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PLANNING COMMISSION

REPORT OF THE WORKING GROUP ON STORAGE

A copy of the Report of the Working Group on Storage for the Fourth Plan is circulated herewith.

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c.c. P.S. to Deputy Chairman
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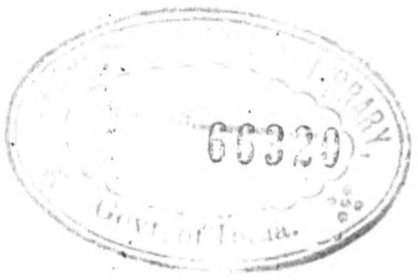
PLANNING COMMISSION

REPORT OF THE WORKING GROUP

ON

STORAGE



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PLANNING COMMISSION

Report of the
Working Group on Storage

Introduction:

A broad review of storage facilities for foodgrains and other agricultural commodities made in the Planning Commission in May 1968 in consultation with representatives of the Central Departments of Food, Agriculture and Cooperation, the Food Corporation of India, the National Cooperative Development Corporation, the Central Warehousing Corporation and the Agricultural Credit Department of the Reserve Bank of India, revealed that available storage capacity with different agencies would be subject to severe strains in handling the quantities of foodgrains expected to be procured, imported and held in reserve by the end of 1968. The review suggested that a substantial enhancement of storage facilities would be necessary in the years ahead to meet the storage requirements of the expected increases in agricultural production and for holding buffer stocks of foodgrains and other critical commodities and inputs. It disclosed certain regional imbalances in the location of storage capacity and suggested the need of a more systematic development of storage facilities.

2. With these considerations in view, the Planning Commission set up a Working Group to take stock of the situation, assess future needs and suggest the lines of storage development in the Fourth Plan and methods of coordination among organisations concerned with the development of storage.

3. The Working Group consisted of the following members:-

Member (A) ... Chairman

Adviser (PA)
(Shri C.S. Ramachandran)

Director-General (Food)

Managing Director,
Food Corporation of India

Joint Secretary (Agri.),
Planning Commission

Joint Secretary,
Deptt. of Agriculture

Secretary, N.C.D.C.

Managing Director,
Central Warehousing Corporation

Chief Officer,
Agricultural Credit Deptt.,
Reserve Bank of India, Bombay

Director Storage and Inspection,
Deptt. of Food

Deputy Chief Officer,
Agricultural Credit Deptt.,
Reserve Bank of India, New Delhi

Chief (Food),
Planning Commission

4. The terms of reference of the Working Group were:-

i) To review the present availability and requirements of storage capacity for food-grains, fertilisers, cotton, jute and such other agricultural products and inputs as require substantial storage capacity;

ii) To assess future requirements of storage and its locational pattern in relation to production, marketable surpluses, marketing centres, consumption requirements, imports, movements by road and rail and buffer stocks expected to be held;

iii) To recommend the pattern of development of storage facilities in the Fourth Plan period, coordination among the different organisations concerned with the provision of storage facilities and measures for the most effective utilisation of resources;

iv) To recommend measures for promoting the construction and improvement of storage facilities on farms and in mandis by private parties.

5. The Working Group set up 3 Sub-groups to review and consider the different aspects of storage development and issued a questionnaire to elicit information and ideas from the various organisations concerned with the construction, utilisation and management of storage facilities.

6. Approach to storage development:

It would be useful to give some idea at the outset of our approach to the problems of storage development. Firstly, we have given the highest priority to the establishment of adequate storage facilities for foodgrains and fertilisers. This means in effect that storage development has to be considered in the overall context of the programmes of agricultural production and particularly with reference to the areas of intensive development. Secondly, we have assumed that as the responsibility for procurement of foodgrains and holding an adequate buffer reserve of foodgrains for purposes of public distribution, stabilisation of prices and meeting emergency situations will rest on the Government for several years, the main burden of developing the requisite storage facilities will lie on the Government. Thirdly, we have assumed that storage development in the cooperative sector and by the Central and State Warehousing Corporations would be supported by adequate credit facilities essential for effective utilisation of capacity and marketing. It is important to bear in mind this obvious link between storage development and credit because in recent years the utilisation of warehousing facilities has been adversely affected by paucity of credit. Fourthly, storage development in the years ahead will involve significant changes in the locational pattern and designs of storage facilities appropriate to the relatively long term storage implicit in holding buffer stocks. Fifthly, as increasing quantities of the marketable surplus will be handled by producers and traders, we consider it essential that appropriate measures be adopted for promoting scientific storage on the farms and in mandis by producers and traders. This will require technical guidance and institutional credit and other incentives for establishing scientific storage facilities in the private sector. Without increasing the involvement of the private sector in storage development, the country will continue to suffer the losses caused by lack of scientific storage facilities.

7. Losses in storage:

Scientific storage may be defined as a complex of facilities designed to protect the commodities stored from animals, pests, rain, dampness, fire and thefts and provide an environment which maintains their condition as it existed at the time of their receipt into storage. As commodities are

susceptible to changes in temperature and humidity in differing degrees the storage facilities for them have to cater for temperature and moisture control. Scientific storage, therefore, often calls for mechanical and automatic temperature and moisture control devices. It is often alleged that heavy losses of foodgrains and other edible produce take place in storage owing to deficiencies in the construction and designs of storage godowns and methods of handling and preservation. A Committee of Experts set up by the Central Food Department in 1966 under the Chairmanship of Dr. Panse to examine the available data about losses, has placed the average loss of foodgrains on the threshing floor and in transportation, processing and storage at 9.3% of the annual average production in 1962-63 to 1964-65. The loss in storage accounted for 6.6%. In quantitative terms, the average loss in storage was estimated at 5.2 million tonnes per year. At current valuation the loss would amount to about Rs.450 crores per year. The incidence of loss of different foodgrains, the break up of loss by causes and the definition of loss are set out in the table in Appendix I. The loss of foodgrains has been considered avoidable by the Committee. This is borne out by the experience of the Food Department and the F.C.I. which handle large quantities in scientifically designed storage with facilities for preservation. The incidence of loss has been lower than 1%. A summary of the recommendations made by the Committee in its interim report is given in Appendix I.

8. Development of scientific storage:

In recent years, the Central Food Department, the Central and State Warehousing Corporations, the Food Corporation of India and the National Cooperative Development Corporation have developed and constructed storage structures of designs and capacity suitable for different purposes. These include multipurpose flat storage units; bulk storage of foodgrains and special storage for fertilisers, pesticides, gur and turmeric. The Indian Standards Institution has also laid down specifications for storage structures for foodgrains for the farms and mandis. Many valuable ideas on designs and other aspects of storage are contained in the reports of the Buildings Projects Team of the Committee on Plan Projects of the Planning Commission and the Sub-committee on Storage Construction of the FCI. The design and capacity of individual godowns have to be related to the purpose they are intended to serve.

9. Broadly, modern storage is of two categories: flat bag storage and bulk storage. The major part of the storage capacity in India consists of the first category. Out of a total storage capacity of about 9.7 million tonnes (both owned and hired) in the possession of the public and cooperative agencies at the end of 1967-68, bulk capacity accounted for 3.3 lakh tonnes only. While the modern bag storage facilities have been found to protect commodities from rodents and dampness, they are not bird and insect proof. Physical and chemical measures have to be taken to protect commodities from birds and insects. Generally, the handling of commodities in such godowns is manual. Though partial mechanisation of handling is possible, it would involve additional construction or loss of available storage space. Foodgrains can be stored in these godowns in satisfactory condition upto about 12 months depending on location and climatic conditions. The period of satisfactory storage is lowest in humid coastal areas. In the dry areas in the interior, it is higher. It follows that for holding grain for longer periods, e.g. buffer reserves, the climatic factor would have to receive special attention.

10. Though bulk storage constitutes a small portion of the total storage capacity in the country, considerable experience has been gained of their construction, installation, operation and maintenance. A comparison of some of the characteristics of bulk and bagged storage is given below:-

	Bag storage	Bulk storage
1. Requirements of land.	3 acres for 5000 tonnes.	1 acre for 5000 tonnes.
2. Maximum storage period for wheat.	One year.	5 to 10 years.
3. Feasibility of mechanical operation.	Difficult.	Easy.
4. Fumigation cost	Rs.4 per tonne.	Rs.1.22 per tonne.
5. Cost of jute bags.	Rs.20 to Rs.25 per tonne.	Nil.
6. Possible losses:		
i) Rodents	Can be rodent proof.	Rodent proof.
ii) Birds	Difficult to make bird proof.	Bird proof.
iii) Insects	Can be controlled.	Can be controlled.
iv) Moisture	Can be avoided.	Can be avoided.
v) Drainage	Cannot be controlled.	Can be controlled.

11. The main advantage of bulk handling is that operations can be mechanised and foodgrains (other than rice) can be held for 5 to 10 years without appreciable deterioration in quality. Bulk storage is economical in land and eminently suitable in areas where land is scarce and expensive. Lately, in view of the new knowledge of the hazards involved in the use of pesticides on foodgrains, the importance of using the minimum quantities of pesticides or their elimination has been emphasised. This will be possible only in bulk storage. Another important factor in favour of bulk storage is the economy in the use of jute bags. As the jute industry is an export oriented industry and is still dependent to a significant extent on imported raw material, the implications of bulk storage for our foreign trade and the foreign exchange earning capacity are obvious. Bagged commodities also require manual handling. Though labour for handling bags is generally regarded as unskilled, there is a certain degree of specialisation, experience and capacity for carrying heavy loads involved in the manual handling of bagged commodities. Shortage of such labour has been experienced from time to time and particularly during 1968 at the principal markets and the rail heads at the points of despatch and receipt of grain. This has often resulted in delays in the disposal of grain by the producers and in the loading and unloading of wagons.

