yield increases and eases the nutrient constraints on multiple cropping and land development programmes. Fertilizers relax the land constraint. Since the yield increase is proportionately more than the corresponding incremental labour applied, fertilizer use increases labour productivity. The production, distribution and consumption of fertilizers create additional employment opportunities—a fact which is extremely important in labour-surplus countries.

SUPPLY

The sources of supply of fertilizers in India are indigenous production and imports. The chemical fertilizers are produced in all the three sectors—public, co-operative and private. Although even before independence, Tata Iron and Steel Company had a plant for manufacturing ammonium sulphate, but it was only after Independence that fertilizer production received serious attention. The licensed manufacturing capacity in 1950 was only 16700 tonnes of N and 20500 tonnes of P_2O_5. Up to the end of December 1959, the capacity expanded to 1.48 lakh tonnes of nitrogen and 0.81 lakh tonnes of P_2O_5. Since then, the manufacturing capacity has continued to expand rapidly. In October, 1996, the country had the installed capacity of manufacturing 93.32 lakh tonnes of N and 29.48 lakh tonnes of P_2O_5. As shown in Table 6.1, the public sector accounts for 40 percent of the total installed capacity of manufacturing fertilizers in the country. The actual capacity utilization in public sector fertilizer plants is only 75.4 percent as against 99.4 percent in private sector plants and 117.6 percent in co-operative sector plants.

The installed capacity in the cooperative sector has also increased rapidly. In 1996, the co-operatives had the installed capacity of manufacturing 18.41 lakh tonnes of plant nutrients (N and P) which accounts for 15 percent of the total installed capacity in the country. One remarkable feature of the co-operative sector fertilizer plants is their capacity utilization. The percentage of capacity utilization in co-operative sector plants during 1995–96 has been

117.6. They accounted for 19 percent of total plant nutrients produced in the country during 1995–96.

The private sector has really made good progress in the production of fertilizers. This sector accounts for 39 percent of installed capacity of nitrogen

Table 6.1
Share of Public, Private and Co-operative Sectors in Fertilizer Production and Capacity Utilization in India

Particulars	Public	Private	Co-operative	Total
Capacity ('000 tonnes) As on 1-10-1996				
N	4134	3666	1532	9332
	(44)	(39)	(17)	(100)
P	791	1848	309	2948
	(27)	(63)	(10)	(100)
Total	4925	5514	1841	12280
	(40)	(45)	(15)	(100)
Production ('000 tonnes) (1995-96)				
N	3025	3940	1804	8769
	(34)	(45)	(21)	(100)
P	689	1543	361	2953
	(27)	(59)	(14)	(100)
Total	3714	5483	2165	11362
	(33)	(48)	(19)	(100)
Capacity Utilization (%) (1995-96)				
N	73.2	107.5	117.8	94.0
P	87.1	83.5	116.8	88.0
Total	75.4	99.4	117.6	92.5

Note : Figures in the parentheses are percentages of row totals.
Source : Fertilizer Association of India, New Delhi, Fertilizer Statistics, 1995–96.

and 63 percent of P_2O_5. The capacity utilization in the private sector has also been very satisfactory. In 1995–96, it was 107.5 percent in the case of *N* and 83.5 percent in the case of P_2O_5 with an overall average of 99.4 percent. In this year, private sector accounted for 45 percent of the production of *N* and nearly 59 percent of the production of P_2O_5 in the country.

In order to asses the position of supply of fertilizers in India over time, production, imports and consumption of fertilizers at selected points between 1951–52 and 2002–03 are given in Table 6.2.

The production of nitrogenous and phosphatic fertilizers increased from 0.27 lakh tonnes in 1951–52 to 2.24 lakh tonnes in 1961–62, 10.59 lakh tonnes in 1970–71, and further to 24.85 lakh tonnes in 1975–76. In the case

of potassic fertilizers, there is no indigenous production and the entire consumption requirement is met by imports. Up to the middle of seventies, almost half of the country's requirements of fertilizers were met by imports. Increased dependence on imported fertilizers coupled with the first oil shock of 1973–75, lead the government to pay added attention to the domestic production of fertilizers in the country.

