



MARKETING POTATOES IN PAKISTAN

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ABRAR A. KOKAB
and
ALAN E. SMITH

Pakistan-Swiss Potato Development Project
Pakistan Agricultural Research Council
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FOREWORD

The efficient marketing of potato is crucial to the development of the Pakistan potato sector and for the provision of an important food source to the urban areas. The range of contentious issues is wide and includes price instability, middlemen's margins, demand trends, postharvest handling, processing and export potential. This study presents for the first time an overview of the potato marketing system and examines the problems that arise. Comprehensive data are provided on price behaviour, consumer demand, storage and the functioning of the system, including the seed potato market. Constructive comment is given to assist in overcoming difficulties experienced.

The market system as described is one which shows a considerable degree of competition and allocative efficiency. Contrary to belief, the farmers receive the largest share of the final price. However, there is no room for complacency as the cyclical pattern of the market leads to alternate gluts and shortages, affecting detrimentally both farmers and consumers. There is also much room for improvement in postharvest handling to reduce unnecessary loss and damage. Wholesale markets' conditions are highly unsatisfactory due to overcrowding and poor hygiene. Lastly, the marketing system for seed requires special attention so that farmers receive a higher quality seed than at present at an affordable price. The report suggests ways and means of tackling these varied problems.

The study will be of great benefit to researchers and policy-makers as well as those actively concerned in the trade. It is intended that complementary studies will be undertaken in due course on such matters as the operation of wholesale markets and postharvest technology so that full information is available on

which to build a more effective market structure, to the advantage of producers and consumers and the economy in general.

Dr. Amir Muhammed
Chairman, PARC.

Islamabad:
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All photographs are by PSPDP.

Abrar A. Kokab and Alan E. Smith
Islamabad: November, 1989.

PREFACE

The International Potato Center (CIP) has produced various reports on the marketing of potatoes in different countries but until now no study has been produced on Pakistan. This study redresses the omission and analyzes the potato marketing system in Pakistan. The information presented is the result of the activities of the Pakistan-Swiss Potato Development Project (PSPDP) of the Pakistan Agricultural Research Council (PARC). The project, established in 1983, has conducted wide-ranging research on all aspects of potato development throughout the country. However, the views expressed in this volume are those of the authors alone.

November 1989.

Abrar A. Kokab
and
Alan E. Smith

Currency Equivalents

Currency Unit =	Rupee
<u>US \$</u>	<u>Rs.</u>
1.00	22.00 (November 1989)

Weights and Measures

One hectare	=	2.471 acres
One tonne	=	1000 Kilograms
One tonne	=	2,204.622 pounds

Abbreviations

ADBP	Agricultural Development Bank of Pakistan.
AMSL	Agricultural Marketing and Storage Ltd.
CIP	International Potato Center.
FYM	Farm Yard Manure.
Govt.	Government.
JBL	Jaffar Brothers (Pvt.) Ltd.
NWFP	North West Frontier Province
PARC	Pakistan Agricultural Research Council.
PASSCO	Pakistan Agricultural Storage and Supply Corporation.
Project	Pakistan-Swiss Potato Development Project.
PSC	Punjab Seed Corporation.
PSPDP	Pakistan-Swiss Potato Development Project.

Kg	=	Kilogram
Km	=	Kilometer
ha	=	Hectare
t	=	Metric tonne
Rs	=	Rupees

CONTENTS

	Page
Summary	I
1. Introduction.....	1
2. Pakistan Agricultural Development and the Importance of Potato.	3
3. Potato Production in Pakistan	5
3.1. Area, Production and Yield of Potato.	5
3.2. Seasonal and Geographical Distribution of Potato Production.....	6
3.3. Types of Potato Producers	8
3.4. Varieties Grown.....	9
3.5. Costs of Production and Profitability.....	9
4. Potato Consumption.....	13
4.1. Potato in the Pakistani Diet.	13
4.2. Consumption Rate.....	13
4.3. Consumer Preferences.	15
4.4. Beliefs and Opinions.....	16
4.5. Constraints against Increased Potato Consumption.....	16
4.6. Consumer Marketing Developments	17
5. Potato Marketing.....	18
5.1. The Marketing System.....	18
5.1.1. Potato Market Structure.	18
5.1.2. Potato Marketing Channels.....	20
5.1.3. Marketing Costs and Margins.	22

5.2.	Price Variations.....	26
5.2.1.	Short-term Price Variations.....	27
5.2.2.	Seasonal Variations in Prices.	27
5.2.3.	Cyclical Fluctuations.	30
5.2.4.	Functional Causes of Price Variations. ..	34
5.2.5.	Trends in Prices.	36
5.2.6.	Relative Prices of Potato with those of Staple Foodstuffs	36
5.2.7.	The Intervention System.....	38
5.3.	Seed Potato Market.	40
5.3.1.	The Demand for Seed Potatoes.....	40
5.3.2.	The Supply System of Seed Potato.....	43
5.3.3.	Seed Certification.....	47
5.4.	Quality: Packing, Grading and Post-harvest Handling.....	47
5.5.	Means of Transport.....	49
5.6.	Cold Storage.	50
5.6.1.	Cold Store Distribution and Capacity. ...	50
5.6.2.	Temperature Control	51
5.6.3.	Store Management	52
5.6.4.	Storage Costs	53
5.7.	Export.....	53
5.8.	Imports of Table Potato.	55
5.9.	Processing.....	56
6.	Conclusions and Recommendations.....	58
7.	Bibliography.....	63

Annexes	66
1.	Official statistics of potato in Pakistan.	66
2.	Percentage distribution of each province in total potato area and production.....	67
3.	Area and production of potato in Pakistan in different seasons.....	67
4.	Average wholesale prices of potato at Lahore market (1980-88).....	68
5.	Average wholesale prices of potato at Karachi market (1980-88).....	69
6.	Description of dealers in NWFP trading in vegetables including potato.	70
7.	Marketing Kalam potato to the Punjab plains.	72
8.	Comments on the constraints in the existing marketing system.	82
9.	A predictive model of price inelastic demand and price elastic supply.	84

Figures

1.	Map of potato production in Pakistan.	VI
2.	Distribution of table potato in Pakistan.....	21
3.	Seasonal index for potato prices, Lahore wholesale market.	28

4.	Seasonal index for potato prices, Karachi wholesale market.....	29
5.	Cyclical fluctuation in constant prices of potato in Lahore wholesale market.	31
6.	Cyclical fluctuation in constant prices of potato in Karachi wholesale market.....	32
7.	Annual average wholesale prices of potato, wheat and rice at Lahore market.	37
8.	Distribution channels of seed potato.....	44

Tables in the Text:

1.	Comparison between selected crops in Pakistan.....	3
2.	Production of dry matter, edible energy and protein in the potato crop.....	4
3a.	Area of potato production in Pakistan.....	5
3b.	Estimated annual volume of potato production in Pakistan.	5
4.	Production of potato by use.....	8
5.	Percentage share of categories by size of farmers in potato production in the Punjab.....	8
6.	Percentage of cost of potato produced during the autumn crop in the Punjab plains.....	11
7.	Weighted profit/loss analysis for autumn crop.....	12

8.	Per capita consumption of potato in urban areas of Pakistan.	14
9.	Consumer preferences when buying potato.	15
10.	Beliefs and opinions about potato.....	16
11.	Marketing and cold storage costs of the Punjab autumn crop.	23
12.	Farmer's price as percentage of potato retail price in selected regions and countries.....	25
13.	Seasonal price levels, 1978-1983.....	34
14.	Estimated normal annual seed potato requirements.....	41
15.	Imports of seed, 1973-1989.	46
16.	Cold storage capacity by province.....	51
17.	Potato exports, 1976-88.	55

SUMMARY

Potato has emerged as an important cash crop in Pakistan. It ranks as highest in yielding ability and is third by volume of production of the major food crops. However, by area under cultivation, its position is ninth. As a nutrition source, its protein production is higher than the three main cereal crops.

The area under potato has steadily increased from 2.8 thousand hectares in 1947-48 to over 60 thousand hectares in 1986-87 while its production has also risen from 28.4 thousand tonnes in 1947-48 to over 1 million tonnes by 1986-87. The country is now self-sufficient in table potato production and there is no need of imports for household consumption.