12. Storage facilities in countries where silo storage is now commonly used for foodgrains were of the conventional type not long ago. The main factors in the switch-over have been technological, economies of bulk storage and changing attitudes of labour to carrying heavy loads manually. The operation of these factors has already been felt in India and it will be prudent to take these factors into account in making a judicious choice between conventional storage and bulk storage lest we find that investment in conventional storage has ceased to be economical and new investment has to be made in bulk storage. Several types of bulk storage have been developed in this country such as circular bins of steel, aluminium or concrete and concrete bins and silos with hopper bottom or flat bottom. The mechanical equipment for silos such as elevators and conveyors is also manufactured in the country.

13. Whatever the type of storage, flat or bulk, it is important to provide for certain standard adjuncts required

for their operational needs. These consist of

i) approach roads and an internal net-work of roads for easy flow of traffic; parking space for vehicles; and sheds and drinking water facilities for animals;

ii) railway siding for godowns with capacities in excess of 10,000 tonnes or from where quantities in excess of 50% of the capacity are received from or despatched by rail;

iii) verandas for providing covered space for weighment and loading and unloading of trucks on the one side and wagons on the other;

iv) isolation shed for handling infested and damaged grain;

v) adequate office accommodation separate from the storage godown;

vi) a separate store room for pesticides, gunnies, dunnage and other stores;

vii) weigh-bridge of 5 to 10 tonne capacity in godowns with capacity or turnover of 25,000 tonnes and over;

viii) drier of a capacity of about 4 to 10 tonnes per hour for godowns located in areas where paddy and other foodgrains are liable to be received with a high moisture content;

ix) cleaner and polisher for godowns with a capacity of 25,000 tonnes and over for reconditioning sweepings. This equipment may be of 5 to 10 tonne capacity depending on the turnover;

x) bagging unit. This is essential in godowns where bags have to be standardised;

xi) mechanical aeration arrangements for controlling temperature and humidity;

xii) fire prevention equipment.

14. Available storage accommodation:

The storage capacity in the possession of the Central Food Department and Food Corporation of India, the State Governments, the CWC, the SWCs and cooperatives at the beginning of 1968-69 is set out in the following table:-

	(000 tonnes)			For State-wise distribution please see tables
	Owned	Hired	Total	
Food Department and FCI	2104.1	872.1	2976.2	I-A,B & C
State governments.	1396.2	1262.8	2659.0	I-D
CWC	651.6	194.5	846.1	I-E
SWCs	227.5	510.7	738.2	I-F
Cooperatives	2517.0	neg.	2517.0	I-G
	6896.4	2840.1	9736.5	

15. A substantial expansion of storage capacity with the Government, Warehousing Corporations and Cooperative Societies was initiated in the Second Plan. At the end of the IInd Plan period, the Central Food Department had storage capacity of about 25 lakh tonnes in its possession, of which capacity owned by the Department amounted to 6.96 lakh tonnes. In the Third Plan, thestorage capacity of the Food Department was proposed to be increased to 50 lakh tonnes, of which owned capacity was to increase to 35 lakh tonnes. At the end of the Third Plan period, the owned capacity stood at 19.53 lakh tonnes. The shortfall was due to difficulties in the acquisition of sites, shortage of construction materials and delays in the construction of railway sidings and finalising specifications of the equipment needed. Though the Draft Outline provided for expansion of owned capacity to 40 lakh tonnes, by the beginning of 1968-69, owned capacity with the Food Department and FCI showed a marginal increase of about 5 percent and touched 21 lakh tonnes. This slow growth was due to a ban on construction of new godowns imposed by the Central Government in 1965. This ban affected other storage agencies also. Whatever growth took place represented completion of works in progress.

16. The growth of storage capacity in the possession of the Food Department and FCI, CWC, SWCs and cooperatives since 1964-65 and anticipated upto the beginning of the Fourth Plan is set out in the following table:-

Growth of storage capacity

(000 tonnes)

At the end of		Owned	Hired	Total
1964-65	Food Deptt.	1879.8	723.3	2603.1
	CWC	106.1	103.8	209.9
	SWCs	141.4	419.3	560.7
	Cooperatives	1768.0	-	1768.0
	Total:	3895.3	1246.4	5141.7
1965-66	Food Deptt. & FCI	1953.2	1125.0	3078.2
	CWC	125.8	175.8	301.6
	SWCs	176.0	704.5	880.5
	Cooperatives	2314.0	-	2314.0
	Total:	4569.0	2005.3	6574.3
1966-67	Food Deptt. & FCI	2037.9	621.7	2659.6
	CWC	581.0	167.4	748.4
	SWCs	210.9	642.0	852.9
	Cooperatives	2421.0	-	2421.0
	Total:	5250.8	1431.1	6681.9
1967-68	Food Deptt. & FCI	2104.1	872.1	2976.2
	CWC	651.6	194.5	846.1
	SWCs	227.5	510.7	738.2
	Cooperatives	2517.0	-	2517.0
	Total:	5500.2	1577.3	7077.5
1968-69 (anticipated)	Food Deptt. & FCI	2624.0	1260.0	3884.0
	CWC	654.0	306.0	960.0
	SWCs	228.0	600.0	828.0
	Cooperatives	2600.0	-	2600.0
	Total:	6106.0	2166.0	8272.0

17. It will be seen that storage capacity owned by the 5 organisations mentioned increased from 38.95 lakh tonnes at the end of 1964-65 to 55 lakh tonnes at the end of 1967-68 and is expected to stand at 61 lakh tonnes at the end of 1968-69. Of the increase of about 22 lakh tonnes from 1964-65 to 1968-69, the Food Department and FCI would account for 7.4 lakh tonnes, CWC for 5.5 lakh tonnes, SWCs for 0.87 lakh tonnes and cooperatives for 8.32 lakh tonnes. Owned capacity with the Food Department and FCI would still be below the Third Plan target of 35 lakh tonnes.

18. Proportion of hired capacity:

Hired capacity has constituted a significant proportion of the total storage capacity with all organisations, other than the cooperatives. Much of the hired capacity is sub-standard. The proportion of hired capacity has been highly variable. For example, in U.P., the capacity hired by the State government at the end of 1967-68, was 2.56 lakh tonnes (84 percent) in a total of 3.04 lakh tonnes in its possession. In the Punjab, it amounted to 2.62 lakh tonnes or 90 percent and in Bihar 1.92 lakh tonnes or 88 percent. Hired capacity with the Food Department and FCI accounted for 41 percent of the total capacity in their possession. While the element of hired capacity with the CWC got reduced in 1967-68 to about 23 percent, it is likely to increase to about 32 percent by the end of 1968-69. The bulk of the capacity with the SWCs on the other hand consists of hired godowns. These accounted for 70 percent of the total at the end of 1967-68. In Bihar and U.P., the entire capacity with the SWCs was hired. In Madhya Pradesh and West Bengal, it was as high as 80 percent and in Rajasthan 70 percent. This brief analysis suggests that the proportion of sub-standard storage is significantly high and needs to be reduced.

19. Cold storage capacity:

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The total cold storage capacity amounts to about 9.5 lakh tonnes, of which 1 lakh tonnes is in the cooperative sector. 50% of the total capacity is utilised for storage of potato seeds. The State-wise and sector-wise distribution of cold storage capacity in 1966 is set out in Table II.

20. Storage capacity for foodgrains and pulses:

Of the total storage capacity of 26 lakh tonnes in the cooperative sector by the end of 1968-69, it is estimated that fertilisers will absorb capacity of about 20 lakh tonnes. The rest of the capacity is used mainly for agricultural inputs including seeds and pesticides and gur, oilseeds, other

products and consumer goods and to some extent for short term storage of foodgrains. Of about 18 lakh tonnes capacity with the CWC and SWCs, fertilisers will absorb about 2 lakh tonnes. Capacity of around 5 lakh tonnes has been set up in Tamil Nadu and Andhra Pradesh exclusively for foodgrains. Half of the balance capacity of 11 lakh tonnes, that is 5.5 lakh tonnes may be counted as available for foodgrains and the rest for general warehousing purposes.

Thus storage capacity which will be available for foodgrains and pulses at the beginning of the Fourth Plan will be as under:-

	(lakh tonnes)	
Food Deptt. & FCI.	38.83	(excluding CWC storage in Andhra Pradesh and Tamil Nadu for foodgrains).
State Governments.	26.59	
CWC and SWCs.	10.50	(Including above)
	75.92	

21. Storage capacity for fertilisers:

The storage requirements for fertilisers has not received adequate attention. Storage facilities at the ports have not kept pace with the increase in the imports of fertilisers.