In 1985–86, the production of nitrogenous and phosphatic fertilizers increased significantly. It went up to 43.28 lakh tonnes of nitrogenous fertilizers and to 14.28 lakh tonnes of phosphatic fertilizers. By the end of 1995–96, the production of nitrogenous fertilizers increased further to 87.77 lakh tonnes and of phosphatic fertilizers to 25.85 lakh tonnes. Even then the domestic production of fertilizers in India was not sufficient to meet the effective demand and the supply continued to be augmented by imports.

Production of nitrogenous and phosphatic fertilizers increased to 108.76 lakh tonnes and 43.56 lakh tonnes by the end of 2002–03. Total production of fertilizers in the country reached 152.32 lakh tonnes during 2002–03. Total consumption of fertilizers was 173.60 lakh tonnes during 2001–02. The supply of fertilizers has continued to be augmented by imports also. India im-

Table 6.2
Production, Imports and Consumption of different Fertilizers In India

(Lakh Tonnes)

	Production				Imports				Consumption			
Year	N	P	K	Total	N	P	K	Total	N	P	K	Total
1951–52	0.11	0.16	–	0.27	0.29	0.00	0.08	0.37	NA	0.14	0.08	0.22*
1956–57	0.82	0.18	–	1.00	0.56	–	–	0.56	1.31	0.22	NA	1.53**
1961–62	1.52	0.72	–	2.24	1.42	–	0.32	1.74	2.43	0.66	0.29	3.38
1965–66	2.32	1.23	–	3.55	3.10	0.13	0.93	4.15	5.41	1.56	0.78	7.75
1970–71	8.30	2.29	–	10.59	4.77	0.32	1.20	6.29	14.87	4.62	2.28	21.77
1975–76	15.35	9.50	–	24.85	9.50	3.34	2.67	15.51	21.49	4.66	2.79	28.94
1980–81	21.64	8.41	–	30.05	15.10	4.52	7.97	27.59	36.78	12.14	6.24	55.16
1985–86	43.28	14.28	–	57.56	16.80	8.16	9.03	33.99	56.61	20.05	8.08	84.74
1990–91	69.93	20.52	–	90.45	4.12	10.20	13.26	27.58	79.97	32.21	13.28	125.46
1995–96	87.77	25.85	–	113.62	19.38	6.47	14.23	40.08	98.23	28.98	11.56	138.77
2000–01	109.62	37.43	–	147.05	1.54	3.96	15.41	20.90	109.20	42.15	15.67	167.02
2001–02	107.68	38.60	–	146.28	2.69	4.39	17.01	23.99	113.10	43.82	16.67	173.60
2002–03	108.76	43.56	–	152.32	NA	NA	NA	NA	NA	NA	NA	NA

*Excluding N.
**Excluding K.
Source: Economic Survey—Various Issues, Ministry of Finance, Government of India, New Delhi.

ports, besides potassic fertilizer, nitrogenous and phosphatic fertilizers to meet its domestic demand.

The import of nitrogenous fertilizers which had increased from 0.29 lakh tonnes in 1951–52 to 9.50 lakh tonnes in 1975–76 went up further to 16.80 lakh tonnes in 1985–86 and 19.38 lakh tonnes in 1995–96. The imports of phosphatic and potassic fertilizers, too, increased from 400 tonnes of phosphatic and eight thousand tonnes of potassic fertilizers in 1951–52 to 8.16 lakh tonnes and 9.03 lakh tonnes in 1985–86 respectively. During the eighties, the domestic production of both nitrogenous and phosphatic fertilizers increased considerably which could, to some extent, reduce the dependence on imported fertilizers.

DEMAND (CONSUMPTION)

The demand for fertilizers is a derived demand. It depends on the prices of fertilizers, of other complementary inputs and the levels of availability of complementary inputs such as irrigation and output prices. Most of the fertilizers are consumed in assured irrigated areas of the country.