The crop is widely grown in many parts of the country in three different seasons: spring and autumn/winter in the plains, and summer in the hills. Potato production shows a strong regional concentration by province. Punjab is the leading province which contributes about 70% in area and nearly three-quarters of the total production of potatoes.

There are a number of varieties grown in Pakistan, the main commercial ones being *Desiree*, *Cardinal*, *Multa*, *Diamant*, *Ajax*, *Patrones* and *Ultimus*. In the trade circles, potato is generally classified as white-skinned potato and red-skinned potato. Red is the more popular with consumers in the north and the centre of the country, and white is more popular in the south.

Potatoes from the hills are mainly consumed in the plains, where most of the population is found. The hill crop supplies the market from August to November. The autumn main crop, covering about two-thirds of national production, is harvested in January, although early harvested autumn potatoes reach the market as early as mid-November. Two-thirds of the autumn crop is sold fresh, with fairly low marketing costs, and the rest is put

into cold storage and marketed during the period June to October. The spring crop is harvested in late April and in May. The largest part (80%) of the spring crop is kept as seed in cold storage until the next autumn planting.

The average urban per capita consumption is estimated at about 13 Kg/year. Demand in the short run appears to be relatively income and price inelastic as potato's role in the Pakistani diet is restricted. The winter is the high consumption season for reasons of lower price and non-sweetness of potato. Cold storage at too low a temperature is the cause of sweetness in potatoes available during the summer. Fresh hill potatoes are sold at much higher prices than cold-stored potatoes during this season.

The market system for table potatoes is mainly that of farmers selling through commission agents in the wholesale markets. Sub-wholesalers buy to break bulk for distribution to retailers. The wholesalers normally do not own trucks. These are provided by general hauliers. Apart from selling on commission, some of the larger traders in the principal markets buy on their own account for storage and resale at higher price periods. The larger farmers also may store and some own cold stores.

High value seed potato has a more specialised marketing chain, especially for imported potatoes. However, the seed most generally used is purchased through local traders and is of variable quality. Domestic high quality seed production has increased in recent years and, as a result, dependence on imported seed has lessened considerably. This trend is expected to continue. Demand for seed potato generally falls following a year of low table potato prices as, for opportunity cost and cash flow reasons as well as price expectations, farmers tend to retain more of their own production for seed.

In surveys it was found that producers received for their table potatoes 64% (Kokab 1988), 56% and 49% (Kokab 1984) of the consumer price for unstored hilly, stored autumn and unstored autumn potatoes, respectively. Traders' net margins were correspondingly low. Retailers' margins are higher than those of wholesalers as turnover is less and they need to cover a greater risk of loss through rotting.

The prevailing situation of price inelastic demand coupled with price elasticity in supply means that any increase in supply results in a disproportionate fall in price so that farmers' net revenue is reduced. This raises questions about the rational of crop maximisation policies for potato if productivity gains do not exceed price falls.

Real potato prices over the last 33 years show a slow downward trend in the Karachi market but a slightly positive one in Lahore. There has been a 3 year cyclical pattern of high to low prices associated with shortage and glut. Seasonally, the prices are normally at their lowest during January and at the peak in November, although in 1989 this pattern was disturbed and prices were depressed throughout the year.

The intervention system has failed to smooth out the very variable year-to-year price fluctuations. It cushions large farmers from the full effect of market forces but has failed to reach most of the small farmers. In some years it has led to very large losses for the intervention agency (AMSL). It also weakens the potential of improved market intelligence to influence the planting intentions of the large traditional potato growers if they know they can cover their costs whatever happens in the market place. With improved market intelligence, a free market alternative to the present intervention policy would improve economic welfare, give the consumer and tax payer a better deal and allow better resource allocation.

IV

Normal private stockholding and speculative storage will tend to remove potato from the market at low price periods and to increase supply from store at high price periods. However, the small farmer cannot store to take advantage of price rises after harvest as he has no access to finance and his cash needs at harvest are normally acute.

Post-harvest handling is very deficient. Unnecessary damage occurs which reduces product value and consumer acceptance and accelerates deterioration. More care and better practices are required after harvest in the fields, at the cold store, during transport and in the markets. Some measures require little cash outlay, merely more careful handling, but others will need some investment, particularly in storage and transport.

The export potential for table potato is limited unless the Iranian market reopens for the low-standard potato generally produced in Pakistan. The Gulf States are probably the most promising market currently. However, major infrastructural improvements are needed to produce and ship potato of export standard. Even if quality is improved and prices are low enough to be competitive, the potential market in the Gulf is probably no more than 20,000 tonnes annually. A more viable strategy may be to consider exporting high value seed regionally. It is lower volume but the potential margins are much higher.

Fig. 1: Potato Growing Areas in Pakistan



Main Potato Growing Areas are shown with Circles (not to scale)

1. INTRODUCTION

In the Indo-Pak sub-continent, potato was first introduced by the Portuguese in the seventeenth century. However, many of the *desi** varieties of potato found in the hilly areas of Pakistan are likely to have originated from the British Isles during the nineteenth century. The area that is now Pakistan was not a major potato producing area before independence. With the creation of Pakistan, consumption has come to be met largely from domestic production and the area cultivated increased from 2.8 thousand hectares in 1947-48 to over 60 thousand hectares annually by the 1980s.

The production of potato has risen from 28.4 thousand tonnes in 1947-48 to over one and a quarter million tonnes by 1989. This represents an even greater increase than in area, thanks to productivity gains through higher yielding technological innovation. If the early statistical data are correct, yields have on average doubled.

The marketing of potato is complex because it is grown all the year round in different parts of the country, and fresh produce as well as cold-stored potato is available for sale almost every month. Potato passes through a chain of intermediaries to reach the consumer. Farmers and some officials often allege that the middlemen charge too much for the services offered by them and margins are too high. However this does not accord with the evidence gathered by PSPDP and others of a competitive marketing environment with correspondingly low margins.

The seasonal and annual fluctuations in the production of potato are a perennial problem, giving rise to wide price movements and creating an undesirable instability in growers'

* *desi* means local (indigenous).

returns. Intervention to smooth out price changes has not been successful for reasons to be discussed later.

For the consumers, potato is an important vegetable component of the diet but it is not viewed as a staple like rice or wheat. Its use is largely restricted to an ingredient in curry or in snacks. Short run demand appears relatively price inelastic. The very low prices obtained in the 1989 glut have not stimulated a major increase in consumption. The overall trend in consumption, while upwards, is perhaps more related to population growth than changing trends in food habits, although there is a discernible shift to potato in uses such as french fries among some urban social classes. Even if demand increases only in line with population, this would be very substantial in a country where 3 million more food consumers are added to the population each year.

In this study, potato production and consumption are examined, followed by a descriptive analysis of the current potato marketing system, including price movements. The market for seed potato is considered separately. Aspects of post-harvest handling are also dealt with. The prospects for the export and processing of potatoes are then assessed. Finally, recommendations for improvements in marketing are presented.

2. PAKISTAN AGRICULTURAL DEVELOPMENT AND THE IMPORTANCE OF POTATO.

Pakistan's economy is mainly based on agriculture. The main cereal crops are wheat, rice and maize. There is a need to increase and secure food availability for the future in the face of a population growth of over 3% annually. In order to supplement the production of grains, it is imperative to tap all sources, and other food crops must be given due priority in the agriculture sector. Potato is one of these food crops, it gives 12-15 times more tonnage per unit of area than the cereals (Table 1). Of the eleven major crops shown in the table, potato ranks highest in yielding ability and third in production. However, by area of cultivation its position is 9th.

Table-1: Comparison between Selected Crops in Pakistan.

Crop	Area (000 ha)	Production (000 tonnes)	Yield (t/ha)
Wheat	7308.4	12675.1	1.7
Rice	1963.0	3240.9	1.7
Gram	820.6	371.5	0.5
Maize	853.9	1126.9	1.3
Millet	292.7	135.3	0.5
Sorghum	319.8	180.6	0.6
Barley	145.0	111.8	0.8
Chillies	60.6	84.3	1.4
Potato*	58.1	1162.0	20.0
Groundnut	66.5	52.1	0.8
Onion	55.4	633.1	11.4

Source: Agricultural Statistics of Pakistan 1987/88.

*Production estimated from yield surveys 1983-85, PSPDP.