Import of fertilisers (material)

1965-66	13.92	lakh tonnes
1966-67	25.44	" "
1967-68	35.64	" "

The imported stocks have, therefore, to be lifted quickly to avoid congestion at the ports. As the offtake of fertilisers is seasonal, the storage requirements are subject to wide seasonal variations. The internal production of fertilisers is generally stored in the factories until they are

lifted. We have already pointed out that storage capacity in the public sector (CWC and SWCs.) and the cooperative sector, for fertilisers is about 2 lakh tonnes and 20 lakh tonnes respectively.

22. Storage facilities for other agricultural products:

For cotton, jute, tobacco, sugar, oil seeds, oils, lac and shellac, storage facilities are provided by the trade and factories using these products. To some extent, some of these commodities are held temporarily in the godowns of the CWC, SWCs and cooperatives. For shellac, the CWC has established air-conditioned storage at Calcutta with capacity of 1,000 tonnes. For jute, the storage capacity available with the mills is estimated at 30 lakh bales. In regard to cotton, the factories and the trade have been holding in the past about 31.5 lakh bales. Precise information about the extent of storage capacity for these and other products is not available.

23. Future requirements: foodgrains and pulses:

With prospects of increases in the production, marketable surplus and public procurement and distribution of foodgrains, it is obvious that a substantial expansion of storage capacity will be required for foodgrains and pulses. On the basis of past experience, we reckon that the marketable surplus may be of the order of 40 to 45 million tonnes by the end of the Fourth Plan. Public procurement for purposes of buffer stocks, price support and public distribution may amount to over 12 million tonnes.

The quantity of imported and internally procured foodgrains handled by the Government in recent years has been of the order of about 14 million tonnes per year.

(million tonnes)

	Internal procure-ment.		Imports
1964-65	4.3	1964	6.2
1965-66	4.6	1965	7.4
1966-67	4.3	1966	10.3
1967-68 (upto 26.8.68)	6.1	1967	3.6

As it is envisaged that the import of foodgrains on concessional terms will cease from 1970-71, internal procurement would have to be increased and the total quantity of foodgrains which may have to be handled by the Government may amount to 14 million tonnes which is approximately the quantity handled in two years preceding the Fourth Plan. The shift from imports to internal procurement will entail seasonal pressures on storage capacity which would be more pronounced than for imported foodgrains the arrivals of which can be more evenly spaced. This will call for a larger storage capacity than in the past for handling the same quantity of foodgrains.

24. Buffer reserves:

The establishment of a buffer reserve of foodgrains is a declared policy objective. The appropriate size of the reserve envisaged has ranged from 5 to 10 million tonnes. The Working Group on Food Policy has considered a reserve of 10 million tonnes as the ideal reserve. But in view of the constraint of resources, it has recommended a reserve of 7 million tonnes by 1973-74. The Agriculture Division of the Planning Commission has taken the view that a reserve of more than 5 million tonnes may not be a practicable proposition. On the other hand the Plan outlay foreseen for the buffer reserve may not permit a reserve of more than 4 million tonnes. In view of this we have based our calculations of new storage capacity on a buffer reserve of 4 million tonnes. A reserve of this size will require storage capacity of 5 million tonnes after allowing for 20 percent of space for operational purposes. Further capacity of 2 million tonnes is likely to be needed for pipeline stocks and to cover seasonal fluctuations in the requirements of storage which are likely to be more pronounced with a reduction in the import component in our food resources. Thus we place the minimum requirements of storage space for FCI/Food Department and State Governments at 7 million tonnes. Against this the capacity owned by them will be 4.5 million tonnes. at the commencement of the 4th Plan

25. For the marketable surplus handled by the producers and the trade, storage facilities would have to be provided by the Warehousing Corporations, the cooperatives and traders. The present level of handling of foodgrains by these agencies is about 25 million tonnes. This is likely to increase by about 10 million tonnes. This will require additional capacity of about 3 million tonnes. This may be developed as under:

CWC	3.5	lakh tonnes
SWCs	6.5	" "
Cooperatives.	10	" "
Private sector.	10	" "

26. Requirements of storage capacity for fertilisers:

The consumption of fertilisers is estimated to increase 2 to 3 times in the Fourth Plan period. The consumption level of fertilisers by 1973-74 is set out in Table III. The imports of fertilisers are also likely to continue with stepping up of indigenous production. It is estimated that the total fertiliser materials which would require handling in the last year of the Fourth Plan will be of the order of 17.3 million tonnes. Owing to the seasonality of fertiliser demand, the problem of providing adequate storage capacity for fertilisers well before the season assumes special importance. Additional capacity will be required at the ports, with the factories, for buffer stocks and for distribution at the mandi and village levels. The requirements of additional storage at the ports are estimated at 2 lakh tonnes during the Fourth Plan. As far as possible, this could be obtained by hiring storage space at or near the major ports. With a tappering off in food imports, more storage capacity will be released for fertilisers. The total storage requirements for all stages of distribution have been estimated at 40% of the total materials required to be handled. This works out to 6.92 million tonnes. Fertiliser factories generally have arrangements for keeping the stocks equivalent to 45 days' production amounting to around 1.8 million tonnes. As more factories are established, it would be prudent to plan larger storage capacity to take care of seasonal fluctuations. As an overall expansion of capacity has to take place, it would be economical to increase storage capacity at the factory level.

27. It is estimated that about 20% of the total warehousing needs for fertilisers (1/5th of 6.92 million tonnes - 1.4 million tonnes) will be provided by the private sector. The balance of the capacity may be established in the cooperative sector. The position by 1973-74 is set out below:-

	(million tonnes)
Total material to be handled	17.30
Requirements of storage at 40%	6.92
i) Storage to be provided by factories.	1.80
ii) Storage to be provided in the private sector.	1.40
iii) Avaialble capacity in the cooperative sector.	2.00
iv) Additional capacity needed in the cooperative sector.	1.70
Total i - iv	6.90

In States where fertilisers are distributed through departmental agencies, the storage requirements will be provided partly by the State Warehousing Corporations and partly by the cooperative societies. The quantities so handled will not be significant to pose any problem.

28. In estimating the requirements of storage for fertilisers at various levels, account has to be taken of the number of turnovers involved, specially in the cooperative sector. In several areas, this is not likely to exceed two. In irrigated areas, three turnovers will be common. Such areas are not likely to exceed 30% of the cultivated area at the end of the Fourth Plan. Although the quantity of fertilisers which would be distributed through agencies other than the cooperative societies are likely to increase gradually and may exceed 20% by 1973-74, for purposes of estimating the need of additional storage capacity in the cooperative sector we have assumed that the private agencies may not be able to provide storage for more than 20% of the storage which would be required for fertilisers owing to limitations of resources and the impact of distribution policies. We should, therefore, be prepared to place the main burden of providing storage for fertilisers on the cooperative sector. In the long run this will be fruitful.

29. Storage for other commodities:

We do not consider it necessary to suggest any specific storage capacity for seeds and pesticides. The enhancement of capacity suggested for the warehousing corporations and cooperatives should meet the requirements.

30. Storage for potatoes:

The production of potatoes is expected to increase by about 50% from 10 million tonnes to 15 million tonnes in the Fourth Plan period. The present level of cold storage capacity of 9.5 lakh tonnes is acutely short of requirements. We feel that this should be increased to 21 lakh tonnes. The entire increase may be left to take place in the private sector which has exhibited the requisite enterprise in this sphere of storage.

31. Storage for other products:

For other agricultural products, such as cotton, jute, tobacco, oilseeds, oils and sugar, we feel that traders and industry will provide the necessary facilities. For warehousing purposes, storage capacity of about 10 lakh tonnes will be available with the Central and State Warehousing Corporations for these products.

32. Locational pattern: foodgrains:

Owing to the preponderance of imported grain in the quantities handled by the Government and the needs of public distribution in large urban centres, the storage facilities for foodgrains have come to be concentrated in the port areas and urban centres. With the increases expected in internal production and procurement, the locational pattern of storage capacity is bound to require significant changes. As internal procurement will be subject to seasonal variations, it will also place strains on the transportation system. Greater stress would, therefore, have to be laid on providing adequate storage facilities in the surplus States to ease the strain on transportation and eliminate available hauls for foodgrains in search of storage. Procurement operations in Punjab and Haryana in 1968 necessitated immediate transportation and long hauls for want of adequate storage facilities in these two States. We suggest that the storage requirements in surplus States could be worked out on the following formula:-

$$(A-B) \times C$$

where A = estimated peak procurement in a month

B = peak movement possible in a month. This may be placed at about 30% above the monthly average.

C = No. of peak procurement months.

33. As imported and internally procured grain has eventually to move to the areas of consumption, we feel that the storage capacity in any area of consumption should be able to hold at least 4 months' requirements. This will reduce the need for intermediate storage between the points of import and procurement and the points of consumption. A part of the stocks held in or near the areas of consumption could be regarded as forming a part of the buffer stocks for convenience of turnover. The balance of the buffer reserve should be located at centres more favourably situated for long term storage in terms of climatic conditions and facilities for quick movements in emergencies and for price control operations.

34. The storage capacity at the ports should be maintained intact and improved technologically. This will be consistent with our quest for self-sufficiency, an insurance against unforeseen emergencies which may call for heavy imports and

useful handling such foodgrains as the country may be in a position to export in the years ahead. The Indo-Swedish team which made a study of the pattern of storage requirements at the ports has proposed the establishment of silo storage capacity of 1,75,000 tonnes at Kandla, Haldia, Madras and Bombay. The prospects of a reduction in imports will now qualify this recommendation. In view, however, of the considerations referred to, we feel that it would be prudent to have silo storage capacity of 50,000 tonnes each at Kandla and Haldia. Subject to this modification, the recommendations of the team in respect of storage capacity at the ports may be accepted.

