

ECONOMICS OF CEREAL STORAGE IN
JABALPUR DISTRICT

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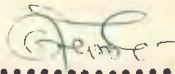
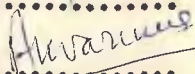
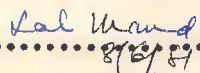
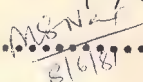
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No part of the thesis has been submitted for any other degree or diploma (certificate awarded, etc.) or has been published/published part has been fully acknowledged. All the assistance and help received during the course of investigations have been duly acknowledged by him.


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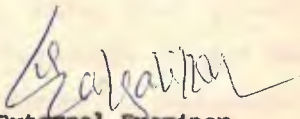
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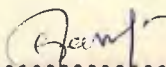
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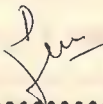
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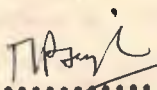
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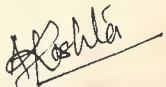
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Jabalpur;

dated June, 1981.


(AJAY KUMAR KOSHTA)

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CHAPTER-I

INTRODUCTION

"Over the past few years, agricultural sector of Indian economy has shown a great buoyancy which is reflected in the high level of production not only in the matter of foodgrains but also in respect of pulses, oilseeds, sugarcane, cotton and other crops. A net importer of foodgrains not so long ago, India has now achieved self sufficiency in foodgrains. What is more, the country has also started exporting foodgrains in limited way. The total foodgrains production for 1980-81 is expected to exceed the level of 125.6 million tonnes achieved last year. The target for foodgrains production by the end of the medium term plan (1978-83) is 140 to 144 million tonnes. Similar increases in output in respect of other major crops also anticipated. Even though favourable weather conditions have also contributed to the high levels of output in recent years, the country is likely to maintain increasingly higher levels of production in foodgrains and other crops thanks to the substantial increase in irrigation facilities, enhanced use of fertilizers, availability of credit and a number of other measures adopted to strengthen production potential in this sector"¹. "If the data of past three

1. The Working Group Report (1979) "On Rural Godowns for Storage of Farm Produce". Kurukshetra, Vol. No. XXVIII. No. 16, 1979, pp.4.

decades, is broken down into two periods, that is, before and after green revolution, considering 1966-67 as the year for dividing the periods than it has been proved that although as per weather conditions, the latter period was more unfavourable than the 1st one, still agricultural production had stability confirms the impact of technology on agricultural production."¹

With this background of increasing agricultural production and farm surpluses, we have to create facilities for storing, processing and marketing of agricultural produce. While production has maintained an upward trend, the facilities for storage, processing and marketing have not kept pace. The task now is to create additional facilities for storage of agricultural products, more particular in rural areas to allow a continued interest with agricultural producers by smoothening the marketing of agricultural product in which storage of commodities form an important part.

Sharp fluctuation in agricultural production are a common occurrence in countries where agriculture is heavily dependent on monsoon. Normally, inventory operation by private traders are expected to smoothen the impact of

1. Kalhon, A.S. (1981), "Agricultural prices (some basic concepts)". The Economic Times, pp.5 March, 4.

fluctuation of production on seasonal availability and on prices. However, experience has shown that in countries like India suffer from chronic shortages in food supply, aggravated by periodical crop failures, private inventories cannot be wholly relied upon for stabilizing availability and prices.

The very fact that a public authority feels the necessity to main stocks of its own, would indicate that the accepted policy objectives would not be fulfilled by trade, whose function it was to maintain stocks.

Generally, stocks are maintained to even out seasonal flows of a commodity. Since agricultural production is seasonal, stocks are necessary to keep up a continuous flow over the year. Buffer stock, however, it was continued, are primarily intended to even out inter-seasonal fluctuations in production, rather than inter-seasonal supplies. Stocks which are meant to perform the latter fluctuation should, therefore, be distinguished from the buffer stocks and should bear a distinct nomenclature. Such stocks are known by a variety of names, such as inventories, pipeline stocks, operational stocks, etc. The main point was whether the government which maintained buffer stocks would also be required to maintain additional, or at-least conceptually separate stocks, which should be differentiated and given a distinct nomenclature. In all

such cases, a portion of the stock with government would be, in a sense, "committed" and, as such, could not be considered as available for the somewhat different purpose of evening out year-to-year^e fluctuations in production. The distinction, though conceptually valid, could not perhaps be adhered to very rigidly for operational purposes. Pending further discussion, it was agreed that stocks positively committed for public distribution may be called "operational stocks".

Thus, distinction could be made between the stock of foodgrains with the government and from stocks held by private trade. Stocks with the government would be called as buffer stocks and those with private as operational stocks. The former, by and large, are meant for inter-seasonal purposes and latter inter-seasonal use."¹

There was a general consensus that though the new agricultural strategy - based on high yielding varieties of seed and massive use of modern inputs - will, in course of time, bring an end to the era of scarcity, for some years to come the context would be that of continuing shortage. It is possible that there may be a year or two of bumper crops in which there may not be an over all

1. Dantwala, M.L. (1969). "Summary of Discussion at the Seminar on Foodgrains Buffer Stocks", Seminar on Foodgrains Buffer Stocks in India, Seminar Series, VIII. pp.2

shortage, but there would also be inter-spersed years of mild or acute crop failures. Under such a situation, maintenance of buffer stocks to even out year-to-year fluctuations in supplies and consequent erratic price movements, became a major plank of Government's food policy.

In the context of the continuing scarcity of foodgrains over the last several years, a well defined food policy with storage as major component is a must for the government. This is all the more necessary to even out many disturbances occurring in the country and very much help the government to have sound planning for countries development.

The absence of a net work of rural godown is causing substantial hardship to the rural population. Firstly, the farmers are compelled to sell their produce immediately after harvest at prevailing prices which are bound to be low. Such distress sale of farm products deprives the farming community of their limited incomes. Secondly, farmers are compelled to store foodgrains and other products in improvised sub-standard godowns. Such storage of foodgrains and other products leads to deterioration of these commodities owing to dampness, etc., As a result of this, the quality of agricultural produce goes down and the farmers are again compelled to sell their products at lower

price in view of deterioration in quality. Third, "storage in katcha godown also leads to loss due to the attack of rodents, insects, pests, etc. The Panse Committee estimated post-harvest loss at 9.3 per cent of which nearly 6.6 per cent occurs due to poor storage conditions alone."¹

The small farmer does not have the staying power to retain his agricultural products with himself till the market prices are favourable. He is under pressure to sell his produce immediately after harvest when prices are invariably low. The need, therefore, is to provide the farming community with storage facilities not far from their farms. These godowns should provide facilities for scientific storage so that wastage and product deterioration are avoided. The farmer should also be able to get his credit requirements without being compelled to sell of his produce at a time when prices are low.

It would be wrong to have an understanding that all the activities relating to storage of foodgrains be carried out by government. This would involve a heavy public exchequer on construction cost, distribution and maintenance. The administrative costs will be quite high. The costs and problems of storage would be minimized when storage of

1. The Working Group Report (1979), "Rural godowns for storage of farm produce". Kurukshetra (1979), Vol. XXVIII No.4, Nov. 16, pp.5.

foodgrains is shared properly among government, traders and producers. The costs and materials used for storage will be in forms and this would not heavily fall in terms of money. In context of this, it would be really of importance to understand the involvement of costs in the present methods of storage.

In the past, problem of storage in India did not receive that amount of attention as the situation of the country demands. When the country got its freedom in 1947, it faced the tremendous problem of food storage. Efforts were directed to meet this demand by importing foodgrains from abroad but it was found that due to lack of storage facilities and defective systems followed in the present store houses, there was considerable loss of foodgrains caused by insects, pests and dampness. This resulted to a great national waste of foreign exchange.

In the modern price economy, there are great change of losses due to price fluctuations. The prices fluctuate very much. Thus, if the prices go up much higher so as to more than cover the cost of storage, there is bound to be some profit.

"Store (From O.Fre. estor or estoire, Late Lat. Staurum or instaurum, stock, provisions, supply) form the late use of a stock or supply of provisions goods or other necessities

kept for future daily or recurrent use or for a specific purpose; thus, the term applies equally to domestic supply of provisions, and to the accumulated stock of arms, ammunition, clothing, food and kept for the general use of a navy or army. A common secondary meaning is that of the place where a supply or a stock is kept, a store house, and thus the term is used particularly in the country districts of America for general shop where goods of all kinds are sold by retail. In English, the term "Storage" has come into use for large general shops with many departments selling all kinds of goods."¹

Store implies a quantity, but agreeable to the derivation of the work, it implies an accumulated quantity. Any quantity of materials brought together for a given purpose may serve as a store. The store is that which we add to occasionally, it is that form which it could be drawn in time of need. By a stock an individual adds to his assets, while by a store guard against wants will be carried out.