The comparative nutritional importance of potato is shown in Table 2. Of the five important food crops shown, potato ranks highest in dry matter, energy and protein production.

Table-2: Production of Dry Matter, Edible Energy and Protein in the Potato Crop.

	<u>Dry matter production</u> Crop t/ha.	<u>Energy production</u> Crop MJ/ha/ day	<u>Protein production</u> Crop kg/ha/ day
Potatoes	2.2	216	1.4
Rice	1.9	151	0.9a
Wheat	1.3	135	1.3
Maize	1.3	159	0.9b
Carrots	1.7	162	1.0

Source: Horton D, Sawyer R.L. Potato Physiology 1985.

a. FAO Production Year Book 1983.

b. Nutrition Division, National Health Laboratories, Islamabad.

In terms of an income source to the farmer, potato can be very important, depending upon the region. In 1985-86, the value of the crop per hectare was assessed at Rs. 21.2 thousands. This compares with Rs. 3.8 thousands for wheat and Rs. 3.7 thousands for rice. The attractive returns obtainable by potato farmers are of course a major reason for the expansion in the area of production over the last forty years.

3. POTATO PRODUCTION IN PAKISTAN

3.1. Area, Production and Yield of Potato

In 1947-48, potato was planted on a very meagre area of about three thousand hectares with an estimated production of 27,000 tonnes. Since then its area and production have increased considerably in each province (table 3).

Table-3a: Area of Potato Production in Pakistan (1965-88).

Year	Punjab	NWFP	Baluchistan	Sind	Pakistan
	(Area in 000'ha)				
1965-70	10.5	4.1	3.2	1.2	19.0
1970-75	14.0	5.7	2.6	1.2	23.5
1975-80	21.4	7.6	2.9	1.1	33.0
1980-85	32.4	9.7	4.7	0.9	47.8
1985-86	45.9	10.6	5.4	1.0	62.9
1986-87	43.2	11.7	4.8	0.8	60.5
1987-88	41.7	8.8	6.9	0.7	58.1

Source: - Agricultural Statistics of Pakistan 1987/88. Excludes Northern Areas and Azad Jammu & Kashmir.

Table-3b: Estimated Annual Volume of Potato Production in Pakistan (1980-88).

Year	Punjab	NWFP	Baluchistan	Sind	Pakistan
	(Production in 000'tonnes)				
1980-85	648	194	94	18	954
1985-86	918	212	108	20	1258
1986-87	864	234	96	16	1210
1987-88	834	176	138	14	1162

Source: PSPDP estimates. Excludes Northern Areas and Azad Jammu and Kashmir.

Official statistics show national yield declining from 10.7 t/ha in 1970-75 to 9.7 t/ha in 1987-88 (see Annex 1). However, it is not possible to rely on the official production statistics because of the imprecise way they are collected. During the last two decades, a broad spectrum of crop management improvements has been made, high yielding varieties have been introduced, plant protection measures have improved, seed production practices refined and many potato growers have become conscious of the importance and value of virus-free seed. The increase in production over the last 10 years in the Punjab in particular has been due to the increased application of insecticides, fertilizer and herbicides as well as increased mechanization. The result is that farmers' yields in fact average about 20 t/ha, which is much higher than those reported in official statistics. This has been consistently proved during the yield estimation surveys made by the Pakistan/Swiss Potato Development Project (Annex-2). The Project's estimates are based on weighing potatoes harvested from a large number of sample plots, whereas the official statistics are based on estimates made by *Patwaris** who are usually not measuring yield but rely on farmers' subjective information.

3.2. Seasonal and Geographical Distribution of Potato Production.

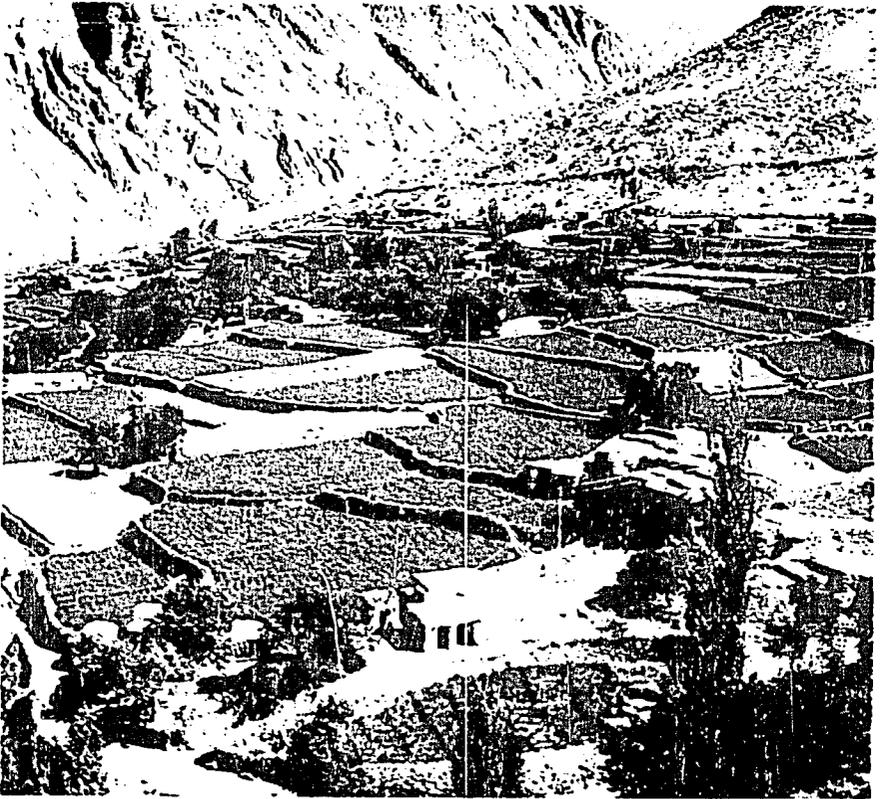
There are two potato crops in a year in the plains and one in the hilly tracts.

In the plains, the first crop, i.e. spring, is sown in January and harvested at end April-May. The second crop, i.e. autumn/winter, is sown between the end of August and early October and harvested in December-January. In the high hills, the crop (summer) is sown during March-April and harvested in September-October. In hilly areas of lower altitude (1000-1600m),

* A *Patwari* is a Provincial Government official responsible for rural data collection.



Autumn crop in Okara, Punjab



Summer hill crop in Hunza, Northern Areas

planting occurs in February-March and harvesting take place as early as July.

The distribution of potatoes by area and production among the various provinces of Pakistan is shown in Annexes 2 and 3.

Potato production shows a strong regional concentration within the provinces. Punjab is the leading province, contributing over 70% in area and about 75% of the total production of potatoes. The major contribution to production in the Punjab is from large growers. In the eastern and central Punjab are located the major potato growing areas like Okara, Sahiwal, Sialkot, Faisalabad and Jhang districts. Okara alone accounts for 15% of the total autumn crop.

The North West Frontier Province (NWFP) contributes 16% in hectareage and 12% of total production. Potatoes are mainly grown in the districts of Swat, Peshawar and Mansehra. Small holder production predominates in NWFP.

The province of Baluchistan's share in total area and production is 10% and 12%, respectively. In this province potatoes are produced mainly in Kalat and Pishin districts. Most producers in Baluchistan are small farmers. Sind is of minor importance as a potato producer, accounting for less than 2% of national production. Nawabshah district is the main centre of potato production there.

Table 4 summarizes production breakdown by use.

Table-4: Production of Potatoes by use

<u>Production breakdown by use</u>	<u>Percentage</u>
-- table potatoes	70-75.0
-- seed potatoes	10-12.0
-- potatoes for processing	2.0
-- wastage (on-farm) and shrinkage (in store).	10.0-15.0

3.3. Types of Potato Producers

There are three types of potato producers categorized (see table 5), small farmers having less than 5 ha of land, medium farmers 5-12 ha. and large farmers having more than 12 ha of land. The large farmers have the largest share in potato production. Due to relatively high financial requirements (seed, chemical inputs, agricultural machinery, cold storage) it appears that in the Punjab plains the proportion of potato production attributable to large farmers is increasing over time. On average, farmers have 55% of their total cultivated area under the autumn potato crop while 11% of the total is under the spring crop.