The fertilizer use by farmers in India has considerably increased during the last five decade. This has been shown in Table 6.2 Fertilizer corisumption was barely 0.22 lakh tonnes in 1951–52 which increased to 173.60 lakh tonnes of nutrients in 2001–02. During 2001–02, out of the total fertilizer use, N accounted for 65.2 precent, P accounted 25.2 percent and K accounted for 9.6 percent with N : P : K ratio at 6.8 : 2.6 : 1.

For assessing the emerging scenario of demand, apart from the aggregate consumption of fertilizers, it is necessary to look at the trends in fertilizer use per hectare of gross cropped area. The consumption of different fertilizers per hectare of gross cropped area in India is shown in Table 6.3.

The fertilizer use per hectare of gross cropped area which was even less than one kilogram up to 1955–56 increased to 13.61 kg in 1970–71, 31.95 kg in 1980–81, 67.49 kg in 1990–91 and further to 90.12 in 2001–02. However, the level is quite low as compared to that in other countries. In terms of total fertilizer use although India ranks fourth in the world after U. S. A., erstwhile U.S.S.R. and China but the average fertilizer use is much lower than the global average. Even compared to the Asian countries, the consumption of fertilizers on unit area basis in India is about two-thirds. Notwithstanding the low consumption of fertilizer use in India vis-a-vis other countries, there are some states where fertilizer use is quite high. For example, the average fertilizer consumption per hectare of gross cropped area in Punjab is 174 kg and in Andhra Pradesh 144 kg. In Haryana, it is 156 kg and in Tamil Nadu it is 142 kg. In Uttar Pradesh also, the fertilizer consumption is quite high at a level of more than 130 kg per hectare. The state-wise fertilizer use per hectare of cropped area in 2001–02 is given in Table 6.4.

DEMAND-SUPPLY GAP

There is a large gap between the requirements (demand) and the available domestic supply of fertilizers. In 1970–71, the total consumption of fertilizers was 21.77 lakh tonnes as against domestic production of 10.59 lakh tonnes—a gap of 11.18 lakh tonnes. This gap widened to 25.11 lakh tonnes in 1980–81 and to 35.01 lakh tonnes in 1990–91. Even during 1995–96 the gap between domestic production and effective demand was 25.15 lakh tonnes.

This gap increased further to 27.32 lakh tonnes during 2001–02. Fertilizer being a critical input and keeping in view its role in accelerating the growth of

Table 6.3
All India Consumption of Fertilizers (Plant Nutrients) per Unit of Gross Cropped Area

Year	Consumption per Hectare of Gross Cropped Area (kg)			
	N	P	K	Total
1951–52	0.44	0.05	0.06	0.55
1955–56	0.73	0.09	0.07	0.89
1960–61	1.39	0.35	0.19	1.93
1965–66	3.70	0.85	0.50	5.05
1970–71	8.92	3.26	1.43	13.61
1975–76	12.54	2.72	1.62	16.89
1980–81	21.31	7.03	3.61	31.95
1985–86	31.72	11.24	4.53	47.48
1990–91	43.02	17.33	7.14	67.44
1995–96	52.96	15.62	6.23	74.81
2000–01	56.69	21.88	8.14	86.71
2001–02	58.72	22.75	8.66	90.12

Source :Fertilizer Statistics, Fertilizer Association of India, New Delhi.

agricultural production, it would be in the overall interest of the country to achieve some degree of self-sufficiency in fertilizers. This is all the more necessary in the case of a country of the size of India as its demand for fertilizers is a considerable part of total fertilizer produced in the world. However, Indian farmers should not be penalised by protecting inefficient domestic fertilizer producing units.