Storage thus implies "the holdings and preserving of goods between the time of their production and the time of their use.", i.e., the keeping of goods or products over a

1. International Conference by F.A.O. in London (1947), Encyclopaedia Britannica, 11th Edition. Vol. XXV. pp. 968.

period of time, usually in warehouse, a cold storage plant or other special facilities, depending upon the nature of the product.

In short, storage is holding back of goods that are produced from the time of completion or production to the time of consumption.

The function of storage is to put back or withhold the goods and preserve them from the time of their production to the time of their consumption. Since the time of production and the time of consumption of goods hardly coincide with each other, goods would have to be kept in deposit at one or more points or their travel from the producers to the consumers. It is because of storage that goods produced in different seasons can be utilized throughout the year, and the products intended for the markets can be held over until there is an effective demand for them. Products required for consumption during short periods can be preserved over a longer period by means of cold storage. Manufacturers can store their own raw materials much in advance for use, and products can also be held back in expectation of higher prices.

Storage serve the use functions of maintaining an adequate supply for processing; takes an advantage of anticipated advance in prices; this is important when the

production is seasonal as in the case of agriculture commodity; preserves the quality and freshness of products; controls the rate of flow into the market, thus helps in price stability; creates bulk and helps movements of products in large quantities; facilitates financing, stored products are considered as a good security and it is easy to obtain bank advances; transfers risks to the warehouse owners; widens the market area; helps in the consumption of out of season products and thus increases their market value; renders useful marketing service particularly in the case of perishable and semi-perishable products; adds to the value of the products by carrying them over from periods of surplus to the times of scarcities and keeps the products in good conditions till it is required by the consumers. In summary, on the point of view of the farmers, storage policy might be designed to, stabilizes the annual income, prices, purchasing power and thereby provide highest annual incomes to the farmers.

Accordingly, storage programme may be employed either to transfer income from one group to another or to correct fault in the production; pricing and marketing system. In latter case, it becomes an instrument for obtaining more out of our agricultural resources, while in the former, it is a scheme for transferring income from consumers to producers or the other way-around. There is accordingly some loss and

little gain in using storages as means to a solution of the income distribution problem. The storage technique is employed to increase the current incomes of the farmers by means of curtailed consumption of stocks.

In the words of Dr. H.C. Taylor, storing is a service to the farmer and consumer. It expands the market and increases the supply for the consumer. It tends to stabilize supplies and prices to the advantage of both.

In consideration to all above, this study has been undertaken to understand in depth, the storage of wheat and paddy, the main crops of Jabalpur region, with respect to costs and methods, with the following objectives :

1. To find out different methods of storage for wheat and paddy in Jabalpur district.
2. To estimate storage costs under different methods of storage.
3. To estimate storage losses in storage.
4. To estimate the quantities stored by various size of land holding farmers.

Based on the above, the following hypotheses have been framed :

1. Capacity utilization of a storage method adopted by the farmers possessing different size of land

holding remains the same.

2. Total costs per quintal of wheat/paddy storage remains the same for different storage methods adopted by farmers.
3. Total cost per quintal of wheat/paddy are the same for the different storage methods (godown) adopted by farmers and merchants.
4. Under the present and in light of the past economic conditions the difference in prices of wheat/paddy covers cost of their storage.

CHAPTER-II

REVIEW OF LITERATURE

CHAPTER-II

REVIEW OF LITERATURE

Agriculture is a seasonal industry as is dependent more on climate and weather. These affect the growth and conditions of crops. The farmer is not free to increase or curtail his acreage in mid season crops produced once in a season to be utilized throughout the year. This is not necessary only in normal years but also in case of either bumper harvest or abnormal years (i.e. shortage). Thus, in every case storage becomes important. With the point of view of farmers, merchants and the public agencies like Food Corporation of India and Ware Housing Corporation, knowledge about scientific and local storage methods and expenses on these are insufficient. The review is being made on the past work in this chapter.

According to the report on the marketing of wheat (1937)¹, Government of India, the total wastage caused by wheat weevils was 1.6 per cent of the average crop.

The report on marketing of rice in India and Burma (1941)², Government of India, revealed that, a little over one per cent of an average production of India rice crop

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1. Report on the marketing of wheat (1937), Government of India, pp.60.
 2. Report on the marketing of rice (1941) in India and Burma, pp. 71.

valued at Rs 302 lakhs is wasted every year through weevil infestation, damp and vermin attack. Weevil alone was responsible for more than half of this loss, vermin being the next in importance.

The International Conference, organized by F.A.O (1947)¹ considered that in tropical and sub-tropical countries, where climatic conditions are conducive to a rapid multiplication of pests, the losses in storage alone might be estimated at about 10 per cent of produce.

Mishra (1959)² concluded that the prevailing practices for storing wheat in different marketing centres were found to be almost the same. Minor differences arise only in the ways of protecting the stored grains from the effect of moisture. Wheat are stored in Pucca kothas and godowns in all the mandies. Wheat is also stored in kachcha and khattis. The Kothis are the cheapest of all the structures, but capacity is smallest. In case of Kuchcha kothis of 450 to 500 mds. capacity, the cost relative to capacity and also as compared to that of kothis,

1. International Conference by F.A.O. in London (1947), Encyclopaedia, Britannica, 11th edition. Vol. XXV, pp.968.

2. Mishra, B.L. (1959). "Storage costs and losses in agricultural produce. Central U.P. Thesis (Unpublished) Submitted to Agra University, pp. 111 to 112.

is smaller. Kuchcha kotha is cheaper than pucca kotha but little utility from the view point of losses incurred and their estimated life. Godown are cheaper in terms of their capacity, smaller losses and longer life. The cost of storage in wheat is Rs 0.18/- per maund per month.

Deoras (1967)¹, in his study on rat problem in India, pesticides reported that the rates consume about 26 gms of food per day.

Mishra (1969)² observed that on an average, cost of storing wheat in bags varied from 285/- to 362/- per quintal depending on period of storage and quantity stored. The storage cost calculated for storage in khattis were lower than cost of storage in bags. They varied from Rs 1.50 to 2.18 per quintal. He also observed that an average quantity stored in bags varied from 150 quintals to 752 quintals, against 75 quintals to 300 quintals in case of bulk storage in kothis. The physical losses of the commodity during storage ranged from 1.6 to 2.4 per cent in case of bags storage while it was 0.43 to 0.72 per cent in case of

1. Deoras, P.J. (1967). Rat Problem in India. Pesticides, Bombay. pp. 67-70.
2. Mishra, B.L. (1969). "Storage of wheat in Satna district of Madhya Pradesh". Proceeding of Second All India Agricultural Marketing Research Conference, pp. 25. June.

bulk storage in khattis. Bag storage is exposed to moisture evaporation and most conductive attack of rodent and weevils. No deterioration in the quantity of produce was reported in case of bulk storage in kattis. Thus, wharves at storage in khattis (where suitable) was more economical than bags storage.

Dantwala (1969)¹ while summarising at the seminar on foodgrains buffer stocks concluded that land and labour sowing economics of silo system can be realized only if bulk handling (as against baggaging) is adopted all along the line in transporting and marketing grain. It would also necessitate volumetric measurement instead of scale-weightion. Another important issue in storage pertains to its location. Ports Versus interior, procurement versus consumption centres. While flexibility in movement would seem to favour storage at procurement centres, necessity for quick release would favour the latter. Similarly, if it becomes necessary to simply rotate, the stock andnot release them straight in a mandi town would be more economical, though it would be possible in such a situation to use the buffer stock stored in deficit consumer centres as operational stock for the purpose of public distribution and buy fresh buffer stocks.

1. Dantwala, M.L. (1969). "Summary of discussions at Seminar on Foodgrains buffer stocks". Seminar Series VIII. Seminar on Foodgrains buffer stocks in India. pp. 10.

Khusro (1969)¹ concluded that handling charges or labour cost, cost of fumigation of grain, other maintenance cost and transport cost (operational cost of godown storages) may all be expected to rise. This happens because labour charges a higher rate wage to carry the grain longer into bigger godowns and also a higher rate if the height of the stocks is raised further. Aeration and fumigation costs per tonne increase because of the greater possibility of infestation of grain and also risk of fire, etc., destroying a large work.

Wilson et al. (1970)² reported that the average level of damage by insect for all indigenous storage practices was 8.4 per cent in September and 4.7 per cent in December. The dominant pest species was the lesser grain borer in September and rice weevil in December. The wheat grain damage in all indigenous units upto 2.54 per cent for storage duration of June to September and 4.50 per cent for storage duration of June to December.

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1. Khusro, A.M. (1969). "Stocks and storage of major foodgrains. Seminar Series VIII. Seminar on foodgrains buffer stocks in India. pp. 147.
 2. Wilson, H.K., et al. (1970). "Study of Rural Grain Storage Practices in Ludhiana district". Branch of Entomological Society. Report, Jan. 21.

Bains (1974)¹ reported that the losses caused by insect to be 2.3 per cent on weight basis during one storage season.