Table-5: Percentage Share of Categories by Size of Farmers in Potato Production in the Punjab.

<u>Zone</u>	<u>Large farmer</u>	<u>Medium farmer</u>	<u>Small farmer</u>
Southern	70.0	20.0	10.0
Central	68.6	17.1	14.3
Northern	60.0	20.0	20.0
All Punjab	67.0	18.2	14.8

Source: Kokab, 1986.

3.4. Varieties Grown

There are a number of varieties grown in Pakistan. In the trade circles, however, potato is generally classified as white-skinned or red-skinned. The red-skinned varieties are preferred for consumption in the north and the white in the south of the country. White potato is also the preferred exportable type. It is estimated that production of red varieties in Pakistan exceeds that of white varieties. During the course of the "Rapid Survey of Production, Marketing and Export of Potato" of some of the main growing districts of the Punjab (Govt. of Pakistan, 1972), it was shown that Sialkot district produced 20 to 30% white and 70 to 80% red potato, Faisalabad 10% white and 90% red, and Sargodha 25% white and 75% red potato. The following are the different red and white varieties of potato:

<u>Variety</u>	<u>Type</u>	<u>Origin</u>	<u>Size, Shape</u>
Multa	White	Netherlands	Medium, round
Patrones	White	Netherlands	Medium, round
Ajax	White	Netherlands	Large, oval
Diamant	White	Netherlands	Medium large, round
Desiree	Red	Netherlands	Large, long oval
Cardinal	Red	Netherlands	Large, elongated
Ultimus	Red	Local*	Large, long, deep eyes

*A Dutch-originating variety developed in the last century but no longer available from that source.

3.5. Costs of Production and Profitability

The percentage of the cost of most production factors varies little between farmers regardless of yield performance. The data (table 6) show that seed is by far the largest single component of the total cost of production. For imported seed, the cost was based on the cost of production in spring (when imported seed was multiplied) plus cold storage and transport charges. Farmers

with low yields spend less on Farm Yard Manure and city sweepings. The percentage of expenditure accounted for by irrigation and manual weeding reduces with yield and that accounted for by pesticides increases with yield.

Yield differs according to farm size. In the 1983/84 survey, similar numbers of small, medium and large farmers were sampled and the mean yields obtained were 20.5 tonnes/hectare for small farmers, 24.6 tonnes/hectare for medium farmers and 27.1 tonnes/hectare for large farmers. The respective costs of production if translated into yield performance were Rs.1.77 per kg. of output for low yielders, Rs.0.87 per kg for medium yielders and 0.61 per kg for high yielders. Moreover owner-operated farms consistently produced higher yields than tenancy or other land holding systems. It is not appropriate here to discuss the reasons for the observed differences but the important conclusion to be drawn in relation to marketing is that the medium and large farmers are much better able to withstand the periodic low price years and so are under less pressure to react to market signals. Moreover the main beneficiaries of the intervention systems are the larger farmers and it is these who least need price support.

Table-6: Percentage of Cost of Potato Produced During the Autumn Crop in the Punjab Plains.

Production factors	All farmers* (%)	Low yielders (%)	Medium yielders (%)	High yielders (%)
Seed	31.1	33.0	30.8	30.1
Grading & packing ¹	11.7	10.6	11.4	13.0
Fertilizer	9.6	9.4	9.5	9.9
Rent ²	8.0	8.4	8.1	7.6
Sowing & ridging	6.2	6.4	6.4	5.9
Transport ³	5.9	5.3	5.7	6.5
Ploughing	5.7	5.9	5.8	5.3
Harvesting	5.4	5.3	5.1	5.8
Irrigation	3.8	4.3	3.9	3.2
Pesticides	3.3	2.6	3.0	4.3
FYM ⁴	2.6	1.5	3.0	2.7
Manual weeding ⁵	2.4	3.1	0.8	0.8
Planking	2.2	2.3	2.3	2.1
Miscellaneous	1.1	0.6	1.7	0.9
Herbicides	0.9	1.2	2.4	1.9
Gypsum	0.1	0.1	0.1	0.1
Production cost ⁶ Rs/ha	19948	19033	19921	20805

* Sample size n = 60 farmers.

¹ Includes cost of bags.

² Includes rent imputed to owners at prevailing rates per ha.

³ To nearest market, including loading and unloading.

⁴ Includes city sweepings.

⁵ Includes earthing up. In recent years the use of herbicides instead of weeding has increased.

⁶ Manual labour cost component is 27.6%.

Source: Yield Survey of Autumn Crop in Punjab Plains, PSPDP 1983/84.

In general, potato production has been profitable for the Punjab farmers. An analysis has shown that only one year between 1975 and 1986 was clearly loss-making. Table 7 illustrates this. Although most of the autumn planted crop is sold soon after harvest at the beginning of the year, prices at this time are generally lowest and the best strategy would normally be to store until July-September to take advantage of higher prices. See also section 5.2.2.

Table-7: Weighted Profit/Loss Analysis for Autumn Crop Rs/kg in 1983/84 prices.

Year	Weighted whole sale price	Weighted total cost	Weighted profit
1975	1.54	1.30	0.24
1976	1.42	1.28	0.14
1977	2.07	1.40	0.67
1978	1.95	1.38	0.57
1979	1.14	1.27	0.14
1980	0.98	1.19	-0.21
1981	2.39	1.47	0.92
1982	1.58	1.30	0.28
1983	1.27	1.25	0.02
1984	1.77	1.34	0.43
1985	1.63	1.32	0.31
1986	1.33	1.26	0.07
Mean	1.61	1.31	0.30

Note: Weights used:

- Jan-March selling period (harvest period when 60% of crop is sold). 0.6
- April-May 0.1
- June 0.1
- July-September 0.2

After September, the cold stores have usually been cleared of the autumn produce and none enters the market.

Source: Price Fluctuations and Profitability of the Autumn Crop in the Punjab A. Geddes & K. Bajwa, PSPDP, 1988

4. POTATO CONSUMPTION

4.1. Potato in the Pakistani Diet

Potatoes are used in a variety of ways in various parts of Pakistan but are usually most appreciated when cooked along with meat. Potato chips fried in vegetable oil are a common serving with tea in urban areas. *Pakorrra* is also a famous local snack, the main ingredient of which is potato. Mostly, however, potatoes are used in curry. Only 18% of the consumers surveyed in 1988 used potato in snacks (Kokab, 1988). However, the consumption rate of potato as a snack has increased during the last 2-3 years. Different types of chips/crisps are being introduced in Pakistan and entrepreneurs are now taking an interest in this business. A number of larger industrial processors now produce high quality packaged chips. Dehydrated potato only finds a market in the Armed Forces although potato flour is now being produced by some Karachi processors.

4.2. Consumption Rate

A consumer survey conducted by PSPDP in 1988 estimated that per capita consumption of potatoes in the urban areas of Pakistan averaged over 13 kg/year. In winter there is a higher per capita consumption rate (table 8). Summer is the low consumption season partly because of the lower availability of fresh potato and the higher price during this time. An important factor in depressing demand is the sweet taste of stored potatoes*, much disliked by consumers.

* *The sweetness is due to potatoes being stored at too low a temperature.*

Table-8: Per Capita Consumption of Potato in Urban Areas of Pakistan (Kg/month).

Cities	Average consumption	Consumption in Winter season	Consumption in Summer season
Karachi	1.0	1.4	0.6
Lahore	1.0	1.2	0.5
Multan	1.0	1.3	0.5
Peshawar	1.2	1.6	0.6
Quetta	1.1	1.4	0.6
Rawalpindi	1.1	1.3	0.4
Mean	1.1	1.4	0.5

Source: Kokab, 1988.

The correlation between income and consumption is not significant (Kokab, 1988) and thus demand is relatively income inelastic. The relationship between consumption and price is more sensitive but the response to price changes appears, at least in the short run, also to be relatively inelastic in view of potato's restricted role in the diet. However consumers when surveyed did give importance to price (see 4.3 below) and this suggests that there is some scope to increase demand through lower prices if they are sustained long enough. However the market offtake in the most recent glut (1989) did not increase dramatically, perhaps because most of the low-priced potato was of poor quality and sweet tasting, coming from the cold stores. Much more research will need to be undertaken to clarify these aspects and until then any predictive statements based on demand inelasticity must be made with caution (see also Section 5 and Annex 9).