PRICES

In India, fertilizers are manufactured by various units which use a variety of basic feedstocks and technologies. The feedstocks are fuel oil, naphtha, coal and gas. It is, therefore, natural that cost of production per unit of fertilizer varies from plant to plant. This apart, the economic cost of imported fertilizer is different than the domestically produced fertilizer. One of the elements of fertilizer pricing policy followed in the country till 1991 was to have a single price for a specific grade of fertilizer throughout the country irrespective of the

Table 6.4
Consumption of Fertilizers per Hectare of Cropped Area in States of India During 2001–02

(Kilogrammes)

S.No	States/UT	N	P	K	Total
1	Andhra Pradesh	87	40	17	144
2	Assam	19	11	9	39
3	Arunachal Pradesh	2	1	0	3
4	Bihar	67	15	5	87
5	Gujarat	57	22	6	85
6	Haryana	117	37	2	156
7	Himachal Pradesh	28	7	6	41
8	Jammu & Kashmir	47	16	1	64
9	Kerala	26	13	22	61
10	Karnataka	54	29	18	101
11	Maharashtra	45	21	11	77
12	Madhya Pradesh including Chhatisgarh	23	15	2	40
13	Manipur	87	12	6	105
14	Meghalaya	11	6	1	18
15	Mizoram	5	5	4	14
16	Nagaland	1	1	-	2
17	Orissa	26	9	6	41
18	Punjab	132	38	4	174
19	Rajasthan	27	9	-	36
20	Sikkim	5	3	1	9
21	Tripura	17	9	5	31
22	Tamil Nadu	76	31	34	141
23	Uttar Pradesh including Uttaranchal	97	29	4	130
24	West Bengal	63	36	28	127
	All India	59	23	9	91

Source : Agricultural Statistics–At a glance-2003, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, New Deihi.

plant in which they are produced. Therefore, the selling prices of different grades of fertilizers were statutorily fixed by the Government of India. The margins retained by various agencies engaged in the sale of fertilizers were also statutorily fixed by the government. The prices of some important fertilizers fixed by the government from time to time till July 1991 are given in Table 6.5.

In order to reconcile the uniform sale price and varying cost of production across manufacturing plants, a Retention Price Scheme (RPS) was introduced in late seventies in the country. Under this scheme, if a manufacturer's net realization from the sale of fertilizers at the government controlled rate (the same farm gate price throughout the country) falls short of the retention price, the government pays the difference as subsidy to the fertilizer manufac-

Table 6.5
Prices of Some Fertilizers in India (up to July, 1991)

(Rs. per tonne)

Fertilizer	11-7-81 to 28-6-83	29-6-83 to 30-1-86	31-1-86 to July, 1991	w.e.f. August, 1991
Urea (46%N)	2350	2150	2350	An average increase of 30% for all fertilizers
Di-ammonium Phosphate (18:46:0)	3600	3350	3600	
Muriate of Potash (60%K)	1300	1200	1300	-do-
Sulphate of Potash (50%K)	2100	1950	2100	-do-
Mixed Fertilizers				
15:15:15	2100	1950	2100	-do-
10:26:26	2950	2750	2950	-do-
12:32:16	3250	3000	3250	-do-

Source : Government of India, Agriculture in Brief, 19th and 23rd Editions, Ministry of Agriculture, New Delhi.

turers. The retention price is fixed for each fertilizer plant by the government. The retention price is fixed after taking into account the type of feedstock or raw material being used, cost of other inputs and maintenance such that under the assumption of 80 percent capacity utilization, the plant is able to earn 12 percent post tax return on its net worth. The basic rationale of adopting the RPS was that it reduces uncertainty of returns on investment and encourages the fertilizer plants to increase capacity utilization and that it also attracts investments by both existing plants and new entrepreneurs. One other element of fertilizer price policy adopted in India is that the prices of fertilizers were kept low so that farmers have the incentive to use more fertilizer which has been the very important purchased input for increasing the productivity of crops. In an endeavour to keep fertilizer prices at the levels lower than the economic cost of domestic production or of imports, the gap between the two widened. This gap is what is usually termed as fertilizer subsidy.