Bhatnagar et al. (1975)² observed that in Punjab Bharolis were most common structure used by 57.8 per cent farmers who stored 31.4 per cent of total wheat produce. The other popular storage practices followed by farmers were bags stocks, platform, bags kept in bhusa, loose room storage, Bukharies, Kothies, metal containers, etc. The structure used were not always rodent, insect and weather proof. The management of structures was faulty. He also observed that as many as 20 species of insects were known of infect stored foodgrain in Punjab out of these Khapra beetle (Trogoderia granarium Evert), Rice beetle (Sitophilus oryza), Lesser grain borer (Rhizopertha dominia F.) and Red flour beetle (Troboium cartaneum Hbrt.) are serious pests of wheat, juar, rice, barley and maize.

Thakur (1975)³ observed that the farmers of Jabalpur stored grains in Banda, kothi, kuthla and kothi, Mandula

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1. Bains, et al. (1974). "Annual progress report on post - harvest technology". All India Coordinated Research Scheme, College of Agril. Engineering, Tamilnadu, Agril. Univ. pp.126.
 2. Bhatnagar, A.P. et al. (1975). "Rural grain storage in Punjab, Research Bulletin-3. PAU Ludhiana. pp.5.
 3. Thakur, S.S. (1975). "A survey of storage technique followed by farmers in Jabalpur". Project report. Agril. Engg., JNKVV, Jabalpur, Pp. 27-30.

and Mandulia, room storage in bags and bags stocks in bhusa.

Rai and Khandelwal (1972)¹ observed in a survey conducted in Jabalpur district that Banda, kothi, ^{Kuthla} ~~khatua~~ and ^{Kuthali} ~~khatua~~, Mandula and Mandulia, Room Storage in bags and bags stocks in bhusa are the common methods of storage in Jabalpur district. The most common method in Jabalpur district is Banda. In Banda, the losses are quite low as compared to other indigenous storage structures. The cost per tonne of pucca banda varies from Rs 200/- to Rs 500/-.

The Panse Committee (1979)² estimated that the post-harvest losses 9.3 per cent of which nearly 6.6 per cent occurs due to poor storage conditions alone.

The working group report (1979)³ observed that there are a number of agencies engaged in warehousing and storage activities. The Food Corporation of India, the Central Warehousing Corporation and State Warehousing Corporations are among the principal agencies engaged in this task.

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1. Rai, R.K. and Khandelwal, N.K. (1976). "A survey of indigenous storage structure in Jabalpur district." Project Report, Agril.Engg., JNKVV, Pp. 30-32
 2. Panse Committee (1979). "Rural godowns for storage of farm produce". Kurukshetra. Vol. No. XXVIII. No. 4. Nov. 16, Pp.5.
 3. The Working Group Report (1979). "Rural godowns for storage of farm produce". Kurukshetra. Vol. No. XXVIII No. 4, Nov. 16, 1979. Pp.5 to 6.

The availability of owned constructed capacity with various agencies at the commencement of mid-term plan (1978-83) is Food Corporation of India (7.07), Central Warehousing Corporation (1.73), State Warehousing Corporations (2.00) and State Government (1.88) million tonnes with capacity available for storage of foodgrains 7.07, 1.03, 1.20 and 1.86 million tonnes, respectively.

It also observed that the cooperative sector has made a significant contribution to the creation of storage facilities in the country particularly in the rural areas. A total capacity of 55.61 lakh tonnes has been sanctioned in cooperative sector upto 31st March, 1978. Cooperatives have emerged as one of the major agencies at the Village level providing godown facilities to the farmers and it accounts for about 22 per cent of the total built up storage capacity in the organized sector.

A programme for improved storage at the farm level, continues to be traditional and losses are considerable. The improved storage structures also appear to have been largely adopted by middle and comparatively well off farmers rather than small farmers.

CHAPTER-III

METHODOLOGY

To fulfill the objectives, information was collected from farmers and merchants.

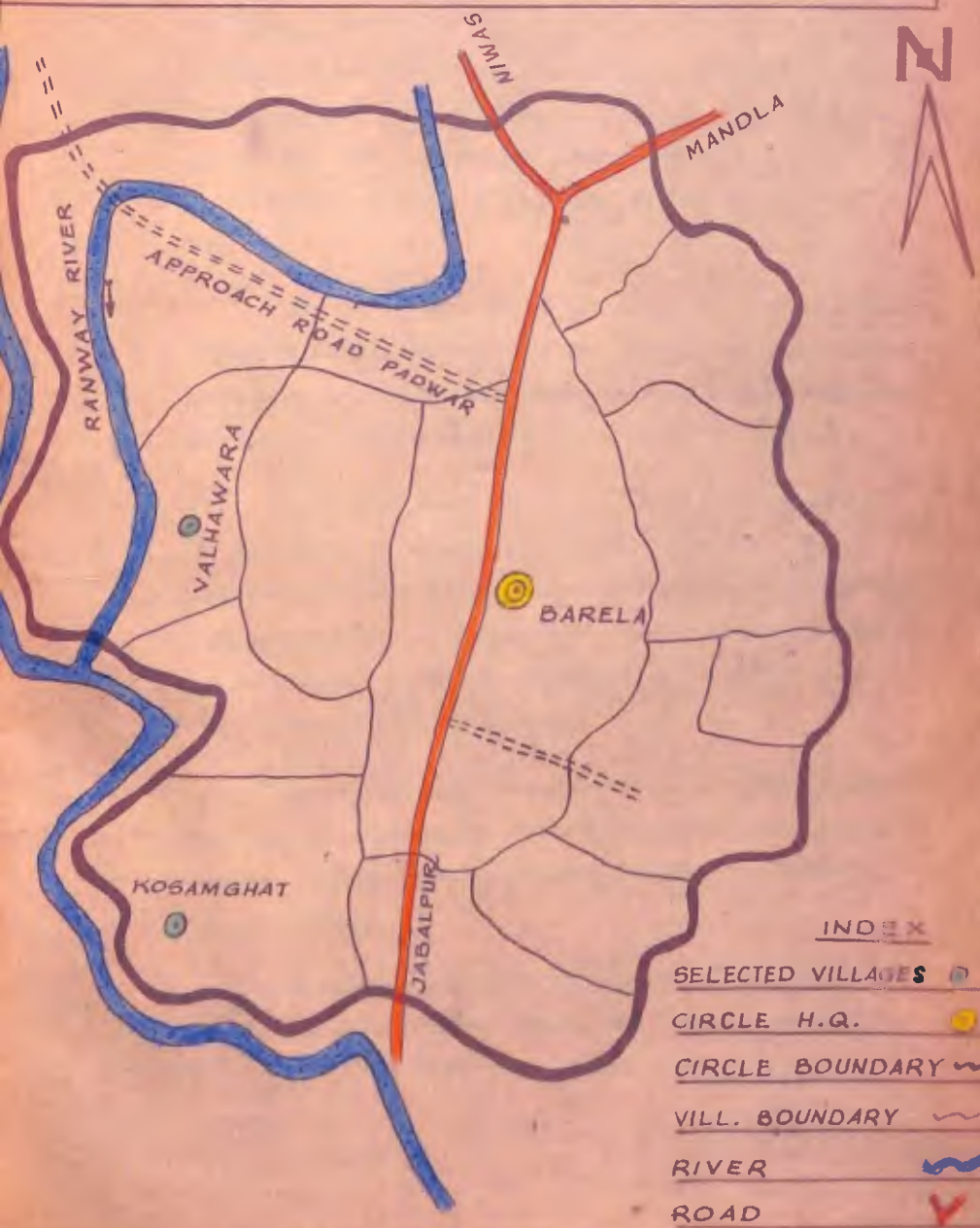
Out of four tehsils, Jabalpur, Patan, Katni and Sihora of Jabalpur district, Jabalpur tehsil was purposively selected because percentage area under cereal was more as compared to other tehsils. Wheat and paddy, being the main crops of Jabalpur tehsil, the study was focussed on these two crops.

Jabalpur block was selected purposively because firstly, Jabalpur town could provide sufficient information from merchants and secondly, the area was well known to the investigator which facilitated to have accurate information.

In Jabalpur tehsil, there are 223 villages and these villages are placed in 9 village level workers circles. For selection of farmers, multi-stage random sampling was adopted. One circle out of these nine circles was selected at random. Three villages were selected at random with the assumption that they would provide desired number of farmers of this study.

The list of the farmers from these three selected villages was prepared in an ascending order of their land

MAP OF VILLAGE LEVEL WORKER CIRCLE
BARELA, TAH. JABALPUR.



INDEX

- SELECTED VILLAGES ●
- CIRCLE H.Q. ●
- CIRCLE BOUNDARY ~~~
- VILL. BOUNDARY ~~~
- RIVER ~~~
- ROAD ~~~

holdings. Farmers of upper group were designated as small, the bottom group as large and the middle group as medium size of land holding of farmers. From each category 12 farmers were selected at random for this study. Thus, total number of farmers included for the present study were 36.

For the selection of merchants a list of merchants from Grain Merchant Association, Jabalpur was obtained keeping in view that these merchants deal with marketing of cereal. Ten merchants were selected at random.