Punjabi vegetable shop



The author A Kokab inspecting a Punjabi retailer's display

4.3. Consumer Preferences

Consumers were surveyed in 1988 on what factors they considered important when buying potato. Nearly all the consumers questioned gave first preference to the freshness of potato. In particular, potato left a long time in the cold store develops the unpopular sweet taste. In June 1989, the strong preference for fresh potatoes meant that they could command a price 3 or 4 times as much as inferior autumn crop cold-stored potato in the Karachi wholesale market.

Prices and skin colour were two other very important characteristics given prominence by the consumers when buying potato. The weight given to price in consumer choice seems, however, secondary to freshness (see comments above). Skin colour is clearly a major determinant of consumer choice. An interesting feature is the strong preference in the northern cities for red-skinned potato and in the south for white, although it is difficult to determine any differences in flavour. Least preference was given to size.

Table-9: Consumer Preferences when Buying Potato (%age).

Cities	Fresh	Price	Skin colour	Damaged/ diseased	Shape	Size
Karachi	100.0	95.1	97.9	78.4	85.4	84.4
Lahore	98.9	93.4	80.9	93.8	70.2	72.2
Multan	98.9	75.5	81.7	77.4	74.5	58.3
Peshawar	98.9	88.9	92.0	89.7	72.2	70.3
Quetta	100.0	82.9	83.1	77.4	48.8	46.3
Rawalpindi	97.3	94.5	92.3	60.0	78.3	53.8
Mean	99.0	88.5	87.1	80.8	71.0	62.7

Source: Kokab, 1988

4.4. Beliefs and Opinions

The beliefs and opinions about potato obviously play a strong role in determining how much, when and in what ways potatoes are used in the diet. During the consumer survey (Kokab, 1988) people were questioned on its supposed nutritive value. The replies were fairly consistent in all cities (Table 10). The health improvement belief was the bottom of the list in all places, although a majority of respondents still thought potatoes improve health. In view of Pakistani cultural assumptions, the opinion that potato can make you fat and also healthy is not necessarily contradictory. The respondents also gave their opinion on the ease of cooking potato and its versatility when served with other vegetables and meat. It was favourably considered on both counts. This raises the prospect of promoting potato consumption through its convenience to the housewife.

Table-10: Beliefs and Opinions about Potato.

Beliefs and Opinions about Potato	Percentage positive response
It causes fatness	95.8
It causes flatulence	91.7
It improves health	74.1
It is easy to cook	99.5
It can be cooked more easily with other vegetables and meat.	97.0

Source: Kokab, 1988.

4.5. Constraints Against Increased Potato Consumption

In Pakistan potato is not consumed as a staple food but as a vegetable or supplementary component of the diet. In terms of increased demand, incorporation into the diet as an important regular item would create greatly increased opportunities for

farmers. However it may be difficult to achieve this as the people's customary diet would have to undergo a major change. Even so, with the population growing at 3.1% per annum, there are over 3 million potential potato consumers added to the demand side annually. This in itself would have an upward pressure on prices if supply stays more or less constant, so increasing the attraction of the crop to the farmers, other things being equal. In these circumstances, even if no radical change in diet occurred, one would expect output to grow over time just to maintain the present level of per capita consumption.

4.6 Consumer Marketing Developments and Market Promotion

AMSL has successfully launched the packaging of potato in plastic-net bags of 5 kg and 10 kg for sale in the Utility Stores supermarket chain and these are said to be selling well. A further development that should be explored to widen farmers' options is the sale of white-skinned potatoes in the Punjab markets (or red in the Sindi markets). The traditional loyalty to skin colour may be weakened if different skin colour varieties are introduced at discounted prices. Test marketing should be tried on this basis.

A clear growth area is for french fried potatoes sold in western-style fast food restaurants in the major cities. However this trend is mostly a middle-class phenomenon, affecting only a small percentage of the population, and its impact on total consumption is thus limited.

The promotion of potatoes is minimal, except for advertising certain branded potato chips. However, for the generic product itself nothing is being done, which is not surprising as the sums required to mount an effective publicity campaign would be large and which single producer is going to take this on when his competitors will equally reap any benefits?

5. POTATO MARKETING

5.1. The Marketing System

Except in the remoter areas such as Chitral, NWFP, and certain parts of the Northern Areas and Azad Jammu and Kashmir, potatoes are produced as a cash crop rather than for subsistence. Potatoes from the hills are mainly consumed in the plains, where most of the population is found. The hill crop supplies the market from August to November and cold storage is unnecessary.

The main bulk of the autumn crop, about two-thirds of national production, is harvested in January, although early harvested autumn potatoes reach the market as early as mid-November. The majority of the autumn crop is sold fresh, with fairly low marketing costs, but perhaps as much as one-third of the crop is put into cold storage and marketed during the period June to October when prices are normally higher. A significant proportion is also used as seed.

The spring crop is harvested in late April and in May. The largest part (80%) of the spring crop is kept as seed in cold storage until the next autumn planting but in 1989 it was noticed that a larger proportion than usual of the spring crop was sold for consumption. Whether this is the start of a trend remains to be seen.

5.1.1. Potato Market Structure

Frequently the marketing of potatoes, especially table potatoes, is described as not properly organized. Most of the criticism refers to issues like alleged excessive profits made by middlemen and low farmgate prices. Various studies undertaken by the Pakistan-Swiss Potato Development Project (PSPDP) on the performance of potato markets in the collection, distribution and price setting of potatoes lead to a different conclusion.

Potato markets in Pakistan do operate generally in a competitive environment. Effective free market systems are based upon a number of conditions like:

- the presence of an appreciable number of buyers and sellers.
- traders and farmers must be responsive to incentives and allowed to retain the benefits.
- the absence of agreements on commercial policy among rivals, e.g. collusion on price fixing, exclusive purchasing zones except perhaps to start up seed schemes.
- entry must be free from barriers except that which is automatically created by the existence of already established firms.
- there must be free access of buyers to sellers.
- good information flows (prices, production plans and output etc) should exist.

Comparing these conditions with those that exist in Pakistan, one may conclude that potato markets are by and large operating in a competitive market structure. There are shortcomings, particularly in the field of market intelligence. However, taking into account the most important condition for an economically efficient market operation, that is the presence of a great number of buyers and sellers, the potato marketing system in Pakistan can fairly be described as competitively organized. The principal needs to improve marketing are probably to undertake certain infrastructural improvements and upgrade post harvest handling. There is also a strong case to improve information flows to farmers, enabling them to respond more quickly to price and other market changes and to know-how and where to sell in the best markets. Improved quality through grading is another measure which could bring price benefits, although in the present market system the costs and effort

involved in this may exceed the benefits that could accrue to the farmers.

5.1.2. Potato Marketing Channels

The present marketing channels for table potato in Pakistan are illustrated in figure 2. Growers in the highlands generally sell their produce to traders from outside the region. These traders transport the potatoes to the Punjab Plains and sell them in the major wholesale markets¹ through the local commission agents² who also act as wholesalers. Sale is generally by auction. Some reconsigning to other wholesale markets may occur and some of the larger traders may buy potato on their own account for storage and resale at higher price periods. Sub-wholesalers³ buy the potatoes from the wholesalers and sell to the retailers. Potato is sold by the bag, not by weight. Annex 6 describes the various types of dealer commonly found in NWFP. In the plains, growers often sell their produce direct to the wholesale market through wholesalers/commission agents and the procedure is then as above. For a fuller description of the system, see Annex 7.