35. In regard to the location of storage facilities in the interior, the following factors should receive consideration:

i) The centres selected should have adequate facilities for movement by rail and road. Since road movement is economical within a radius of about 200 Kms., the godowns should generally be located at rail junctions with marshalling yard facilities for handling large stocks of foodgrains and their movement in different directions;

ii) As shortage of labour was experienced in 1966 at several centres for handling foodgrains at the points of procurement and destination, availability of adequate labour force should be a factor in determining the location and capacity of godowns. Mechanisation of the handling operations will, however, reduce the importance of this factor;

iii) The suitability of the centres selected needs to be determined with reference to whether foodgrains are intended to be held for short term storage or long term storage. Favourable climatic conditions will determine the location of buffer stocks. Large godowns of 50,000 tonnes capacity and over should normally be located in comparatively dry areas.

These considerations suggest that planning of storage location should be on a regional basis rather than on State basis.

36. It is not possible to indicate the actual location of godowns in this Report. A systematic study of the locational pattern is recommended on the pattern of the study done for ports by the Indo-Swedish team. Until this is done, the planning of location of storage facilities will necessarily be on a short term basis in consultation with the State governments and with reference to the factors mentioned above.

37. Fertilisers:

With regard to fertilisers, the requirements of storage capacity at the ports will be determined by the anticipated volume of imports and the construction and hiring of capacity will have to be undertaken accordingly. Elsewhere, the location of capacity will have to take into account the distribution and buffer stocks requirements and facilities for movement. It follows that godowns for fertilisers should be planned on a regional basis to take care of the regional requirements of imported quantities and the inter and intra-regional movements of domestically procured fertilisers. In planning the location of godowns for distribution to users, account should be taken of the availability of other facilities such as credit, issue of permits, accessibility to users and means of transportation. This means that godowns intended for distribution of fertilisers to the users should be as near as possible to the points of consumption. This applies also to other agricultural inputs such as seeds, machinery, pesticides etc. By and large, the location of storage capacity for fertilisers and other inputs should be oriented to the agricultural production programmes.

38. Agency targets:

Based on the considerations set out above, we recommend the following agency-wise targets of additional storage capacity:

(Lakh tonnes)

	Food-grains	Fertilisers	Total
Food Deptt. & FCI	25	-	25
CWC	3.5	-	3.5
SWCs	6.5	-	6.5
Cooperatives	10	15 (for current consumption) 2 (for buffer stock) 17	27
Private sector	10	12 (factories) 14 (trade) 26	36
Total:	55	43	98

39. Storage capacity with the State Governments:

Part of the stringency in storage has been due to inadequate capacity with the State governments. In a number of States, some storage capacity with the FCI and Food Department has been taken up for holding stocks of foodgrains on behalf of the State governments. In some States, storage accommodation has been hired from the FCI or the Food Department. We feel that instead of increasing their own storage capacity, it will be more economical for States to use the storage facilities set up by the FCI, CWC and SWCs which have extensive experience of storage and will build up special expertise.

40. Financial outlays:

Of the targets of additional capacity suggested, 2.5 million tonnes for Food Department and FCI and 1 million tonnes for CWC and SWCs for foodgrains and 1.7 million tonnes in the cooperative sector for fertilisers be financed from the Plan outlays and the rest through institutional finance and private investment. Estimates of the costs of construction of godowns for foodgrains suggest that the average cost per tonne will be Rs.185 for conventional godowns and Rs.250 for silos. For fertilisers, the cost is estimated at Rs.120 for godowns for buffer stocks and Rs.80 for godowns at the mandi and village level. The financial outlays proposed below are based on these estimates.

(Capacity: Lakh tonnes)
(Outlay Rs. crores)

		Capacity estimated to be required by Food Deptt. and FCI.	Available owned capacity with Food Deptt., FCI and State Govts. & CWC exclusively for foodgrains at the end of 1968-69.	Additional capacity required to be set up.	Cost per tonne (Rs.)	Outlay recommended
Deptt., FCI State Govts.:						
od- ains:	Bulk	13.3	3.3	10.0	250	25.00
	Bagged	56.7	41.7	15.0	185	27.75
		70.0	45.0*	25.0		52.75
and SWCs:						
odgrains & her commodities:				10.0	185	18.50
eratives:						
rtili- rs:	Buffer stock			2.0	120	2.40
	Village godowns			15.0	80	12.00
				17.0		14.40
Total:				52.0		85.65 **

* Food Deptt. & FCI 26.24
State Govts. 13.96
CWC exclusively for foodgrains 4.87
45.07

** Of this Rs.64.75 crores may be in the Central sector and Rs.20.90 crores in the State sector.

41. Institutional finance for storage:

Out of 2.7 million tonnes new capacity recommended to be established in the cooperative sector (1.7 million tonnes for fertilisers and 1 million tonnes for foodgrains), we have suggested financing of 1 million tonnes through institutional credit. This will require finance of the order of about Rs.18 crores. We hope that financial requirements of this order for storage in the cooperative sector will be provided by the Agricultural Refinance Corporation. This amount can be reduced to the extent that the cooperatives are able to mobilise their own resources.

The ARC has already shown interest in financing storage construction in the private sector through commercial bank credit. The effect of the measures adopted would have to be watched and further special incentives offered if they hold promise of a more favourable response. Expansion of storage capacity in the private sector by 1 million tonnes for foodgrains and 1 million tonnes for potatoes will require an investment of about Rs.98 crores. (Investment in cold storage has been estimated on the basis of Rs.800 per tonne of capacity). A substantial part of this would obviously have to come from private investment. We feel that the institution of Regulated Markets and Market Yards can be a powerful means of promoting private investment in storage. A brief account of the achievements of the Market Committee at Kolhapur is given in Appendix II.

42. Utilisation of storage capacity:

Storage facilities represent productive investment. The value of the investment in storage capacity of about 6.9 million tonnes owned by the Food Department, FCI, State governments, CWC, SWCs and cooperatives would be around Rs.130 crores. By the end of the Fourth Plan this may increase to about Rs.200 crores. It is important, therefore, to achieve the maximum utilisation of capacity. This is particularly important for the Warehousing Corporations and cooperatives which are expected to manage their storage facilities on a viable basis and are free of the burdens of public obligations which rest on the Food Department, the FCI and State governments in holding and utilising storage facilities.

Under-utilisation of storage facilities with the warehousing corporations and cooperatives has been a cause of concern. The occupancy of the CWC godowns has been as under:

End of 1960-61	1964-65	1965-66	1966-67	1967-68
62%	44%	72%	79%	80%

The improvement in utilisation after 1964-65 reflects partly the effect of guaranteed occupancy provided by the FCI and other government agencies and partly the efforts made by the corporation to attract deposits from producers, cooperatives and traders. The measures adopted have consisted of study of business

trends at individual centres, offer of concessional rates for deposits from cooperatives, incentives in the form of high occupancy allowances to the field staff and publicity and liaison with the trade.

The occupancy of the SWC godowns has also been generally low and variable.

In the cooperative sector also, the utilisation of capacity needs to be watched and the causes for under-utilisation identified. A survey of godowns in the cooperative sector in Maharashtra covering the years 1963-64 to 1965-66 disclosed the importance of meticulous planning of the location, size and capacity of storage capacity, in the cooperative sector for full utilisation of capacity. A summary of the findings of the Survey is given in Appendix III.

43. Research, training and extension in storage:

Research and training are essential for the development of scientific storage in the country. Currently, these activities are undertaken by the following organisations:

i) Indian Grain Storage Centre, Hapur.
ii) Central Building Research Institute, Roorkee.
iii) Agricultural University, Ludhiana.
iv) Indian Institute of Technology, Kharagpur.
v) Central Mechanical Engineering Institute, Durgapur.
vi) Central Food Technological Research Institute, Mysore.

The specific areas in which research and training need to be strengthened are (i) determination of the requirements of material for storage construction, particularly steel; (ii) costing; and (iii) management.

The CWC has introduced extension services for the promotion of scientific storage through advisory and technical services to stockists of agricultural produce in the private sector. This line of activity needs to be extended and undertaken by the SWCs also. Several other measures recommended by the Committee of Experts on Losses in Storage and set out in Appendix I need to be followed up by the Central and State governments and the CWC and SWCs.

Coordination in Storage Development:

44. The overall structure of organisations concerned with the development of storage facilities for foodgrains and other agricultural products and inputs is pyramidical. With the Central Food Department, the Food Corporation of India and the Central Warehousing Corporation at the apex, and about 30 agencies at the State level, consisting of the State governments and State Warehousing Corporations, the base consists of thousands of cooperative societies setting up and managing storage facilities in villages and at taluka and district marketing centres.

45. This structure reflects the regional and functional characteristics of the various organisations and the nature of the needs which they have been established to fulfil. The Central Food Department, the F.C.I. and the State governments are concerned principally with the storage of foodgrains. The C.W.C. and S.W.Cs. have for their main objectives the promotion of scientific storage and warehousing receipts as instruments of credit for financing the marketing of agricultural products and inputs by traders, cooperatives and producers. Storage in the cooperative sector is designed to assist storage and marketing facilities for producers and distribution of agricultural inputs.