Secondary and primary data both were collected for the study. A comprehensive question-schedule was prepared to cover up the study. The data were collected through personal interview from the individual farmers and merchants. Data were tabulated and classified in light of the stated objectives.

The results were summarized in the form of simple averages and percentages in case of farmers, and simple averages, percentages and co-efficient of variation in case of merchants.

In case of merchants, the formula used for comparing the variation of different economic items of post-harvest such as storage methods, quantity stored,

storage losses and also storage cost, was :-

$$\sigma = \sqrt{\frac{\sum (x_1 - \bar{x})^2}{n - 1}}$$

Where, σ = S.D. (Standard deviation)

x_1 = Value of the i^{th} observation of the variable.

\bar{x} = Mean

n = No. of observation.

$$v = \frac{\sigma}{\bar{x}}$$

Where,

v = Co-efficient of variation.

$$\% v = \frac{\sigma}{\bar{x}} \times 100$$

CHAPTER-IV

RESULTS AND DISCUSSION

This chapter deals with the presentation and analysis of data in view of the objectives and hypotheses framed in this study. Besides, it covers the various aspects of foodgrains, storage facilities available with the farmers and merchants. The results and discussion may be divided into two parts. The first part deals with the analysis of primary data collected from different categories of sample farmers. The second part covers the analysis of primary data collected from sample merchants. Land utilization, cropping pattern, storage methods, utilization of storage methods, storage losses and various costs have been analysed and discussed.

Agricultural Land Holdings and Sample Farmers

Before proceeding to various tables which include data to answer the objectives framed in this study, it is necessary to have a general knowledge with respect to agricultural land and family members of the sample farmers. Data on number of family members, size of land holding, cultivated area, irrigated and double cropped area was collected, the details are given in table 4.1.

Table 4.1. Size of family and agricultural land holding of sample farmers

Sl. No.	Land holding size group	No. of cases	Average No. of family members (approx)	Average size of land holding	(Area in ha.)		
					Average cultivated area	Average irrigated area	Average area sown more than once.
1	2	3	4	5	6	7	8
1.	Small (1.01 to 2.02)	12	9	1.51	1.20 (79)	0.17 (15)	0.16 (13)
2.	Medium (2.02 to 6.02)	12	8	4.02	3.73 (93)	0.87 (23)	1.02 (27)
3.	Large (6.02 and above)	12	11	8.06	7.51 (93)	3.16 (92)	3.17 (42)
Average Total		-	9	4.53	4.15 (91)	1.40 (34)	1.45 (35)

Figures in brackets in Cols. 6, 7, 8 refer to percentage of Cols. 5, 6 and 6 respectively.

The data on members with an average sample family revealed that there were about 9 members. These varied with the size of land holdings. As many as 11 members were on an average with a family in large sized land holding group. In general, it could be said that the average size of the families included in the sample farmers was larger than the general average and no specific reason could be assigned for such a variation except that the families included in the sample were mostly of joint family type.

Average size of the land holding was 1.51, 4.02 and 8.06 hectares in small, medium and large size group. Overall, the average was 4.53 hectares. The farmers included in medium and large sized group brought as much as 93 per cent of the total area under cultivation. This percentage was low in case of small size of land holdings. Area under irrigation showed a very high percentage as compared to average district of Madhya Pradesh. It was observed that the farmers harnessed the water available of rivers and nalas in addition to wells and, therefore, the percentage area irrigated of the area cultivated reached such high as 40 per cent. Area sown more than once also represented the same percentage.

Thus, it could be concluded that the sample farmers had more number of family members and large per cent of irrigated area to cultivated area than the general average of district of Madhya Pradesh.

Cropping Pattern

A general insight into the cropping pattern of the sample farmers of this study as compared to Jabalpur district will provide an overall picture of the agriculture with the sample units. With this in view, data was collected and the same is provided in table 4.2.

Table 4.2. Cropping Pattern : Jabalpur district and selected sample farmers

S.No.	Crops	Jabalpur district*		Selected farmers	
		Area ('000 hectares)	Percentage of gross sown area.	Area under crops (ha)	Percentage to gross sown area
1	2	3	4	5	6
1.	wheat	168.0	30.50	121.03	64.36
2.	Gram	84.2	15.28	14.80	7.87
3.	Other rabi crops	67.9	12.32	-	-
4.	Paddy	129.9	23.60	46.06	24.50
5.	Other kharif crops	100.0	18.30	6.16	3.27

*Source : Agricultural Statistics of M.P., 1977-78.

In Jabalpur district as well as with sample farmers, the main crops grown are wheat and paddy. The percentage area of the gross cropped area devoted to paddy is roughly the same with the district and sample farmers but there is quite a big difference for wheat. As clear from the land utilisation pattern, the sample farmers have more percentage irrigated area than that of Jabalpur district and that is why the sample farmers raised wheat more than other rabi crops as it is comparatively more paying than the later. Other rabi and kharif crops occupy small percentage of gross cropped area with the sample farmers.

Storage Methods for Foodgrains with the Farmers

Provision for storing grains is to be made by producers as well as consumers. Both, store grains for future consumption as these are nonperishable and secondly the producers could produce these only once a year. The producers store grains for seed, exchange and future sales. It is the later purposes i.e., seed and future sale which provide importance of grains storage with the producers. There are various methods used by the farmers to store grains. The methods used for wheat/paddy are given in the following table.

Table 4.3. Methods of storage used for wheat/paddy with sample farmers

Sl. No.	Size group (Ha.)	No. of cases	Storage methods				Total
			Kuthiya	Kuthla	Bags stacked in room.	Banda	
1	2	3	4	5	6	7	8
1.	Small	12	12 (23)	3 (3)	3 (3)	-	- (29)
2.	Medium	12	12 (41)	1 (1)	3 (3)	3 (2)	- (47)
3.	Large	12	12 (18)	2 (2)	4 (4)	10 (10)	- (34)
Total		36	(82)	(6)	(10)	(12)	(110)

Figures in brackets give the number of items in the group.

It is seen from the table that irrespective of the size of land holding, all farmers had kuthiya method of storage. A farmer may have even 4 to 5 kuthiyas for storing wheat/paddy. This is due to the fact that kuthiyas are easy to construct and are handy, placed adjacent to walls and many times serve the purpose of partition.

All the 36 farmers had in total 82 kuthiyas. Some of the farmers with small size of land holdings had kuthla and bags stacked in room, the other methods of storage, in addition to kuthiya. Three farmers had kuthla and three had bags stacked in a room. No one used banda as a method for storing grains in case of small size of land holding farmers. Out of 12 farmers of medium size of land holding group, only two had banda method of storage. Only one farmer had kuthla and three bags stacked in a room. In case of large size of land holding group of farmers, out of 12, ten had banda method of storage. Two and four had kuthla and bags stacked in a room respectively.

It is revealed from the analysis that a farmer can have more than ^{one} method for storing wheat/paddy. This depends upon the quantity produced by the farmer.

Thus, it could be concluded that kuthiya was most common method of storing wheat/paddy with all the farmers. In addition to kuthiya most of the farmers of large size

land holding had banda, the other methods of storage kuthia and bags stacked in a room were also used by some of the farmers.

Utilization of Storage Methods

The farmers included in this study are located in the wheat/paddy region of Madhya Pradesh and, therefore, mainly grow wheat and paddy. Other crops grown are of minor importance specially with respect to their marketing and storage. Therefore, while considering storage methods existing with the farmers of this region, only wheat and paddy crops have been considered. These two crops are grown in different seasons and, therefore, the same storage could be used for either on both of these. As discussed in the previous section, farmers of the selected area adopt kuthiya, kuthla, bags stored in a room, and banda as the methods of storage. These vary in capacity and utilization, the details are given in table 4.4.

From the table 4.4, it could be observed that the capacity of the individual method of storage goes on increasing with the size of land holding. This is due to the fact that with the increase of land holding, the quantity of grains produced are also increased. The farmers would not like to have a large number of small stores but will increase the size of storage method.

Table 4.4. Utilization of storage methods

Sl. No.	holding size group (Ha.)	(in quintal)							
		Types of storages				Sags stacked in room			
		Kuthiya		Kuthla		Banda		Banda	
Ave. capacity.	Maximum quantity stored.	Ave. capacity.	Maximum quantity stored.	Ave. capacity.	Maximum quantity stored.	Ave. capacity.	Maximum quantity stored.		
1	2	3	4	5	6	7	8	9	10
1. Small :									
(a)	wheat	6.5	5.2 (78)	25.0	22.0 (88)	30.0	22.0 (73)	-	-
(b)	Paddy	6.5	3.2 (49)	25.0	4.7 (19)	30.0	19.3 (64)	-	-
2. Medium :									
(a)	wheat	7.4	6.3 (84)	20.0	15.0 (75)	86.7	67.7 (78)	47.5	28.5 (60)
(b)	Paddy	7.4	2.2 (29)	20.0	11.0 (55)	86.7	7.3 (8)	47.5	-
3. Large :									
(a)	wheat	11.1	9.4 (84)	32.5	23.5 (73)	67.5	62.5 (93)	109.3	102.3 (94)
(b)	Paddy	11.1	7.6 (68)	32.5	22.0 (68)	67.5	29.2 (43)	109.3	26.3 (24)

Average :									
	wheat	8.0	6.6 (83)	26.7	21.3 (80)	62.0	52.0 (84)	99.0	90.0 (91)
	Paddy	8.0	3.7 (45)	26.7	11.6 (43)	62.0	19.7 (32)	99.0	22.7 (23)

Figures in brackets refer to percentage utilization of storage method.