Since July, 1991 (the period when a programme of economic reforms was launched in the country), there have been considerable changes in the fertilizer pricing policy. The low analysis nitrogenous fertilizers (like Ammonium Sulphate and Calcium Ammonium Nitrate) were decontrolled with effect from July 25, 1991. These were again brought under price control with effect from August 25, 1992 but were finally decontrolled with effect from June 10, 1994. Phosphatic, Potassic, NP and NPK fertilizers were decontrolled with effect

from August 25, 1992. Thus beginning from June 10, 1994, all fertilizers, except urea, have been decontrolled. Though the objective of decontrol was to reduce the burden of subsidies on the government exchequer, the actual out go on this account has not decreased. Owing to the decontrol of phosphatic and potassic fertilizers, their prices shot up and the government had to announce adhoc subsidy to reduce the burden on the farmers. The prices of some important fertilizers since July 1991 are shown in Table 6.6.

Table 6.6
Prices of Fertilizers in India Since 1991

(Rs./tonne)

Year	Urea	DAP	MOP
Controlled Prices			
July 25, 1991	3300	5040	1820
Aug. 14,1991	3060	4680	1700
Aug. 25, 1992	2760	decontrolled	decontrolled
June 10, 1994	3320	decontrolled	decontrolled
Prices paid by Farmer			
1992–93(K)	3060	4680	1700
(R)	2760	6650	4500
1993–94 (K)	2760	6600	3800
1994–95 (K)	3320	7500	3800
1995–96 (K)	3320	9800	4450
1995–96 (R)	3320	10,000	4600
1996–97 (K)	3320	11000*	4800*
1996–97 (R)	3320	9000**	4300**
1997–98 (K)	3660	8300	3700
1997–98 (R)	3660	NA	NA
1998–99 (K)	3660	NA	NA
1998–99 (R)	3660	NA	NA
1999–2000 (K)	4000	NA	NA
1999–2000 (R)	4000	NA	NA

* Upto 6th July, 1996, K = Kharif Season, R = Rabi Season
** With enhanced price concession on DAP/MOP
DAP & MOP prices after Decontrol are net of subsidy.
Source: Economic Survey, Ministry of Finance, Government of India, New Delhi and Fertilizer Statistics, Fertilizer Association of India, New Delhi.

FERTILIZER SUBSIDY

The subsidy on fertilizers as defined in India is the difference between net realization by the domestic fertilizer manufacturers (farmer's price minus distri-

bution margins) and the ex-factory retention price (inclusive of equated freight) fixed by the government. In the case of imported fertilizers, the subsidy is the difference between the C.I.F. (cost, insurance and freight) price of imported fertilizer plus the pool handling charges and the farmar's price (excluding dealer's margins and sales tax). After the decontrol of, P and K fertilizers, there is direct subsidy on these nutrients.

Although it is a fact that fertilizer subsidy exits because fertilizer is sold to the farmers at a price lower than its economic cost but it is not true that the benefits of this subsidy accrue only to the farmers who use this fertilizer. In this connection, it is important to recognise that the fertilizer subsidy although induces farmers to use more fertilizer which increases the production of agricultural commodities but if as a part of the overall price policy, the prices of farm products are also kept low, the benefits of fertilizer subsidy also accrue to the consumers of farm products[1]. The consumers are able to get food products at affordable prices and the industries which use raw material from the agricultural sector are able to keep the cost of production of such manufactured goods low.

In this context, it is relevant to look at the prices of fertilizers in relation to the prices of farm products. In 1980, an Indian farmer had to forego 4.58 kg of paddy to buy one kg of N and 5.55 kg of paddy to buy one kg of P_2O_5. During the same period, a farmer in Japan had to sell only 0.68 kg and 0.55 kg of paddy to buy one kg of N and P_2O_5 respectively. In 1988, while an Indian farmer had to sell 3.19 kg of paddy to buy a kg of N, the Japanese farmer had to sell only 0.34 kg of paddy to buy a kg of N. In 1988, for buying one kg of N, the quantity of paddy to be sold was 0.66 kg in Korea, 2.16 kg in Pakistan and 3.08 kg in U.S.A.