46. Within a broad regional and functional demarcation, these autonomous organisations have a common objective of developing sound storage and warehousing facilities and they draw on available resources, the allocation of which among them is governed by this objective. It is essential, therefore, to ensure that available resources are allocated and utilised with maximum benefit. This requires a systematic coordination among the organisations concerned. It has indeed been felt necessary to coordinate their activities for achieving effective application of resources and utilisation of facilities and avoiding overlapping of effort. Such coordination is, however, of recent date. At the Central level, it is effected through the Central Storage Committee set up by the Department of Food in 1966. This Committee consists of the Director-General (Food) as Chairman and Managing Directors of the Central Warehousing Corporation and the Food Corporation of India and Secretary of the National Cooperative Development Corporation as members.

At the instance of the Department of Food, several State Governments have set up Coordination Committees consisting of representatives of the Civil Supplies, Cooperation and other concerned departments, the State Warehousing Corporations and the Central Warehousing Corporation.

47. The main tasks of these Committees are to scrutinise and approve the construction programme of agencies at the Centre and in the States, designate the agencies which should set up

storage facilities at different places and keep a general watch on the development of storage facilities.

48. Differing views have been expressed about the adequacy of inter-agency coordination. Some organisations have expressed the view that as the purposes and areas of operation of the different agencies are well demarcated, there is little scope for duplication of effort and, in practice, no significant overlapping in the construction and location of storage facilities has taken place. In their estimation, the coordinating arrangements established have been adequate. Some other organisations have held that coordination has not been sufficiently effective partly because some issues of policy need to be settled and partly because some State Committees have been active in a preliminary way and some others have yet to go into action. A major policy issue is one of giving to C.W.C. and S.W.Cs. a share in the storage of foodgrains in a regime of large scale procurement and distribution of foodgrains by the Central and State governments which has the effect of curtailing the warehousing business of the Corporations. This has a bearing on their viability and economies in storage in general. Though the C.W.C. and some S.W.Cs. have been entrusted lately with the storage of foodgrains to some extent, their long term role in this direction needs to be considered.

Areas of coordination:

49. It is, however, generally agreed that there is need of continuing coordination. While the immediate objectives of coordination are to rationalise and integrate the construction programme of different agencies, determine the agencies which should establish storage facilities in the areas selected and avoid overlapping, we feel that it would be useful to enlarge the objectives of coordination to include long term planning of storage development, systematic flow and exchange of information and experience, and improvement of the standards of personnel engaged in the management of storage facilities and of technical services rendered for the preservation of agricultural produce. There is evidence to suggest that there is need of spelling out the objectives and areas of coordination in greater detail. We would suggest that it should cover the following aspects of storage development:

A. Planning:

i) evolving a standard schedule of data for estimating the immediate and long term needs of storage facilities in areas served by different organisations with reference to the production, marketing and transportation of agricultural products and inputs; the quantum of stocks required to be held for consumption and in reserves; and the quantum and quality of storage facilities required to be set up by public agencies and in the private sector;

ii) prescribing guidelines for the location of individual godowns with reference to the marketing, transportation and other facilities;

iii) designating the agencies which should establish storage facilities at the centres approved with due regard to the funds available with them and to ensure the most effective utilisation of funds;

iv) developing standard designs for godowns and ancillary facilities appropriate for different locations and purposes;

v) methods of publicity for promoting the use of warehousing facilities by traders, cooperatives and producers.

B. Exchange of information pertaining to:

i) the utilisation of capacity and measures for improving occupancy;

ii) the costs of construction and scales of storage charges;

iii) the techniques, costs and effectiveness of preservation of produce.

C. Training and technical services:

i) qualifications of personnel required by different storage agencies and their training;

ii) the types and methods of advisory, technical and extension services required to be developed.

Mechanics of coordination:

50. Within these larger objectives of coordination, the Central Storage Committee and Storage Committees in the States could become more effective instruments of achieving a better integrated development of storage on a long term basis. We would suggest an expansion of the Central Storage Committee to include representatives of the Departments of Agriculture and Cooperation. The Committee should have a servicing cell under the supervision of the Chairman and in charge of an officer of the rank of Under Secretary. For technical guidance, some technical officers should also be posted in the cell. The functions of the cell should be to provide a specific organisational link between the bodies represented on the Committee to act as a clearing house of information, provide liaison with the State Committees and undertake preparation of data required by the Committee for taking decisions. The decisions of the Committee should be binding on the Departments concerned. In taking decisions on the location of new godowns, the Committee should associate representatives of the States concerned with its deliberations. The decisions of the Committee should be communicated to the State Committees to keep them informed of the developments at the Centre.

51. We suggest that Coordination Committees should be set up in States which have not yet constituted them. These Committees would serve their purposes best if the Development Commissioners are appointed as their Chairmen. Their membership should ordinarily consist of representatives of the Civil Supplies, Agriculture, Cooperation and other departments concerned, the State Warehousing Corporations, the C.W.C. and F.C.I. Their decisions should be binding. Like the Central Committee, each State Committee should also be served by a small cell to perform functions suggested earlier.

52. The Central and State Committees should keep in view the recommendations of the Parliamentary Committee on Public Undertakings such as that in the interest of economy, godowns should not be set up by a multiplicity of public agencies at the same centre; that at places where the C.W.C. has warehouses, no new ones should be constructed or hired by the Central government or F.C.I. or any public sector organisation unless this becomes necessary due to the inability of the C.W.C. to cater to their needs, etc.

Table I-A

Storage capacity in the possession of the Central Food Department as on 1.4.1968.

(000 tonnes)

	Owned	Hired	Total
Andhra Pradesh	-	11.5	11.5
Assam	36.2	3.7	39.9
Gujarat	48.6	139.2	187.8
Tamil Nadu	-	46.5	46.5
Maharashtra	503.8	128.0	631.8
West Bengal	223.2	110.5	333.7
Union Territories.	19.3	9.3	28.6
	831.1	448.7	1279.8

Table I-B

Storage capacity in the possession of the Food Corporation of India as on 1.4.1968.

(000 tonnes)

	Owned	Hired	Total
Andhra Pradesh	129.7	13.3	143.0
Assam	-	19.5	19.5
Bihar	160.0	12.8	172.8
Haryana	15.3	Included in Punjab	15.3
Kerala	134.3	39.2	173.5
Madhya Pradesh	45.9	28.6	74.5
Tamil Nadu	191.7	4.6	196.3
Mysore	59.9	-	59.9
Orissa	15.3	4.5	19.8
Punjab	33.1	41.1	74.2
Rajasthan	65.0	-	65.0
Uttar Pradesh	306.3	10.3	316.6
West Bengal	-	247.6	247.6
Delhi	114.0	-	114.0
Other Union Territories.	2.5	1.9	4.4
	1273.0	423.4	1696.4

Table I-C

Combined storage capacity in the possession of the Central Food Department and Food Corporation of India as on 1.4.1968.

(000 tonnes)

	Owned	Hired	Total
Andhra Pradesh	129.7	24.8	154.5*
Assam	36.2	23.2	59.4
Bihar	160.0	12.8	172.8
Gujarat	48.6	139.2	187.8
Haryana	15.3	Included in Punjab	15.3
Kerala	134.3	39.2	173.5
Madhya Pradesh	45.9	28.6	74.5
Tamil Nadu	191.7	51.1	242.8**
Maharashtra	503.8	128.0	631.8
Mysore	59.9	-	59.9
Orissa	15.3	4.5	19.8
Punjab	33.1	41.1	74.2
Rajasthan	65.0	-	65.0
Uttar Pradesh	306.3	10.3	316.6
West Bengal	223.2	358.1	581.3
J & K	-	-	-
Delhi	114.0	-	114.0
Other Union Territories	21.8	11.2	33.0
	2104.1	872.1	2976.2

* Exclusive of 2.87 lakh tonnes constructed by C.W.C. exclusively for foodgrains.

** Exclusive of 2 lakh tonnes constructed by C.W.C. exclusively for foodgrains.
These are included in Table I-B.

Table I- D

Storage capacity in the possession of State governments as on 1.4.1968.

(000 tonnes)

	Owned	Hired*	Total
Andhra Pradesh	88.1	-	88.1
Assam	16.0	5.0	21.0
Bihar	26.3	191.8	218.1
Gujarat	143.9	87.3	231.2
Haryana	31.4	41.0	72.4
Kerala	39.3	-	39.3
Madhya Pradesh	81.8	74.1	155.9
Tamil Nadu	4.5	68.3	72.8
Maharashtra	376.0	236.5	612.5
Mysore	49.3	19.2	68.5
Orissa	41.1	-	41.1
Punjab	31.7	261.5	293.2
Rajasthan	48.7	10.0	58.7
Uttar Pradesh	48.3	255.7	304.0
West Bengal	273.0	0.4	273.4
Jammu & Kashmir	63.0	1.1	64.1
Union Territories	33.8	10.9	44.7
Total:	1396.2	1262.8*	2659.0

* Some of this has been hired from the S.W.Cs. and cooperatives.

Table I- E

Storage capacity in the possession of Central Warehousing Corporation as on 1.4.1968.