The production of wheat and paddy is seasonal and the flow of these commodities, in and out, is not intermittent. This is only once or a few times during post-harvest period and out is also not as frequent as with the other articles of consumption. Therefore, it would be wrong if the utilization of storage methods is considered from the data of commodity remained stored in these during different months of the year. In this study, utilization have been calculated from the maximum quantity of wheat and paddy kept in these storage methods during the year.

It was found that kuthiya, kuthla and bags stored in a room, methods were used for wheat and paddy by all the farmers whereas banda method of storage was adopted by medium and large size of land holders for wheat and only by large size of land holders for paddy. The per cent utilization of the total capacity available is maximum in all cases for wheat than paddy. The capacity utilized percentage is roughly the same in different methods of storages in case of wheat, irrespective to method or size of land holding, whereas no such observations could be made with respect to paddy.

Paddy was stored in banda by only the large size of land holding farmers, but these farmers too utilized the capacity at a small percentage. This may be due to

the fact that farmers did not like to store paddy for a long period but would like to store it in such a storage method from where they can take out this commodity for consumption, marketing or any other purpose.

On an average, the small size of land holders utilized the maximum percentage of the capacity available of bags stored in a room method of storage out of the three methods, i.e., kuthiya, kuthla and bags stored in a room, in which paddy was stored, whereas kuthla was with medium size of land holding farmers. The large size of land holding farmers utilized better kuthiya and kuthla than bags stored in a room and banda in case of storing paddy.

It could be concluded that capacity of a storage method goes on increasing with the size of land holding. The approximate percentage utilization of the storage methods was 80 per cent. All methods had nearabout the same percentage of utilization irrespective of method and size of land holding, in case of wheat whereas no such conclusion could be drawn for paddy.

The hypothesis framed in this study, "capacity utilization of a storage method adopted by the farmers possessing different size of land holding remains the same" is thus on the basis of above conclusion is accepted for wheat but rejected for paddy storage.

Storage Losses

Various losses are incurred in the process and during storage of grains. These have been grouped into the three major heads, that is, losses at the time of filling and emptying the grains, losses due to insects, pests, diseases and loss due to heat, dampness and mold. These may vary due to the variety and quality of grains. These losses for wheat and paddy under various storage methods have been given in the following table.

Table 4.5. Losses of wheat and paddy grains under storages methods

		(kg per quintal)							
		Storage methods							
Sl. No.	Quantity losses due to	Kuthiya		Kuthla		Bags stacked in room		Banda	
		wheat	Paddy	wheat	Paddy	wheat	Paddy	wheat	Paddy
1	2	3	4	5	6	7	8	9	10
1.	Filling & emptying time.	.04	.03	.05	.02	.04	.02	.01	.00
2.	Insects, pests & diseases	.09	.08	.07	.05	.12	.09	.04	.04
3.	Heat, dampness & mold	.02	.02	.04	.04	.03	.03	.03	.01
Total		.15	.13	.16	.11	.19	.14	.08	.05
Percentage of loss		.15	.13	.16	.11	.19	.14	.08	.05

From the analysis into the losses of grains in storages, it is clear that bags stored in a room suffer the maximum out of the four methods of storages considered with the sample farmers. This is irrespective of the commodity. Kuthiya and kuthla methods of storages have nearabout equal losses for wheat and paddy. The lowest losses are in the method of banda storage. This is due to the fact that the commodity is stored once for a required long period and there is no possibility of taking out or adding the commodities as and when desired, as it is with kuthiya, kuthla or bags stored in a room. This is added with the fact that storage in banda is with proper care and large quantities are being stored.

Out of the losses, the insects, pests and diseases cause the maximum loss of the commodity, irrespective to the commodity and method of storage.

Thus, it could be concluded that losses in bags stored in a room are the maximum and lowest in banda method of storage. Insects, pests and diseases cause maximum loss irrespective to commodity and type of storage.

Life and Cost of Storage Structure

The structures used for storing grains by farmers are kuthiya, kuthla, bags stacked in a room and banda.

These vary in their life and cost of construction. In construction of these structures, all costs are not paid. Most of the labour and material is not purchased and, therefore, while calculating cost, imputed value for these have been charged. The details on life and costs are given in the table 4.6.

Table 4.6. Life and cost of storage structure

Sl. No.	Storage structure	Average life of storage (yr)	Average cost of storage structure (₹)	
			Per storage	Per quintal
1	2	3	4	5
1.	Kuthiya	6	34	4.2
2.	Kuthla	12	112	4.1
3.	Bags stacked in room	14	270	4.3
4.	Banda	17	327	3.3

The analysis reveals that kuthiya's life is only for 6 years whereas banda would have life of 17 years. Kuthla and store room have nearabout the same life period. Construction expenses for the structures increase as one moves from kuthiya to kuthla to store room to banda. It is very interesting that although there is variation into the total construction cost for the various storage structure, but construction cost per unit of commodity stored is

roughly the same for kuthiya, kuthla and bags stored in a room. The construction cost per quintal commodity basis is the lowest in case of banda but this facility could only be availed by big land holding farmers.

Thus, it could be concluded that on the per unit of commodity basis, the construction cost of kuthiya, kuthla and bags stored in a room are roughly the same whereas for banda, it is the lowest.

Fixed Costs on Storage

In case of storage of foodgrains in villages, the fixed cost item is the structure of storage. Therefore, it will be simple to arrive at the fixed costs in storing food grains. This will include depreciation of the storage structure and interest on fixed capital. In the previous section life of the storage structure and its cost have been provided and, therefore, depreciation is calculated accordingly. For purposes of interest on fixed capital, the value of the storage structure was enquired at the time of investigation and on this, an interest of 12 per cent have been charged. The data arrived at for depreciation and interest on fixed cost for various storage structures have been given in table 4.7.

Table 4.7. Fixed cost on storage structure (wheat and paddy)

Sl. No.	Storage methods	Interest on fixed capital	Depreciation on storage methods	(Rs.) Fixed cost	
				Per storage structure	Per quintal of wheat and paddy
1	2	3	4	5	6
1.	Kuthiya	2.04	5.66	7.10	.69
2.	Kuthla	6.72	9.33	16.05	.48
3.	Bags stacked in a room	16.20	19.28	35.48	.49
4.	Banda	19.62	19.23	38.85	.35

From table 4.7 it is revealed that on an average the fixed costs per year for kuthiya is the lowest and for banda and bags stored in a room are roughly the same. The fixed costs for kuthla are about half to that of bags stacked in a room. The correct picture on fixed costs could be derived not from total yearly fixed costs on storage structure but it would be from the data of per unit commodity.

Fixed costs per quintal of commodity per year is highest in kuthiya. It is roughly the same for kuthla and bags stacked in a room. It is lowest for banda. Thus, there is economics to scale storage of foodgrains. The kuthiya, kuthla and bags stacked in a room, methods of storage adopted by small and even medium are really with

no costs as the labour and material employed are of family and free. Opportunity cost of family labour is zero under the present economic setting. In the present analysis these have been imputed to have proper comparison.

Thus, it could be concluded that in foodgrains storage with the farmers there exists the operation of the principle of scale economy.

Storage Operational Costs for Wheat and Paddy

Storage of a commodity requires in addition to fixed costs, operational costs also. These include human labour in handling the commodity and other materials required in storage method, value of the losses incurred in storage, costs on insecticides and pesticides and some other costs. Other costs include gunny bags, sutli, straw, partition cloth. Total operational costs per storage capacity varies from one method to the other. Therefore, calculations have been carried out on per quintal of foodgrains (wheat and paddy) for a year. The details of operational costs for various storage methods used by farmers have been provided in table 4.8.

Table 4.8. Per quintal operational cost of wheat and paddy in storage methods

Sl. No.	Storage methods	Expenses on human labour.	Value of grain losses	Expenses on material (Rs)		Total operational cost per year
				Insecti-pesti- cides.	Straw / Others	
1	2	3	4	5	6	7
1.	Kuthiya-a.Wheat	0.40	.31	.28	-	.99
	b.Paddy	0.40	.30	.21	-	.91
2.	Kuthla :-					
	a.Wheat	0.41	.33	.23	-	.97
	b.Paddy	0.41	.26	.20	-	.87
3.	Bag stacked in room :					
	a.Wheat	0.50	.38	.11	1.00	1.99
	b.Paddy	0.50	.34	.09	1.00	1.93
4.	Banda - a.Wheat	0.34	.17	.21	0.21	0.94
	b.Paddy	0.35	.10	.17	0.21	0.83

Human labour expenses in an individual storage method for wheat and paddy are the same. This is due to the fact that the handling of grains will require the same quantum of human labour irrespective of the commodity and human labour requirements for other connected jobs will also remain the same and will not vary due to the commodity. Human labour costs for kuthiya and kuthla are the same whereas it is more than these in bags stacked in a room.