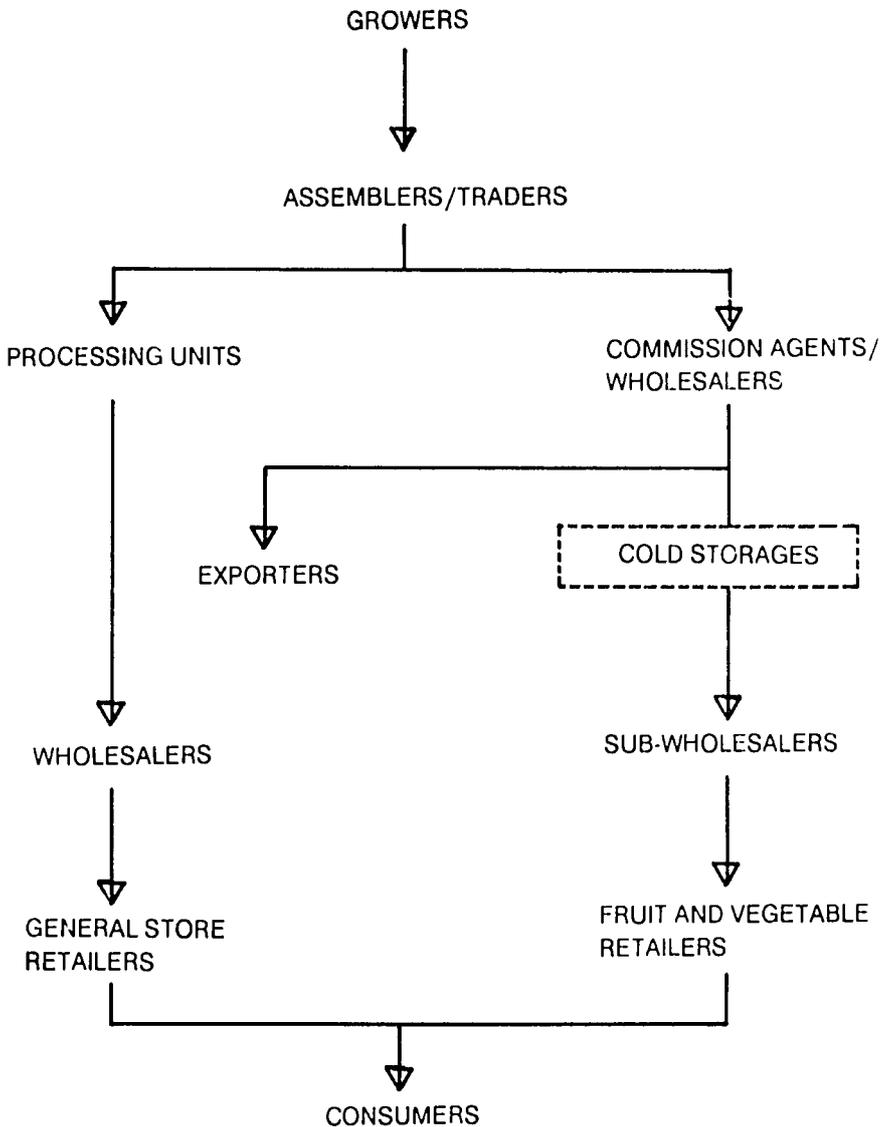
The wholesale markets themselves are characterised during trading hours by an apparently chaotic activity, taking place in conditions of poor hygiene, overcrowding and severe congestion. However they in fact have the capacity to handle very large volumes of produce in a fairly effective way. This is not to say that there is no room for substantial improvement. The market facilities for storage and handling are woefully inadequate and the conditions of hygiene call for urgent action. The congestion which contributes to this and to handling inefficiency can only be dealt with in most markets by site expansion and/or relocation and rebuilding. For two differing views on the wholesale operating environment, see Annex 8.

¹ Called "Mandies".

² Called "Arties".

³ Called "Pharias".

Fig. 2: DISTRIBUTION OF TABLE POTATO IN PAKISTAN



Potatoes sold for processing go through traders to the processing units. The processed material like chips/crisps etc. is then sold to the general stores and bakeries through wholesale agents.

For export, potatoes are sold to traders who transport them to Karachi for shipment. The government intervention agency AMSL is also responsible for export. Exports in 1988 were negligible. Formerly, there was a large overland trade to Iran and Afghanistan but this has effectively ceased because of internal difficulties in these countries (see also section 5.7).

Potatoes are invariably packed in jute bags of 85 kg (high hills) to 110 kg (Punjab Plains). They are too large for careful handling and are normally overpacked. They are stacked on the truck without any partitions. The result is that the potatoes are subject to unnecessary damage.

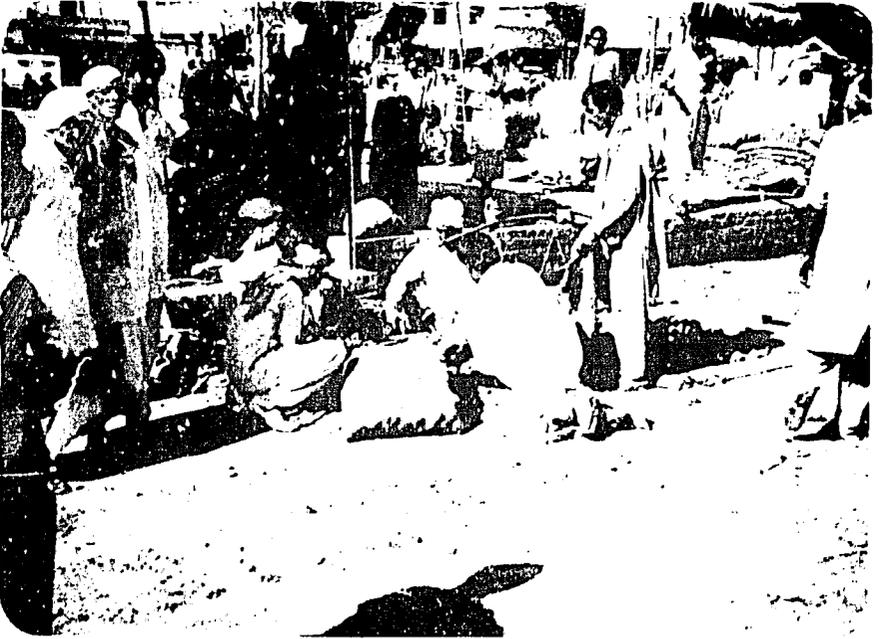
Most traders do not own their own transport but hire vehicles from general hauliers who do not specialise in potatoes or even the transport of vegetables. There is thus little expertise in freighting perishable, easily damaged produce. The lorries used, typically 10 tonne Bedford trucks, are overloaded and the produce has little protection against the weather. Journey times are often lengthy, in some cases lasting 2 days or more. Packaging and transport are discussed further in sections 5.4 and 5.5.

5.1.3. Marketing Costs and Marketing Margins

Marketing costs comprise all the expenses incurred from the farmgate to the retailer as well as some on-farm activities. These include cost of bags, loading and unloading charges, cost of transport, storage charges, transit and market fees and taxes, traders' commission, traders' overheads. See Table 11 for a typical breakdown (also see Table C, Annex 7).



Auctioning potatoes, Lahore wholesale market



Rebagging potatoes after sorting, Lahore wholesale market

Table-11: Marketing and Cold Storage Costs of the Punjab Autumn Crop.

Item	Per bag of 110 kg	(Rs)
Farmgate price		130.00
Bagging/loading	2.00	
Bag	12.00	
Cap	2.25	
Transport to cold storage	2.00	
Loading/unloading.	2.50	
Storage charges	53.00	
Losses (calculated at 10% of farmgate price plus costs above)	20.00	
Transport to market	3.00	
Unloading at market	1.25	
Octroi	2.00	
Market fee	0.40	
Commission fee	3.40	
Total Marketing Cost		<u>103.80</u>
Wholesale price		<u>233.80</u>

Source: Monninkhof 1988.

There is a widely held misconception about the potato marketing margin (the difference between farmgate price and retail price), i.e. it is excessive in relation to the costs incurred by the middlemen and the services they perform. They are thought to buy cheap and sell dear, exploiting the farmers by their control of the distribution mechanism or at least by access to information and contacts which the farmers are denied. This does not bear much relation to the generally observed situation.

Middlemen perform the role of delivering the produce from the producer to the consumer. The economic effectiveness of the middlemen is judged by the costs of the services rendered in relation to the size of the margin. A low net margin i.e. after

deduction of costs of services, implies a more competitive and hence economically efficient system than high margins. PSPDP studies have demonstrated that traders' margins are relatively low. In a 1984 survey it was found that the gross market margin for stored autumn potato was 44% of the retail price, the remainder going to the producer (Kokab,1984). The market margin is even less in the case of unstored hill potato. In 1989 a study revealed that it was 36% of the consumer price (see Table B, Annex 7 for more detail on hill potato costs and margins). Several studies by other organizations have produced similar conclusions. CIDA (1988) found that the growers received 62% of the final price, commission agents 9%, pharias (sub-wholesalers) 12% and the retailers 17%. The relatively higher margin of the retailers consistently shown in both CIDA and PSPDP studies may be attributable to the higher risk that they run of the potato rotting before sale and also because of their lower turnover.