(000 tonnes)

	Owned	Hired	Total
Andhra Pradesh	317.9*	7.1	325.0
Assam	18.0	0.3	18.3
Bihar	-	3.8	3.8
Gujarat	13.0	10.5	23.5
Haryana	-	5.4	5.4
Kerala	8.2	4.2	12.4
Madhya Pradesh	10.9	8.7	19.6
Tamil Nadu	213.1**	6.8	219.9
Maharashtra	24.2	76.7	100.9
Mysore	14.9	3.9	18.8
Orissa	5.0	6.8	11.8
Punjab	1.0	11.5	12.5
Rajasthan	15.4	2.7	18.1
Uttar Pradesh	10.0	5.1	15.1
West Bengal	-	36.9	36.9
Union Territories	-	4.1	4.1
Total:	651.6	194.5	846.1

* Includes 2.87 lakh tonnes constructed by C.W.C. exclusively for foodgrains and for use by F.C.I.

** Includes 2 lakh tonnes constructed by C.W.C. exclusively for foodgrains and for use by F.C.I.

Table I-F

Storage capacity in the possession of State Warehousing Corporations as on 1.4.1968.

(000 tonnes)

	Owned	Hired	Total
Andhra Pradesh	18.47	50.31	68.78
Assam	13.03	14.27	27.30
Bihar	-	30.66	30.66
Gujarat	7.15	17.64	24.79
Haryana	7.00	3.52	10.52
Kerala	17.78	4.07	21.85
Tamil Nadu	28.76	44.53	73.29
Madhya Pradesh	19.55	105.15	124.70
Maharashtra	39.44	30.62	70.06
Mysore	33.24	14.58	47.82
Punjab	8.50	51.38	59.88
Orissa	6.10	4.00	10.10
Rajasthan	19.81	51.00	70.81
Uttar Pradesh	-	38.00	38.00
West Bengal	8.62	50.94	59.56
Total:	227.46	510.69	738.15

Table I-C.

Storage capacity in the cooperative sector as on 1.4.1968.

	(000 tonnes)
Andhra Pradesh	152
Assam	64
Bihar	221
Gujarat	177
Haryana	4
Kerala	71
Madhya Pradesh	186
Tamil Nadu	208
Maharashtra	389
Mysore	391
Orissa	55
Punjab	183
Rajasthan	92
Uttar Pradesh	196
West Bengal	105
Union Territories	23
Total:	2517

Table I-H

State and agency-wise distribution of total storage capacity (owned and hired) as on 1.4.1968.

(000 tonnes)

States	Food Deptt. & FCI	State Governments	C.W.C.	S.W.Cs.	Cooperatives	Total
Andhra Pradesh	154.5	88.1	325.0	68.8	152.0	788.4
Assam	59.4	21.0	18.3	27.3	64.0	190.0
Bihar	172.8	218.1	3.8	30.7	221.0	646.4
Gujarat	187.8	231.2	23.5	24.8	177.0	644.3
Haryana	15.3	72.4	5.4	10.5	4.0	107.6
Kerala	173.5	39.3	12.4	21.8	71.0	318.0
Madhya Pradesh	74.5	155.9	19.6	124.7	186.0	560.7
Tamil Nadu	242.8	72.8	219.9	73.3	208.0	816.8
Maharashtra	631.8	612.5	100.9	70.1	389.0	1804.3
Mysore	59.9	68.5	18.8	47.8	391.0	586.0
Orissa	19.8	41.1	11.8	10.1	55.0	137.8
Punjab	74.2	293.2	12.5	59.9	183.0	622.8
Rajasthan	65.0	58.7	18.1	70.8	92.0	304.6
Uttar Pradesh	316.6	304.0	15.1	38.0	196.0	869.7
West Bengal	581.3	273.4	36.9	59.6	105.0	1056.2
Jammu & Kashmir	-	64.1	-	-	-	64.1
Union Territories	147.0	44.7	4.1	-	23.0	218.8
Totals:	2976.2	2659.0	846.1	738.2	2517.0	9736.5

Table I-I

State and agency-wise distribution of owned storage capacity as on 1.4.1968.

(000 tonnes)

State	Food Deptt. and F.C.I.	State Governments.	CWC	SWCs.	Cooperatives	Total
Andhra Pradesh	129.7	88.1	317.9*	18.5	152.0	706.2
Assam	36.2	16.0	18.0	13.0	64.0	147.2
Bihar	160.0	26.3	-	-	221.0	407.3
Gujarat	48.6	148.9	13.0	7.2	177.0	389.7
Haryana	15.3	31.4	-	7.0	4.0	57.7
Kerala	134.3	39.3	8.2	17.8	71.0	270.6
Madhya Pradesh	45.9	81.6	10.9	19.5	186.0	344.1
Tamil Nadu	191.7	4.5	213.1**	28.8	208.0	646.1
Maharashtra	503.8	376.0	24.2	39.4	389.0	1332.4
Mysore	59.9	49.3	14.9	33.2	391.0	548.3
Orissa	15.3	41.1	5.0	6.1	55.0	122.5
Punjab	33.1	31.7	1.0	8.5	183.0	257.3
Rajasthan	65.0	48.7	15.4	19.8	92.0	240.9
Uttar Pradesh	306.3	48.3	10.0	-	196.0	560.6
West Bengal	223.2	273.0	-	8.6	105.0	609.8
Jammu & Kashmir	-	63.0	-	-	-	63.0
Union Territories	135.8	33.8	-	-	23.0	192.6
Total:	2104.1	1396.2	651.6	227.4	2517.0	6896.3

* Includes 2.87 lakh tonnes constructed under crash programme.
** Includes 2 lakh tonnes constructed under crash programme.

Table - I - J

Statewise percentage distribution of Total (owned and hired) storage capacity with various agencies as on 1.4.1968.

States	Food Deptt. & F.C.I.	State Govt.	C.W.C.	S.W.Cs.	Cooperatives	Total
Andhra Pradesh	5.19	3.31	38.41	9.32	6.04	8.10
Assam	2.00	0.79	2.16	3.70	2.54	1.95
Bihar	5.81	8.20	0.45	4.16	2.78	6.64
Gujarat	6.31	8.69	2.78	3.36	7.03	6.62
Haryana	0.51	2.72	0.64	1.42	0.16	1.10
Kerala	5.83	1.48	1.47	2.95	2.82	3.26
Madhya Pradesh	2.50	5.86	2.32	16.89	7.39	5.76
Tamil Nadu	8.16	2.74	25.99	9.93	8.26	8.39
Maharashtra	21.23	23.04	11.93	9.50	15.46	18.53
Mysore	2.01	2.58	2.22	6.48	15.53	6.02
Orissa	0.67	1.55	1.39	1.37	2.19	1.41
Punjab	2.49	11.03	1.48	8.11	7.27	6.40
Rajasthan	2.18	2.21	2.14	9.59	3.66	3.13
Uttar Pradesh	10.64	11.43	1.78	5.15	7.79	8.93
West Bengal	19.53	10.28	4.36	8.07	4.17	10.85
Jammu & Kashmir	-	2.41	-	-	-	0.66
Union Territories	4.94	1.68	0.48	-	0.91	2.25
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table - I - K

Statewise percentage distribution of OWNED storage capacity with various agencies as on 1.4.1968.

States	Food Deptt. & F.C.I.	State Govt.	C.W.C.	S.W.Cs.	Cooperatives	Total
Andhra Pradesh	6.16	6.31	48.79	8.13	6.04	10.24
Assam	1.72	1.15	2.76	5.72	2.54	2.14
Bihar	7.60	1.88	-	-	8.78	5.91
Gujarat	2.31	10.31	2.00	3.17	7.03	5.65
Haryana	0.73	2.25	-	3.08	0.16	0.84
Kerala	6.38	2.82	1.26	7.83	2.82	3.92
Madhya Pradesh	2.18	5.86	1.67	8.57	7.39	4.99
Tamil Nadu	9.11	0.32	32.70	12.66	8.26	9.37
Maharashtra	23.94	26.93	3.71	17.33	15.46	19.32
Mysore	2.85	3.53	2.29	14.60	15.53	7.95
Orissa	0.73	2.94	0.77	2.68	2.19	1.78
Punjab	1.57	2.27	0.15	3.74	7.27	3.73
Rajasthan	3.09	3.49	2.36	8.71	3.66	3.49
Uttar Pradesh	14.56	3.46	1.54	-	7.79	8.13
West Bengal	10.61	19.55	-	3.78	4.17	8.84
Jammu & Kashmir	-	4.51	-	-	-	0.91
Union Territories	6.46	2.42	-	-	0.91	2.79
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table - I - L

Agency wise Percentage distribution of OWNED storage capacity in different States as on 1.4.1968.