In 1993, to buy a kg of N, a farmer in India had to sell 1.94 kg of paddy, whereas the quantity of paddy required to be sold by the farmer was 1.87 kg in Bangladesh, 1.79 kg in China, 0.32 kg in Japan and 0.40 kg in Korea. For buying a kg of P, the quantity of paddy required was 4.60 kg in India as against 3.24 kg in Pakistan, 2.26 kg in China and 0.72 kg in Japan. In fact, except Bangladesh, the P to paddy price ratio was the highest in India.

In March 2002, the quantity of paddy required in India to buy a kg of nutrient was 1.98 kg for N, 3.06 kg for P (DAP) and 1.40 kg for potash (K_2O). The quantity of Wheat required to buy a kg of nutrient was 1.72 kg for N, 2.66 kg for P (DAP) and 1.22 kg for potash (K_2O).

Over the years, although the cost of domestic and of imported fertilizers has increased but the sale prices of fertilizers were not raised commensurate with the increase in the cost. This apart, the consumption of fertilizer has expanded rapidly. Therefore, subsidy bill has continuously increased over the years. The amount of subsidy outgo on indigenous and imported fertilizers in India during the last 30 years is given in Table 6.7.

There was no subsidy on indigenous fertilizers up to 1975–76. It was only

Table 6.7
Subsidy on Fertilizers in India

(Rs. in corers)

Years	Indigenous fertilizers	Imported fertilizers	Decontrolted fertilizers	Total
1971–72	—	–20	—	– 20
1972–73	—	–18	—	– 18
1973–74	—	33	—	33
1974–75	—	371	—	371
1975–76	—	242	—	242
1976–77	60	52	—	112
1980–81	170	335	—	505
1985–86	1600	324	—	1924
1990–91	3730	659	—	4389
1995–96	4300	1935	—	6235
1996–97	4753	1163	1672	7578
1997–98	6600	722	2596	9918
1998–99	7473	124	3790	11387
1999–00	8670	74	4500	13244
2000–01	9480	1	4319	13800
2001–02	8257	47	4504	12808
2002–03 (BE)	6499	505	4224	11288

Sources: (i) Fertilizer Statistics Various Issues, The Fertilizer Association of India, New Delhi.
(ii) Economic Survey, Various Issues, Government of India, New Delhi.

the imported fertilizer that was subsidised. Following the introduction of fertilizer retention price and subsidy scheme with effect from November, 1977 and due to the increasing trend in production/consumption, subsidy on fertilizers increased from 604 crores in 1979–80 to as much as Rs. 6235 crores in 1995–96. It went up to Rs. 12808 crores in 2001–02.

Between 1980–81 and 1990–91, there has been no increase in the fertilizer prices. In 1991–92, the government raised the prices of fertilizers by 30 percent to minimise the drain on budgetary resources. However, the small and marginal farmers were exempted from this fertilizer price increase. This policy amounted to a dual price framework in which the small and marginal farmers were to be given fertilizer at low prices while other farmers had to pay a higher price. As it was not easy to implement a dual price policy for such a farm input, it was given up later.

Subsidy on fertilizers is common in most of the developing countries, though the rate of subsidy varies across countries and types of fertilizers. Though the direct effect of fertilizer subsidy is to provide fertilizer to the farmers at a price lower than its economic price, the ultimate benefits of the subsidy accrue either to the farmers or to the consumers or both depending on the package of other policies including product price policies. Differential rate of subsidy on nitrogenous, phosphatic and potassic fertilizer was used to cor-

rect the imbalance in the use of nutrients by the farmers. However, after the decontrol of P and K fertilizers, their prices rose sharply leading to the distortion in the use ratio of N, P and K. The current ratio is 6.8 : 2.6 :1.