It is lowest with banda but the difference is not very large.

Discussion of losses have already been carried out in previous section, and in this table, the values for the losses have been shown. Insecticides and pesticides expenses are roughly the same in kuthiya and kuthla. These are lower for banda but difference is not large. As the commodity is kept in bags the costs in insecticides and pesticides is lowest with bags stacked in a room.

Expenses on other operational items are nil with kuthiya and kuthla. Heavy expenses are incurred on gunny bags when wheat/paddy stored in a room. Only Rs 0.21/- are spent on other operational expenses in case of banda storage method.

Total operational costs are nearabout the same for kuthiya, kuthla and banda whereas these are nearabout double with bags stacked in a room. Although the commodity storage methods, bags stacked in a room is costliest, still the farmers adopt it due to its easeness in handling.

Thus, it could be concluded that operational cost for storing of wheat and paddy is nearabout the same i.e., approx. Rs. 1/- per quintal per year, in kuthiya, kuthla and banda method of grains storage whereas it is Rs 2/- per quintal per year for bags stacked in a room.

Maintenance Costs in Storage of Foodgrains (Wheat and Paddy)

In storage of foodgrains, the structures do involve some more costs than the fixed and operational, already discussed in previous sections. These include white wash, repairs and other which are required during the year for the proper maintenance of the structure. Maintenance costs involved in various structures used for storage of foodgrains (wheat and paddy) by the farmers are given in the following table.

Table 4.9. Maintenance cost in storage structure (wheat and paddy)

		(Rs. Per quintal)			
S.No.	Storage Methods	White wash	Repairs	Any other	Total maintenance cost
1	2	3	4	5	6
1.	Kuthiya	0.09	0.02	0.00	0.11
2.	Kuthla	0.08	0.02	0.00	0.10
3.	Bag stacked in room	0.10	0.02	0.02	0.14
4.	Banda	0.04	0.04	0.03	0.11

It is very surprising that the maintenance costs per quintal of grains is nearly the same in kuthiya, kuthla and banda method of storage. This is a little higher in

It is very surprising that the maintenance costs per quintal of grains is nearly the same in kuthiya, kuthla and banda method of storage. This is a little higher in case of bags stacked in a room. Although the total maintenance cost is nearly the same in the various storage structures, but the maintenance components costs vary. White wash cost is the same in kuthiya, kuthla and bags stored in a room which comes to approximately Re. 0.9 per quintal of foodgrains whereas, it is only Re. 0.04 in case of banda. Other costs are only in bags stacked in a room and banda methods of storage.

It could thus be concluded that maintenance costs for storage of foodgrains comes to approx. Re..11 per quintal irrespective of the storage method.

Total Cost of Storage of Foodgrains



After estimating the fixed, operating and maintenance cost for storage separately, it is essential to have a picture into the total cost, because it is the total cost to which most of the concerned units are interested. In case of storage structure, total costs for storage could be calculated on the basis of full and utilized capacity. The total costs so calculated have been provided in the following table for the various storage methods.

Table 4.10. Total cost of storage for wheat and paddy

S.No.	Storage methods	On full capacity		On utilized basis	
		Wheat	Paddy	Wheat	Paddy
1	2	3	4	5	6
1.	Kuthiya	0.87	0.87	1.50	1.20
2.	Kuthla	0.74	0.74	1.33	1.08
3.	Bag stacked in room	1.32	1.32	2.44	2.11
4.	Banda	0.63	0.63	1.30	0.93

The analysis results on storage costs of wheat and paddy as incurred by farmers given in above table reveal that the total storage costs as calculated on the basis of total capacity are less than those obtained from utilized capacity for both the crops, wheat and paddy. This is due to the fact that the total capacity available for storage is not fully utilized. Detailed discussion on this have been discussed in section relating to table 4.4. The total costs per quintal per year are the minimum under banda method of storage. These are maximum in bags stacked in a room. In case of kuthiya and kuthla methods of storage, the total costs are nearabout equal.

On the basis of utilized capacity, the total storage costs for wheat are higher than paddy, irrespective of the

method of storage. It can be said that total storage costs for wheat and paddy are approximately the same for kuthiya, kuthla and banda method of storage and ranges in between Rs 1.30/- to Rs 1.50/- for wheat and Rs 0.93/- to Rs 1.20/- for paddy. There are nearabout double in bags stacked in room method than the other methods of storage.

Thus, it could be concluded that storage total costs for wheat per quintal per year are higher than for paddy. Total storage costs are approximately the same under kuthiya, kuthla and banda method of storage. The storage costs in bags stacked in a room are nearabout double than the other methods of storage. The hypothesis, "Total cost per quintal of wheat/paddy storage remains the same for different storage methods adopted by farmers" is rejected on the basis of above discussion.

Storage of Foodgrains (Wheat and Paddy) with the Merchants

Storage of foodgrains by the merchants basically differs from that of a farmer. Farmer is a producer of foodgrains and he stores for consumption, wages, sales and other purposes whereas merchant earns profits through marketing, i.e., purchase and sale of the commodities. The stock of a farmer for storage remains maximum immediately after harvest and it deplets as the time passes

through various utilization ways. In case of a merchant, the commodity is purchased and is stored for a period in which he thinks that he can earn more by detaining the sale proceeds. A godown (storage structure) thus handles various quantities for different periods. Such process does not exist with the farmer. Therefore, it is very difficult to find out storage costs for foodgrains with the merchants. In this study, although the main emphasis was on storage costs of foodgrains incurred by the farmers, an attempt has been made to estimate storage costs incurred by the merchants. The variations with respect to quantities handled, number of commodities handled, the period of storage existing among the merchant allowed this study to have only very rough estimates. The research worker is aware of the shortcomings but had carried out the study with the aim of peeping into the storage costs incurred for foodgrains by the merchants and took advantage to learn something in this field. The various principles as applied in estimation of costs for the storage of foodgrains by the farmers have been used for the godowns of the merchants, if there is any change then it has been specified.

Capacity and Utilization of Storage Structure

There is only one method of storage of foodgrains (wheat and paddy) with the merchants and that, is bags

stacked in a room, which is commonly known as godown. As already discussed in previous sections, farmers have other methods of storage in addition to bags stocked in a room. The godowns vary in size from one merchant to the other and to have the extent of variation coefficient of variation have been worked out. It is very difficult to trace various quantities stored during the year to find out the percentage utilization. Therefore, the maximum quantity stored at a time of the particular commodity have been taken as a basis for calculating percentage utilization. The details are given in the following table.

Table 4.11. Capacity and utilization of merchants godowns.

S.No.	Capacity	<u>Quantity stored</u>		(Qtls)
		wheat	Paddy	Percentage of utilization
1.Average	2720	1085.09	619.91	63
2.Coefficient of variation	48	35.22	51.14	-

It is clear from the above table that the average capacity of a godown maintained by merchants comes to 2720 quintals with 48 per cent coefficient of variation. This means that the various godowns of the merchants vary in

capacity to store foodgrains. There is more variation in quantities stored of paddy than wheat, although the later is stored nearabout two times in quantity. Percentage of utilization is 63 which is quite reasonable as it is impossible to have 100 per cent utilization.

Life and Cost of Godown

Investigation with respect to life and cost of average godown revealed that on an average a godown serves for about 21 years and its construction cost will be about Rs 20,200/-.

Godown Losses

Losses of grains are incurred at various levels in storing commodities in the godowns. These may be at the time of bringing commodity to godown, during storage and later at the time of disposal from godown. The respondents failed to provide information on these items of losses and could only give data for total grains losses in storage. This storage loss in merchants godown differs from that of a farmer as the commodity stored is kept in the godown wherever required by the merchant and variation into the period of storage varies with the lots whereas the farmer stores the commodity for once and generally no replacement or addition

is made to it if taken out from the storage for various purposes. The losses in godown storage of the merchants have been provided on an average basis per lot and no specification for the period could be given. The details are given in the table 4.12.

Table 4.12. Losses of wheat and paddy in godown

S.No.		(Quantity losses)			
		Total losses (in kg)		Percentage of losses	
		wheat	Paddy	wheat	Paddy
1	2	3	4	5	
1.	Per quintal	0.193	0.193	0.19	0.19
2.	Coefficient of variance	7.62	7.62	-	-

The losses per lot on per quintal basis comes to 0.193 kg for wheat as well as for paddy. The low figure for coefficient of variation reveals that the merchants have a definite idea with respect to losses they keep in mind for the commodities stored.