State	Food Deptt. & F.C.I.	State Govts.	C.W.C.	S.W.Cs.	Cooperatives	Total
Andhra Pradesh	18	12	45	3	22	100
Assam	25	11	12	9	43	100
Bihar	39	7	-	-	54	100
Gujarat	13	37	3	2	45	100
Haryana	27	54	-	12	7	100
Kerala	50	14	3	7	26	100
Madhya Pradesh	13	24	3	6	54	100
Tamil Nadu	30	1	33	4	32	100
Maharashtra	38	28	2	3	29	100
Mysore	11	9	3	6	71	100
Orissa	12	34	4	5	45	100
Punjab	13	12	-	3	72	100
Rajasthan	27	20	6	8	37	100
Uttar Pradesh	55	8	2	-	35	100
West Bengal	37	45	-	1	17	100
Jammu & Kashmir	-	100	-	-	-	100
Union Territories	70	18	-	-	12	100
Totals:	32	20	9	3	36	100

Table II

Cold Storage Capacity
(1966)

	Public sector	Private sector	Cooperative sector	Total	Installed capacity (in tonnes)	Percentage of total
			(No of Units)			
Andhra Pradesh	3	4	1	8	435	0.05
Assam	-	1	-	1	360	0.04
Bihar	1	99	1	101	113740	13.13
Delhi	-	25	-	25	24045	2.78
Goa	4	-	-	4	820	0.09
Gujarat	5	14	6	25	10430	1.20
Kerala	13	22	1	36	2990	0.34
Madhya Pradesh	-	22	-	22	15545	1.79
Tamil Nadu	6	7	-	13	600	0.07
Maharashtra	6	32	5	43	12405	1.43
Mysore	5	2	1	8	305	0.04
Orissa	3	3	-	6	2070	0.24
Pondicherry	1	-	-	1	nag.	-
Punjab	6	71	13	90	78985	9.12
Rajasthan	-	5	-	5	2920	0.34
Tripura	-	1	-	1	630	0.07
Uttar Pradesh	2	198	3	203	369800	42.68
West Bengal	2	111	1	114	230390	26.59
Total:	57	617	32	706	866470	100.00

Table III

Consumption Targets of N,P & K for 1973-74

('000 tonnes)

States	N	P	K
Andhra Pradesh	460.80	206.71	148.76
Assam	35.55	14.86	8.50
Bihar	244.15	105.10	64.95
Gujarat	211.70	96.38	49.40
Jammu & Kashmir	23.44	9.49	4.80
Kerala	83.20	41.88	39.73
Madhya Pradesh	154.38	73.64	32.37
Tamil Nadu	297.86	135.92	93.24
Maharashtra	428.25	199.00	107.60
Mysore	158.18	82.13	61.26
Orissa	143.02	56.94	33.64
Punjab	418.01	150.61	113.50
Rajasthan	155.00	83.15	26.40
Uttar Pradesh	584.70	350.00	249.05
West Bengal	180.85	70.90	54.75
Union Territories	151.02	56.52	19.67
Totals:	3730.11	1733.23	1107.62
	x 5	x 6	x 2
Material Eq Equivalent	18,650.55	10,399.38	2,215.24

31,265.17

Table - IV

State-wise distribution of storage capacity for food-grains in the possession of the Central Food Department, Food Corporation of India and State Governments in 1967-68 in relation to the production of food-grains in that year.

('000 tonnes)

States	Storage capacity	Production of Foodgrains 1967-68	Storage capacity as percentage of total Foodgrains Production
Andhra Pradesh	242.6	7,502	3.23
Assam	80.4	2,056	3.91
Bihar	390.9	8,612	4.54
Gujarat	410.0	3,368	12.44
Haryana	87.7	3,994	2.20
Kerala	212.8	1,132	18.80
Madhya Pradesh	230.4	10,163	2.27
Tamil Nadu	315.6	5,930	5.32
Maharashtra	1244.3	6,954	17.89
Mysore	128.4	4,506	2.85
Orissa	60.9	4,324	1.41
Punjab	367.4	5,446	6.75
Rajasthan	123.7	6,608	1.87
Uttar Pradesh	620.6	16,810	3.69
West Bengal	814.7	5,855	14.60
Jammu & Kashmir	64.1	652	9.83
Union Territories	191.7	1,675	11.44
Totals	5635.2	95,587	5.90

Appendix I

Summary of Findings and Recommendations of the Committee on Losses of Foodgrains during Post-harvest Handling.

FINDINGS.

i). Loss needs a realistic definition, It is defined by the Committee as reduction in food supply brought out by either reduction in weight or deterioration between two handlings and on the whole between production and consumption.

ii) Population of domestic rodents that causes loss to stored grain is considered on par with human population. Maximum loss on account of domestic rodents is estimated at 1.9 million tonnes of grain or 2.5% of total production.

iii) Qualitative damage caused by insects is quantamised on the basis that each affected kernel has on an average lost half its value in terms of food value.

iv) Present estimates of possible losses on an average basis are given for the threshing yard, transit, processing, rodents, insects and moisture. Total figure amounts to about 9.33%. Major portion of this loss is avoidable.

RECOMMENDATIONS

i) Government should assume responsibility for minimising the loss observed at various stages of handling and set up an adequate organisation at the Centre and in the States to take coordinated action in this direction.

ii) Legal provisions relating to disinfestation measures to be adopted by Roller Flour Mills, Grain stockists and Rice Millers should be rigidly enforced. Similar steps should be taken to ensure adoption of pesticidal measures by Food Processing Industries(including oil extraction units, bakeries etc.), all industrial establishments, goods sheds of railways and ports.

iii) Sufficient stress should be laid on grain handling and grain storage in institutes where agriculture and agricultural engineering are taught.

iv) Nation-wide educational programme should be planned by the Government to stress the avoidable nature of losses, the need for avoiding them and the likely benefits by avoiding them.

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v. Availability of suitable receptacles, storage structures, grain handling equipment and pesticides is very necessary in ensuring damage-free handling of grain. Government should take steps that would promote manufacture and distribution of these at reasonable prices. Farmers not in a position to pay the price of the receptacles should be supplied these on a long term loan basis. Government should also either themselves set up consulting agencies or encourage setting up of consulting agencies for advising on designing of storage and grain handling by Cooperatives, Corporations, etc.

vi. Considerable additional storage capacity will be necessary in view of increased production planned during the coming years. Government should plan for this addition and ensure that structures of the desired type only are allowed to come up.

vii. Pesticides needed for safe preservation of grain in the rural storage be made available to the grain producers free of cost for the first two years to promote the use of suitable pesticides in preventing heavy wastage due to pests in this area of grain handling.

viii. A review of the work should be undertaken every year to assess the progress made to know the fields needing research effort and executive action for continued improvement.

ix. With a view to obtaining precise representative figures for losses particularly in storage, the work of collecting samples and analysing them along with collection of relevant data should be continued for a further period of three years. Revision of figures now given for the losses may be carried out after a period of three years with the help of the data so collected.

ESTIMATES OF LOSSES COMMITTEE ON LOSSES OF FOODGRAINS DURING POST-HARVEST HANDLING AND STORAGE

	WHEAT	RICE	JOWAR	BAJRA	MAIZE
Annual Average Production (In thousand tonnes) (Average of the years 1962-63, 1963-64 and 1964-65)	10,933.333	35,945.666	9,501.667	4,026.667	4,596.333

ESTIMATED LOSS ('000 tonnes)

Stages	WHEAT		RICE		JOWAR		BAJRA		MAIZE	
	Qty.	%	Qty.	%	Qty.	%	Qty.	%	Qty.	%
Threshing Yard	109.933	1.0	898.642	2.5	190.033	2.0	20.133	0.5	22.982	0.5
Transport*	16.490	0.5	53.918	0.5	14.253	0.5	6.040	0.5	6.895	0.5
Processing	-	-	718.913	2.0	-	-	-	-	-	-
Storage										
i) RODENTS	274.832	2.5	898.642	2.5	237.542	2.5	100.667	2.5	114.907	2.5
ii) BIRDS	54.967	0.5	359.457	1.0	95.017	1.0	40.267	1.0	22.982	0.5
iii) INSECTS @	329.799	3.0	718.913	2.0	190.033	2.0	40.267	1.0	137.889	3.0
iv) MOISTURE £	54.967	0.5	179.729	0.5	190.033	2.0	20.132	0.5	22.982	0.5
Total	840.988		3,828.214		916.911		227.507		328.687	

N.B. Loss is worked out on the basis of loss to food value only. DRIAGE which causes loss in weight but not loss in food value, spillage, loss in weight on account of theft, loss on account of conversion where some quantity may be lost for human consumption but is available for animal consumption, are not considered as loss.

* Loss in transport is confined to marketable surplus which is estimated at 30% of production. The Committee examined in this connection the estimate given by Shri Chaturvedi of 6%. This estimate, however, was observed to include losses on account of driage, different modes of weighment and also pilferage. The Committee has taken into account only the loss to food value.

@ Loss caused by insects is quantamised on the basis that a kernel damaged by insects has lost half its food value. CFTRI is of the opinion that loss on account of insects is a complete loss of the kernal. The Committee felt that the insect damage varies between slight to considerable and the portion of the remaining kernel has a sizeable food value.