Another misconception is that a large gross marketing margin causes low farm prices. It is important to note that marketing functions like sorting, collection, transport, storage etc add value to the product. Moreover the wholesalers normally sell on commission, auctioning off the produce and normally taking a flat rate commission per bag (3 Rs. in 1989). Finally, the size of the potato gross marketing margin is sometimes taken as a measure of the profits to be gained by farmers and traders. However, this margin is composed of both costs and profits. The net profit margins for the traders in the CIDA's report cited above were 3% for the commission agents, 5% for the pharia (sub-wholesaler) and 5% for the retailer.

So the exploitation of producers and consumers by middlemen cannot be demonstrated. The Applied Economic Research Centre reported that "*despite the common belief that in agriculture the middleman exploits the farmers this appears not to be the case for fruit and vegetable farmers. Marketing margins are low and fairly stable*" (ADBP 1985). In fact eliminating the complex

distribution network operated by middlemen in Pakistan would be a step backward in marketing efficiency, not forward.

Table 12 compares the farmgate-retail price ratio on a global basis. It appears that the farmer's share of the retail price is much lower in countries like USA and the Netherlands compared to countries in Africa and Asia. In developed countries, the farmer's share in the retail price is sharply reduced by high marketing costs. In fact Pakistani potato farmers do quite well in this respect when compared with many other countries.

Table-12: Farmer's Price as Percentage of Potato Retail Price in Selected Regions and Countries.

Africa	52
Latin America	69
Near East	54
Asia	61
North America	22
Netherlands	33
Pakistan	56

Source: ILO 1987, Kokab 1984.

It is observed in Pakistan that the marketing margin tends to remain constant in rupee terms with short-term variations in farm and retail prices. One of the main reasons for the inflexibility of the rupees marketing margin in the short-run is that the costs of performing marketing functions are related to the physical volume marketed rather than the price of table potato. It costs the same to sort, store, transport and process a bag of potatoes regardless of its price.

While in low price years, one would expect the proportion of the middlemen's share to rise as they cover their fixed costs, farmers generally obtain around 50-60% of the retail price of potato. In the case of the more perishable vegetables like

carrot etc, only 30-40% of the wholesale price is paid to the growers. The implication with potato is that the farmers cannot expect to receive much more by squeezing the middlemen or by replacing them in some way through, say, cooperative organisations. However Seymour (1988) has argued that Growers Associations could be set up to supply inputs, provide technical advice, make production forecasts, have centralised packaging, grading, quality control and storage facilities, provide market intelligence and publicity, and establish market sales outlets. However it is difficult to imagine that such Associations will develop in the short term. Only one Potato Growers Association currently operates - the Okara Cooperative in the Punjab. This serves a group of larger farmers and is concerned principally with the provision of seed and other inputs to its members. Its marketing operations are very limited, each member normally being responsible for his own storage and sale.

Cooperative action among smaller farmers could undertake some of these roles, perhaps in transport, grading and packing and selling, but the major means to increase the farmers' returns would be through reducing unit costs of production. This must be qualified, however, because yield increases, leading to greatly increased national increases in output, could merely result in pushing the price down and wiping out gains to farmers. But by the same token, this would benefit consumer welfare and, if a low price regime subsequently removes inefficient farmers to other activities and/or stimulates exports, there ought to be an overall gain to the economy. Annex 9 illustrates the dilemma the farmer finds himself in when confronted by inelastic demand but elastic supply - the probable scenario for potato in Pakistan. The crux is that in this situation, a reduction in output leads to a higher price such that the farmers' net revenue increases, not diminishes.

5.2. Price variations

Prices observed over time are the result of a mixture of changes associated with seasonal (climate), cyclical (economy)

and demand trends (tastes, income, population growth). The various forms of price fluctuations will be briefly dealt with. A detailed study on price movements has been published in "Price Variations of Potato in Pakistan" (Monninkhof 1987).

5.2.1. Short-term price variations

The short term fluctuating prices of table potatoes are determined mainly by supply changes in a situation of short run price inelasticity of demand (see Annex 9). This view is given some support by the extreme price fluctuations that occur when supply is destabilised through shortage or glut.

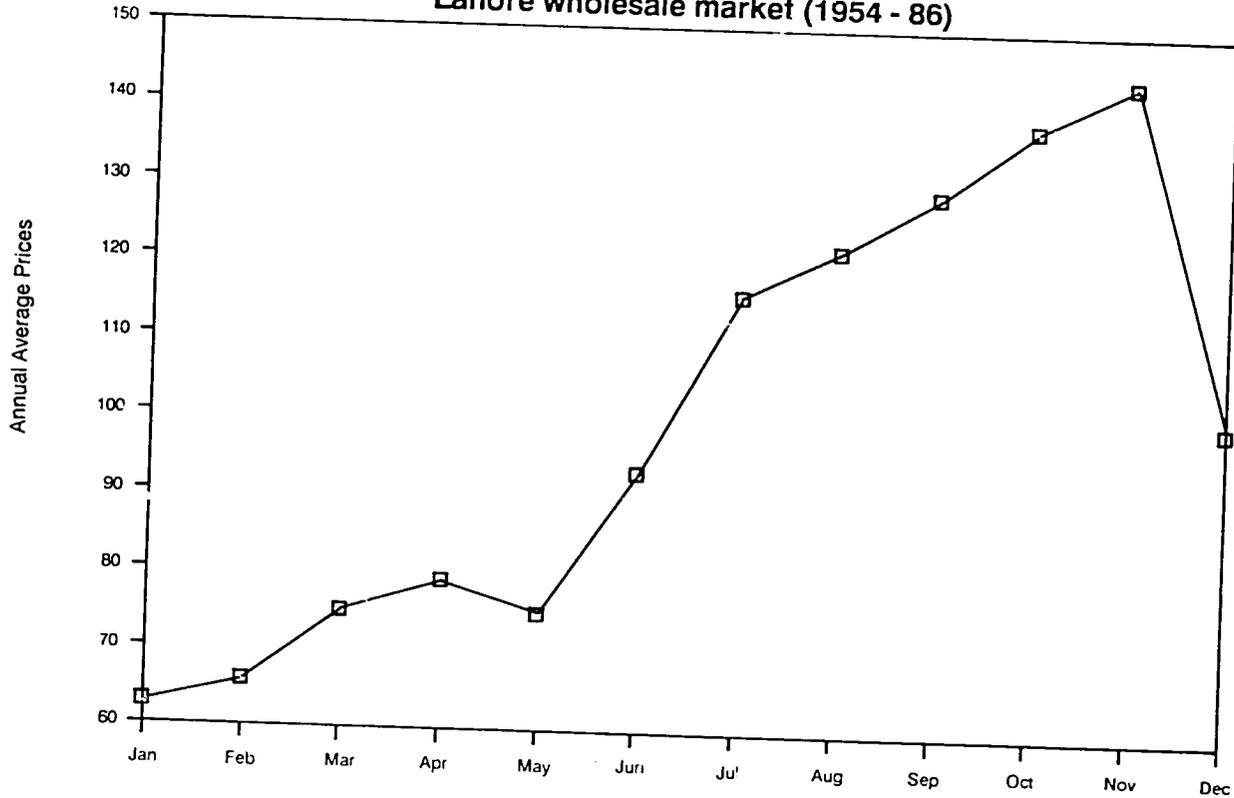
5.2.2. Seasonal variations in prices

This is primarily caused by seasonality in supply. The usual price pattern for a seasonal crop like potatoes is for the price to rise after a certain period following the harvest as supplies of fresh potato diminish and stocks reduce. The timing and size of the new crop also influence the seasonal price pattern (figures 3 and 4).

Main crop supplies from store are supplemented by new crop production. Stored potatoes from the autumn crop compete with table potatoes from the spring and summer crop. Effectively there is a two-tiered market with consumer-favoured fresh potatoes attracting a much higher price than cold-stored potatoes. For example, in Mingora, NWFP, in June 1989, Punjab cold-stored potatoes were selling at Rs.100 per bag or below while local fresh potatoes were attracting prices between Rs.135 and Rs.150, depending on quality. Thus the timing of the harvest and the size of the spring crop influence the price of stored potatoes. Towards the end of the stored season the prices rise more steeply when supplies are running short.