Fixed Cost on Storage Structure (Godown)

While calculating interest on fixed capital and depreciation the principles adopted in calculation of fixed costs for storage structures of the farmers have been considered for merchant's godowns also. As per estimation

average total fixed costs per year comes to Rs 2173.90. When these are calculated on per quintal commodity basis, it comes to Re. 0.79 and Re. 1.27 for full and utilized capacity respectively.

Operational Cost for Storing Wheat and Paddy

Items of operating cost in storage refer to lot basis and not on the annual basis. The items included in operational costs are weighman charges, transport, cost on bags, local tax, value of losses and cost on insecticides and pesticides. The details are given in table 4.13.

Table 4.13. Operational cost in godown.

(Re. per quintal per lot)

Operational cost	Weighman/utrai/bharai	Transport.	Bags	Local tax	wheat	Paddy	Insecticides/pesticides.	Total operational cost
1	2	3	4	5	6	7	8	9
Per quintal	.25	.40	1.00	.35	.39	.44	.04	2.45

It is clear from the data given for operational cost in storage of wheat and paddy by merchants in godown, that out of total of Rs 2.45 per quintal, Re. 1/- is only for bags. Transport and losses of grains in storage are the next items

in operational cost. Insecticides and pesticides account for a very nominal cost out of the total operational cost.

Maintenance Cost of A Godown (Merchant)

There are two items included under maintenance cost of a godown, white wash and repairs. These, on an average, incur ₹ 13.8 and ₹ 37/- respectively ^{per}/year. The total maintenance cost thus comes to ₹ 50.80. When this cost is calculated on per quintal on the basis of full and utilized capacity, it comes to ₹ 0.02 and 0.03/-, respectively. It is made clear at this instance, this cost on the basis if bags are stored throughout the year whereas in practice, the lots change and it is very difficult to calculate for every lot. Complete data for various lots on quantity and time will be required to segregate out the overall maintenance cost as calculated in this section.

Storage Total Costs in Godown (Merchants)

In the previous sections various costs which comprise total storage costs in average godown maintained by a merchant have been discussed. It has been made clear that fixed and maintenance costs have been derived on per year basis whereas operational costs relate to commodity lot basis. Thus, it is not possible to arrive at a total cost estimate for storage of wheat and paddy in godown by merchants.

Anyway, the above results give a rough picture into this field in which very little work has been carried out, although its importance is unquestionable.

The hypothesis framed in this study "total cost per quintal of wheat/paddy are the same different storage methods (godown) adopted by farmers and merchants" is thus on the basis of above discussion the hypothesis is rejected because cost of godown storage methods (bags stacked in room) adopted by farmers and merchants is different.

Storage Costs and Prices of Wheat and Paddy

In the previous sections, discussion on total storage costs and their components for wheat and paddy have been discussed. These costs relate to storage methods adopted by farmers and merchants. From economic point of view in a perfect competitive market, the difference in prices in two periods should not be different than the storage costs. In view of this attempt have been made in this section to compare the prices of wheat and paddy which prevailed in different months to the storage cost estimated in this study. The following table provides data on prices of wheat and paddy for 1976 to 1980 to have a view in changes of prices. For wheat April prices have been considered as base and changes in prices have been shown for June, September, December and March. For paddy,

October month is the base.

Table 4.14. Prices of wheat

		(in Rs per qtl.)			
		Prices of wheat +			
S.No.	Months	1976-77	1977-78	1978-79	1979-80
1	2	3	4	5	6
1.	April* (Rs per qtl.)	145	153	155	170
2.	June	+ 7	+ 5	+ 5	+ 6
3.	September	+23	+15	+15	+13
4.	December	+27	+20	+20	+22
5.	March	+ 32	+27	+30	+35

Table 4.15. Prices of paddy

		(in Rs. per qtl.)			
		Prices in paddy+			
S.No.	Months	1976-77	1977-78	1978-79	1979-80
1	2	3	4	5	6
1.	October* (Rs/qtl)	190	194	200	210
2.	December	+ 7	+ 6	+ 6	+10
3.	March	+22	+18	+17	+30
4.	June	+28	+29	+23	+41
5.	September	+36	+36	+35	+50

* April month of the concerned year is considered as base price to show the change in the other months.

+ Details on prices of wheat/paddy are given in Appendix-I.

The data on prices of wheat and paddy given in the above tables reveal that the prices have changed more than Rs 5/- per quintal within a period of two months. The total storage costs in any method of storage either with a farmer or a merchant is less than the change in price. Thus, it is quite evident that if the commodity is stored, the price variation will not only cover the storage costs but will also increase the profits of the seller. This analysis also shows that the markets for wheat and paddy are not operating under conditions of perfect competitive conditions. Thus the hypothesis, "under the present and in light of the past economic conditions, the difference in prices of wheat/paddy covers cost of their storage" framed is accepted.

Commodity storage by Food Corporation of India, Jabalpur and State Warehousing Corporation, Jabalpur:-
 In addition to the investigation into the total storage costs incurred in various storage methods by farmers and merchants, an attempt was made to understand the role played by Food Corporation of India (Jabalpur) and State Warehousing Corporation (Jabalpur) in commodity storage (wheat and paddy). The administrative network and the procedure adopted by the Food Corporation of India for storage of commodity is very much complicated and it was

not possible to investigate into the total storage costs due to limited time and energy with the investigation. State Warehousing Corporation, Jabalpur do not possess any facility for foodgrains storage.

SUMMARY, CONCLUSION AND SUGGESTIONS

SUMMARY

Over the past few years, the agricultural production in India, with the introduction of new improved techniques in the field of agriculture, has increased significantly and upto some extent, it has achieved self sufficiency. Moreover, the country has started exporting foodgrains, in limited way. On one hand, the agriculture production is increasing every year, the facilities for storing this agricultural produce have not kept pace on the other hand. The task now is to create additional facilities for storage of agricultural products particularly in rural areas to allow a continued interest with agricultural product in which storage of commodities form an important part.

The absence of a net work of rural godown is causing substantial hardship to the rural population. Firstly, the farmers are compelled to sell their produce immediately after at prevailing prices which are bound to be low. Secondly, farmers are compelled to store foodgrains and other products in improvised sub-standard godowns. Such storage of foodgrains and other products leads to deterioration of these commodities owing to dampness, etc. As a result of this, the quality of agricultural produce goes down and

the farmers are again compelled to sell their products at lower price in view of deterioration in quality. Third, storage in katcha godown also leads to loss due to the attack of rodents, insects, pests, etc.

Looking into the problems of rural people, the use of storage is greatly emphasized. The storage serve the function of maintaining, constant supply of foodgrains throughout the year, preserves the quality and freshness of products, controls the rate of flow into the market, creates bulk and helps movements of products in large quantities, etc.

In consideration to all above, the study "Economics of Cereal Storage in Jabalpur District", was undertaken to understand in depth, the storage of wheat and paddy, the main crops of Jabalpur region, with respect to costs and methods, with the following objectives :-

- (1) To findout different methods of storage of wheat and paddy in Jabalpur District.
- (2) To estimate storage costs under different methods of storage.
- (3) To estimate storage losses in storage.
- (4) To estimate quantity stored by various size of land holding farmers.

This study was undertaken during July 1980 in Jabalpur block of Jabalpur District.

For the present study, the information was collected from farmers and merchants.

Among the four tehsils, namely, Jabalpur, Katni, Patan and Sihora of Jabalpur District, Jabalpur tehsil was purposively selected because percentage area under cereals was more as compared to other tehsils. Wheat and paddy were the main crops of Jabalpur tehsils, hence, the study was founded on these two crops. Jabalpur block purposively selected because it was expected that it would provide sufficient information from merchants and also the area was well known to investigator which facilitated to have accurate information. Jabalpur tehsil has 9 Village Level Worker circles covering 223 villages. For selection of farmers, multi-stage sampling was adopted. One V.L.W. circle out of these nine circles was selected at random.

The list of the farmers from three selected villages was prepared in ascending order of their land holdings. The farmers were there divided into three groups. The farmers of upper group were designated as small, the bottom group as large and middle group as medium size farmers. From each category 12 farmers were selected at random. Thus the total number of farmers selected were 36 for the present study.

The selection of merchants, a list of merchants from Grain Merchant Association, Jabalpur was obtained. Ten merchants were selected at random.

The primary data were collected from selected farmers and merchants through interview schedules. Secondary data were also obtained from merchants.

The results were summarized in the form of simple averages and percentages in the case of farmers, and simple averages, percentages and co-efficient of variation in the case of merchants in the light of stated objectives following hypothesis have been framed to study the above objectives :-

- (1) Capacity utilization of storage method adopted by the farmers possessing different size of land holdings, remains the same.
- (2) Total cost per quintal of wheat/paddy storage remains the same for different storage methods adopted by the farmers.
- (3) Total cost per quintal of wheat/paddy are the same for the different storage methods (Godown) adopted by farmers and merchants.
- (4) Under the present and in the light of past economic conditions, the difference in prices of wheat/paddy

covers cost of the storage.