MARKETING OF FERTILIZERS

Fertilizers are produced only at selected locations and imported fertilizers arrive at seaports. The marketing system has to carry out the functions of storage, transportation and selling to the farmers spread throughout the country. Over time the marketing system for fertilizers has undergone rapid change both in terms of its capacity and mode of operation. Its evolution has been mainly guided by the public policy. Since fertilizer was a new input for the farmers, the spread of know-how and incentives had to accompany the marketing of fertilizers. In fact, initially the demand for fertilizer had to be created. But the objective of demand creation was not to sell more fertilizers and earn profit but was to increase agricultural production. Up to the end of the First Five Year Plan (1951–56), the sale of chemical fertilizers was the sole responsibility of co-operative societies and State Agriculture Departments. During the Second Five Year Plan (1956–61), the sale of fertilizers became almost the monopoly of co-operative societies. This step aimed at popularising the co-operative movement and achieving a higher efficiency of the distribution system. The village panchayats were also given this responsibility wherever the co-operatives did not exist. Later, the Government allowed the fertilizer production units, which had been licensed before December 31, 1967, to sell

Table 6.8
Number of Sale Points (Outlets) for Fertilizer in India

As on March 31,	Co-operatives and Other Institutional Agencies		Private		Total
	Number	Percent of Total	Number	Percent of Total	
1970	33418	47	38234	53	71652
1975	39156	40	59473	60	98629
1980	51560	44	64862	56	116422
1985	59658	38	96080	62	155738
1990	80040	35	151130	65	231170
1995	79460	31	179560	69	259020
2000	73933	26	205360	74	279293
2001	73136	26	211828	74	284964
2002	71434	25	211342	75	282776

Source: Fertilizer Statistics — Various Issues, The Fertilizer Association of India, New Delhi.

70 percent of their produce through their own agencies for a period of seven years from the date of commencement of production. The remaining 30 percent of the production was required to be sold through public or co-operative agencies. At the end of March, 1970, the number of sale points of fertilizers were 71652, out of which 53 percent were in the private sector and 47 percent were in the co-operative or public sector (Table 6.8).

During the early seventies, the proportion of private sector sale points increased at a faster rate but slowed down in the later half of seventies. However, during the eighties, the private sector fertilizer outlets have expanded at a rate higher than that of the co-operative or the public sector. At the end of March, 2002, there were 2.83 lakh sale points of fertilizers in the country, out of which 75 percent were in the private sector and remaining 25 percent were operated by either co-operative societies or other public sector institutions like State Agro Industries Corporations. In order to make available the fertilizers to farmers, the temporary sale points are also provided in some areas during a part of the year.

Legal Aspects of Fertilizer Marketing

(i) *The Essential Commodities Act, 1955*

This Act was passed by the Parliament in 1955 in the interest of general public with the object of controlling production, supply and distribution of trade and commerce in certain commodities. Fertilizers was declared as an essential commodity and as such provisions of this act are applicable to fertilizer production, supply and distribution too.

(ii) *The Fertilizer (Control) Order, 1957*

The Government of India declared fertilizers as an essential commodity on March 29, 1957 and issued the Fertilizer (Control) Order under section 3 of the Essential Commodities Act, 1955. The basic objective of the Fertilizer (Control) Order, 1957 is to regulate the manufacture, sale, distribution, price and quality of fertilizers. Under the provisions of this Order, it is a statutory requirement that any person carrying on the business of selling fertilizers will have to obtain a license from a competent Registering Authority appointed by the State Government. Till recently the prices of various fertilizers were also controlled by the Government of India. However, urea continues to be under price control.

The Order, provides that (a) if a dealer is found selling at a higher price than what is fixed by the Government, he is liable for punishment; and (b) if the fertilizer sold is found of sub-standard quality, the trader selling such a substandard or adulterated fertilizer can be prosecuted.

The order also provides for appointment of Inspectors of Fertilizers under clause 19 of the order. These persons are authorised to collect samples during inspection and send them for analysis to fertilizer testing laboratories. If