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ESTIMATES OF LOSSES COMMITTEE ON LOSSES OF FOODGRAINS DURING POST-HARVEST HANDLING AND STORAGE

	GRAM	MILLETS	PULSES (other than gram)	TOTAL
nual Average oduction (in usand tonnes) verage of the ars 1962-63, 3-64 & 1964-65)	5,209.000	1,943.000	[illegible].000	78,317.666

ESTIMATED LOSS- (quantity in thousand tonnes)

ages	GRAM		MILLETS		PULSES (Other than Gram)		TOTAL	
	Qty	%	Qty.	%	Qty.	%	Qty.	%
reshing Yard	26.045	0.5	19.430	1.0	30.510	0.5	1,317.708	1.68
ansport*	7,814	0.5	2.915	0.5	9.153	0.5	117.478	0.15
ocessing	-	-	-	-	-	-	718.913	0.92
orage								
RODENTS	130.225	2.5	48.575	2.5	152.550	2.5	1,957.940	2.50
) BIRDS	26.045	0.5	38.860	2.0	30.510	0.5	668.105	0.85
) INSECTS @	260.450	5.0	9.715	0.5	305.100	5.0	1,992.166	2.55
) MOISTURE £	26.045	0.5	9.715	0.5	30.510	0.5	534.114	0.68
Total	476.624		126.210		558.333		7,306.424	9.33

CFTRI was of the view that damage on account of moisture was upto 5% when grain was stored in underground 'Khattis' and pits. The Committee was of the view that very little foodgrain is stored in underground structures and the loss, therefore, is of a small magnitude given in the statement. CFTRI was of the view that in the conversion of pulses to dals, loss occured to the extent of 5 to 7%. Whatever was, however, lost for human feeding was a gain for the cattles since the by-products of dal-making are fully utilized as cattle food. The Committee did not consider this a loss.

Appendix II

The Market Yard at Kolhapur, Maharashtra

The Market Yard at Kolhapur, known as Shahu Market Yard, was established in 1958. Before its establishment, the wholesale market for agricultural produce was located in a thickly populated part of the city. The yard has an area of 120 acres on the Poona-Bangalore National Highway, within easy reach of the city.

2. The Market Yard contains facilities for the sale and purchase of agricultural produce, storage, warehousing and credit. It is owned and managed by Kolhapur Agricultural Produce Market Committee. The Committee purchased the land for Rs.2,52,000, developed it for the purposes of a market yard and established common service facilities. These consist of the Committee's office building, a rest house for growers who bring the produce for sale, rest house for labour, a cattle shed, a police chowki, canteens, railway siding, a network of road, petrol pump, water supply and electricity, a building for banks and post office and a well laid-out garden. The yard contains 243 plots allotted to commission agents, 98 plots allotted to traders, godowns of the Central Warehousing Corporation, a seed godown of the State government and offices of some cooperative societies.

3. The plots for commission agents and traders have been sold on ownership basis on certain conditions. They are required to construct their shops and godowns according to model plans prescribed by the Committee. 55 cooperative marketing societies have established offices in the Market Yard.

4. The Market Committee received two loans of Rs.5 lakhs each from the State government, carrying interest at 4½ percent and 6 percent respectively. Additional resources were raised through the sale of plots. The income of the Market Committee consists of market fee and licence fees on commission agents, traders, truck owners, cartmen, weighmen, assistants, kamals, and other licensed to work in the market yard. The licence fees for different functionaries vary. The market fee is levied on the purchasers of produce at a flat rate of 15 paise per Rs. 100. The latter constitutes the major source of revenue for the Committee. In 1967-68, it amounted to Rs.1.90 lakhs. The income from the licence fee amounted to Rs.41,000 and from other sources Rs.60,000. Against a total income of Rs.2.91 lakhs, the Committee's expenditure amounted to Rs.1.21 lakhs. The Committee has been able to repay 60 percent of the loans obtained from the State government.

5. The complex of facilities in the Market Yard permits not only marketing of produce according to the regulations in force and under proper supervision but also provides storage, warehousing and credit. It is possible for traders to deposit their purchases in the warehouses and obtain credit immediately against warehouse receipts within the Market Yard. These facilities are also open to growers who may wish to deposit their produce in the warehouses rather than sell it. Produce which is not deposited in a warehouse, is held in the godowns constructed by the traders and cooperatives before it is moved from the yard for despatch to other destinations. The Market Yard at Kolhapur has thus been instrumental in involving private traders in constructing godowns according to model plans. This manner of development of storage in the private sector has not involved any loans or subsidies from public resources. The private traders have been involved in the construction of storage godowns at some other centres also in Maharashtra, for example, Sangli. We draw attention to this experience in the belief that implementation of legislation for the regulation of markets and particularly for the development of market yards, can become a powerful instrument of developing storage capacity of prescribed standards in the private sector without public investment in the form of loans and subsidies.

Appendix III

Summary of a survey of Godowns in the cooperative sector in Maharashtra.

A survey of godowns in the cooperative sector in Maharashtra was undertaken by the Department of Cooperation of the State government and N.C.D.C. in 1966-67. It covered the period from 1963-64 to 1965-66 and was based on a random stratified sample.

2. At the end of June 1963, there were 31 large, 100 medium and 674 small sized godowns in the cooperative sector in Maharashtra. The construction of godowns in the State received special impetus in 1964-65 from the monopoly procurement of foodgrains by the State government through the cooperative sector, reinforced by the State's determination to become self-sufficient in foodgrains. In a sense, the expansion of storage capacity was planned and achieved in anticipation of higher agricultural production. By way of financial assistance to the cooperatives, the State government granted loans and subsidies to cover the full cost of construction. The system of financial assistance was standardised on the following basis:

	Loan	Subsidy	Total (Rs.)
Small godowns	7500	2500	10000
Medium sized	15000	5000	20000
Large sized	30000	10000	40000

3. The quantum of aid was fixed on the basis of cost estimates made in 1956. Any excess of cost over the standard cost was expected to be borne by the cooperatives from their own resources. Conditions for the grant of financial assistance provided:

i) That the cooperative societies seeking assistance should be engaged in the marketing of agricultural produce or purchase, storage and supply of agricultural and domestic requirements of their members;

ii) That godowns would be constructed according to model plans and were expected to be managed efficiently;

iii) That the cooperatives may construct godowns in a market yard or a sub-yard owned by a market committee and use the godowns only for purposes of storage. The conditions for assistance did not call for information on the turn over of the commodities handled by the applicant society, location of godown with reference to the marketable surplus, transit requirements and agricultural inputs. The conditions also did not call for an estimation of revenue and expenditure.

4. The survey revealed that the construction of new storage capacity was well ahead of and in excess of demand. The percentage of godowns constructed but not in use was as under:

	1963-64	1964-65	1965-66
Small	24	16	22
Medium	10	5	5
Large	10	10	10

The survey report observed that this revealed the extent to which the construction of godowns could have been held off for atleast three years without any inconvenience. Through staggering, more storage capacity could have been constructed within the same outlay. The average cost of construction exceeded the standard estimate by Rs.2330 for small godowns, Rs.8833 for medium sized godowns and Rs.9151 for large godowns. That the cooperatives concerned were able to bear the excess showed that they were capable of raising resources on their own and that the State government need not have provided loans and subsidies to the full extent of the cost of construction. But in some cases (3% of small godowns and 20% of large godowns), the aid given by the Government exceeded the cost of construction by Rs.840 and Rs.1627 per godown respectively. This suggested that loans and subsidies should have been released with reference to thecost estimates and the progress of construction.

5. With regard to the use of godowns, the survey disclosed that though under the rules, government assistance stipulated that the godowns would be utilised by the societies or by their members, in some cases, godowns were totally rented out or allowed to be used by non-members. In the period 1963-64 to 1965-66, 9% of small godowns, 20% of medium sized godowns and 3% of large godowns were rented out. The utilisation of godowns retained by the cooperatives was well below capacity. This is set out in the following table:

Percentage utilisation of godown capacity
(based on daily percentage of utilisation)

	Small	Medium	Large
1963-64	16	40	50
1964-65	23	42	63
1965-66	35	65	74

6. Improvement in utilisation in 1965-66 reflects the impact of monopoly procurement. The survey, however, concluded that neither monopoly procurement through the cooperatives nor the desire of the members to store their produce with the cooperatives helped in achieving reasonable utilisation of small sized godowns. It attributed this to locational imbalance and absence

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of taking the locational aspect into account in approving godowns for financial assistance. This was further borne out by the experience of Maharashtra Apex Cooperative Marketing Federation which, as the sole agent of the State government for monopoly procurement had to commandeer many godowns belonging to other agencies. Obviously, the locational pattern of the cooperative godowns was not suitable for the purposes of the Federation. The survey expressed the view that it was doubtful whether in the absence of any external impetus, the small sized godowns would be economically utilised. It called for a review of the policy of promoting the construction of small godowns by cooperatives. The three years average frequency distribution of small and medium godowns showed that 50% of them had 75% excess capacity. For large godowns, the situation was better with 50% of the godowns utilising 76 to 100% of their capacity. The survey stated categorically that "the small sized godown is a huge waste while there is enough scope for improvement in the medium sized godowns". This is borne out by the financial position of small godowns.

7. The average annual income and expenditure of small godowns in 1963-64 to 1965-66 were Rs.464 and Rs.1288 respectively. The medium and large godowns were financially viable with an excess of income over expenditure, of Rs.651 in the case of medium godowns and Rs.1384 in the case of large godowns. The small godowns were also more dependent on revenue from non-members than from members. If non-members had been debarred from using cooperative godowns, in compliance with the conditions of financial assistance, the financial position of small godowns would have been worse. In 1963-64 to 1965-66, revenue from non-members accounted for 47% of the total revenue of small godowns.

8. The survey report concluded that while the working of medium and large godowns was reasonably satisfactory, the position of small godowns was so bad as to raise doubts about the utility of entrusting cooperative societies to construct and manage small godowns. As 80% of the godowns in the cooperative sector were of small size, the survey suggested a revision of the policy of constructing small godowns.