The main findings of the study are :-

- (1) The sample farmers had more number of family members and large per cent of irrigated area than the general average of Jabalpur District of Madhya Pradesh.
- (2) The percentage area of the gross cropped area devoted to paddy is roughly the same with the district and sample farmers but there is quite a big difference for wheat. As clear from the land utilization pattern, the sample farmers have more percentage irrigated area than that of Jabalpur District and that is why sample farmers raised wheat more than other rabi crops as it is comparatively more paying than the later other rabi and kharif crops occupy small percentage of gross cropped area with the sample farmers.
- (3) Kuthiya was the most common method of storing wheat/paddy with all the farmers. In addition to Kuthiya most of the farmers of large size of land holding had banda, the other methods of storage kuthla and bag stacked in room ^{was} were also used by some of the farmers.
- (4) The capacity of storage method goes on increasing with the size of land holdings. The approximate percentage utilisation of storage methods was

80 per cent. All methods had nearabout the same size of utilization irrespective of methods and size of land holdings, in case of wheat, whereas, no such conclusion could be drawn for paddy. On the basis of above finding, the hypothesis number 1 is accepted for wheat and rejected for paddy storage.

- (5) The losses in bags stored in a room are maximum and lowest in banda method of storage. Insects, pests and diseases caused maximum loss irrespective to commodity and type of storage.
- (6) On the per unit commodity basis, the construction cost of kuthiya, kuthla and bags stored in a room are roughly the same, whereas for banda it is the lowest.
- (7) In foodgrains storage with the farmers there exist the operation of the principle of scale economy.
- (8) The operational cost for storing wheat/paddy is nearabout the same, that is, approximately Re. 1/- per quintal per year. In kuthiya, kuthla and banda method of grain storage whereas it is Rs. 2/- per quintal per year for bag stacked in a room.
- (9) The maintenance cost for storage of foodgrains come to approximately Re. 11/- per quintal irrespective of storage method.

- (10) The total storage cost for wheat per quintal per year are higher than for paddy. Total storage costs are approximately the same under kuthiya, kuthla and banda methods of storage. Total storage cost in bags stacked in a room are nearabout double than the other method of storage on above finding, the hypothesis number 2 is rejected.
- (11) The average capacity of a godown maintained by merchants comes to 2720 quintals with 48 per cent co-efficient of variation. There is more variation in quantities stored of paddy than wheat, although the later is stored nearabout two times in quantity. Percentage utilization is 63 which is quite reasonable as it is impossible to have 100 per cent utilization.
- (12) On an average, a godown serves for about 21 years and its construction cost will be about Rs.20,200/-.
- (13) The losses per lb on per quintal basis comes to 0.193 kg for wheat as well as paddy. The low figures in co-efficient variation reveals that the merchants have a definite idea with respect to losses they keep in mind for the commodity stored.
- (14) An average total fixed cost per year comes to Rs 2173.90/- when these are calculated on per quintal basis, it comes to Rs. 0.791/- and 1.271/- full and utilized capacity respectively in case godown storage adopted by the merchants.

- (15) Operational cost in storage of wheat and paddy by merchants in godown, that out of total of Rs. 2.45/- per quintal, Re. 1/- is only for bags. Transport and losses of grain in storage is the next item in operational cost. Insecticides and pesticides account for a very nominal cost out of the total operational cost.
- (16) The maintenance cost includes, white wash and repairs, ^{Which} on an average ^{Cost} i.e., Rs. 13.80 and Rs. 37/-, respectively. Per quintal maintenance cost, on the basis of full and utilized capacity, comes to Rs. 0.02/- and 0.03/- respectively.
- (17) Total storage cost in case of merchants gives rough picture because ^{Some components} total cost of storage is calculated on per lot per quintal ^{and others on per Year basis} basis although its importance is unquestionable. On the finding of total storage cost (godown) ^{of} farmers and merchant, the hypothesis No. 3 is rejected.
- (18) If the commodity is stored, the price variation will not only cover the storage cost but will also increase the profits of the sales. This analysis also shows that the markets for wheat and paddy are not operating under conditions of perfect competitive conditions. The hypothesis No. 4 is accepted on the above finding.

SUGGESTIONS

- (1) It was revealed by small and some medium farmers, that due to various reasons, they were forced to sell the commodity immediately after harvest and thus could not availed the advantage of storage and, therefore, were of the opinion that some storage agency should be developed at village level which should advance money against the commodity stored and sell-off, the commodity later on, so that advantage of prices of later months be gained by them.
- (2) The time, energy and money at the disposal of the investigator could not allow this study to probe into the commodity storage problem in details and, therefore, suggests the following :-
- (i) Present study dealt into quantitative assessment of commodity storage and the equally important aspects of qualitative changes was left out. Therefore, it is suggested that a study be undertaken to study this aspect in details, not only at farmers' level but also at merchant and public agency level.
- (ii) A detailed study on commodity storage at merchant's level be also undertaken to assess the costs appropriately.

(iii) A study of costs on storage of commodities with the public agencies like Food Corporation of India and State Trading Corporation be also be initiated.

The studies suggested in (ii) and (iii) are necessary to have proper comparison.

3. The farmers incurred heavy losses in commodity storage in some of the years and, therefore, wanted to have some low cost quantity flexible storage method. It is, therefore, suggested that agricultural engineering research unit should come forward for developing and making available such storage structure to the farmers.
4. Extension agencies should also disseminate technical know how of scientific grain storage which is ignored at present.

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APPENDIX-I

Prices of Wheat -

(Rs./Qt.)
(in year)

S. No.	Months	Price of wheat			
		1976-77	1977-78	1978-79	1979-80
1	2	3	4	5	6
1.	April	145	153	155	170
2.	May	145	154	157	172
3.	June	152	158	160	176
4.	July	155	160	165	176
5.	August	160	164	167	180
6.	September	168	168	170	183
7.	October	170	170	172	189
8.	November	170	172	172	190
9.	December	172	173	175	192
10.	January	174	175	177	195
11.	February	175	180	180	200
12.	March	177	180	185	205

Source: Ledger of Merchants, "Grain Merchant Association", Jabalpur.

APPENDIX - IIPrices of Paddy -

S.No.	Months	(10 year) (Rs./Ql.)			
		Price of paddy (rice)			
		1976-77	1977-78	1978-79	1979-80
1	2	2	3	4	5
1.	October	190	194	200	210
2.	November	194	195	205	212
3.	December	197	200	206	220
4.	January	203	203	210	230
5.	February	207	205	215	232
6.	March	212	212	217	240
7.	April	215	215	218	245
8.	May	215	220	221	250
9.	June	218	223	223	251
10.	July	220	225	225	253
11.	August	225	228	280	257
12.	September	226	230	235	260

Source : Ledger of Merchants. "Grain Merchants Association", Jabalpur.

APPENDIX-III

Interview Schedule

1. Name of the head of the family :
2. Education :
3. No. of family members :
4. Size of land holding (acres) :
5. Total cultivated area (acres):
6. Area irrigated (acres) ;
7. Area sown more than once (acres):
8. Crops : area and production -

S.No.	Name of Crop	Area (Acres)	Total Production in (Qtls.)
1	2	3	4

9. Commodity utilization (Qtls.)-

S.No.	Name of Crop	Sold			Seed	Wages	To Others	Consumption	Total
		When (mth)	Price (Rs)	How much (qtl)					
1	2	3	4	5	6	7	8	9	10

10. If does not sale—Other sources of income (other occupation):

11. Details about the storage methods :-

S.No.	Name of storage	(A) Wheat, (B) Paddy Location		Capacity (qtls)	Quantity stored (qtls.)	Life in yr.	Period of storage (months)
		Inside/ Outside	Below/ above ground				
1	2	3	4	5	6	7	8

12. Costs in Storage Method

A. App.cost of storage structure (Rs) :

B. Miscellaneous charges (Rs) :

(i) White wash

(ii) Repairs

(iii) Any other charges paid
between storage period :C. Costs, if any, material used for increasing the
efficiency of storage :

(i) Insecticide/Pes icide (Rs) :

(ii) Straw/other material (Rs) :

If bag stacked in room :-

.. Utrai & Bharai charges (Rs):

.. Sutli and stitching (Rs) :

.. Cost of Bags :

13. Filling Procedure :

14. Filling charges :

S.No.	Labour	Time (day)	Rate (Rs)	Total cost(Rs)	Remarks
1	2	3	4	5	6

15. Emptying procedure :

16. Emptying charges :

S.No.	Labour	Time(day)	Rate (Rs)	Total costs(Rs)	Remarks
1	2	3	4	5	6

17. Losses in storage (Types of commodity & quality) :

- (i) During filling and emptying (kg) :
- (ii) Insect, pest and diseases (kg) :
- (iii) Damage due to heat (kg) :
- (iv) Dampness (kg) :
- (v) Mold (kg) :

V I T A

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