Typically, therefore, prices are at the lowest during January, February and March after the autumn crop has been harvested

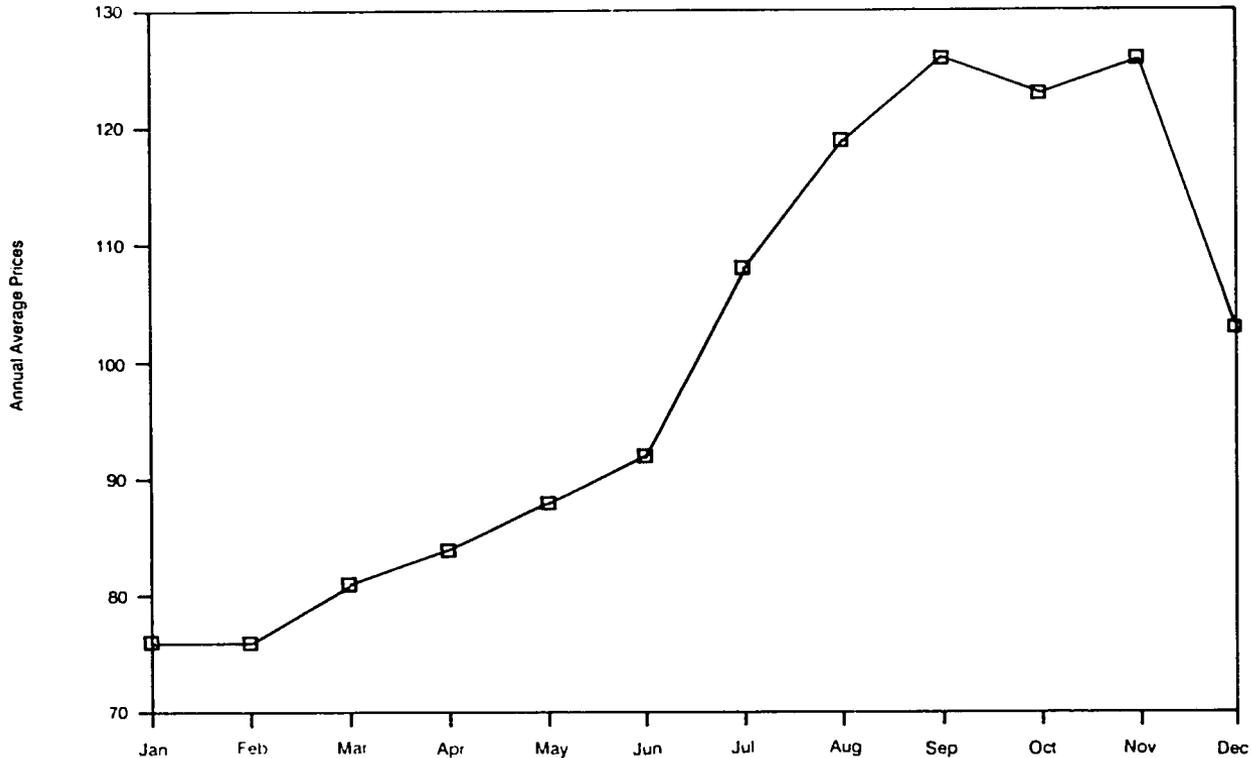
Fig. 3: Seasonal index for potato prices,
Lahore wholesale market (1954 - 86)



The 100% line represents the average of Rs 211.53 over the 33 year period of analysis of potato price (constant) data

Source: Monnikhof & Kokab 1987

Fig. 4: Seasonal index for potato prices,
Karachi wholesale market (1954 - 86)



The 100% line represents the average of Rs. 223.02 over the 33 year period of analysis of potato price (constant data)

Source: Monnikhof & Kokab 1987

and entered the market. They increase thereafter to peak steeply in October and November when only the high hills summer crop can supplement the market. The early autumn crop, harvested from the second half of November onwards, exerts downward pressure again.

In 1989, the normal pattern was deviated from as a result of the very large harvest from the previous year's autumn planting. By March 1989, all the available cold storage space was full and the potato left in the fields could only be sold for direct consumption, thus depressing prices when normally they would start rising. Spring crop potatoes, sold as table potato instead of seed, prolonged this. There was some recovery in July and prices picked up for a time, only to fall steeply again during November when the unsold potato in the cold stores was put on the market to make space for the forthcoming early harvested main crop.

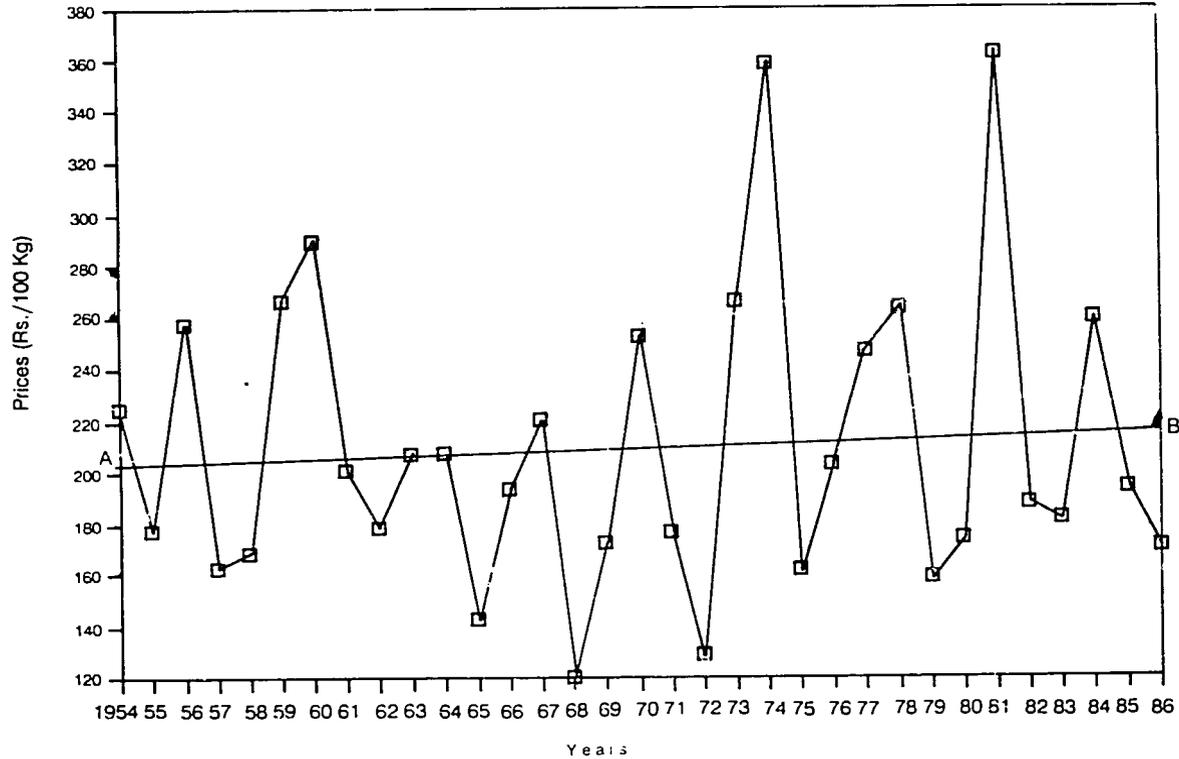
5.2.3. Cyclical fluctuations

For potatoes, prices have shown a cyclical behaviour from low to high every 3 years or so. (Figures 5 and 6 illustrate this). Planting expectations are influenced by historical price movements and by the subsequent derived demand for seed and cash needs. As such it is supply side determined, consumer demand being inelastic.

The cyclical price movement of potato prices may be largely explained as follows:

1. Prices are mainly determined by the January harvest in the same year. These comprise the majority of potatoes destined for cold storage, so affecting price later in the year.
2. The January harvest is determined by the acreage of the crop planted in September/October of the previous year.

Fig. 5: Long term price trend of potato with cyclical fluctuation in Lahore wholesale market (1954 - 86)

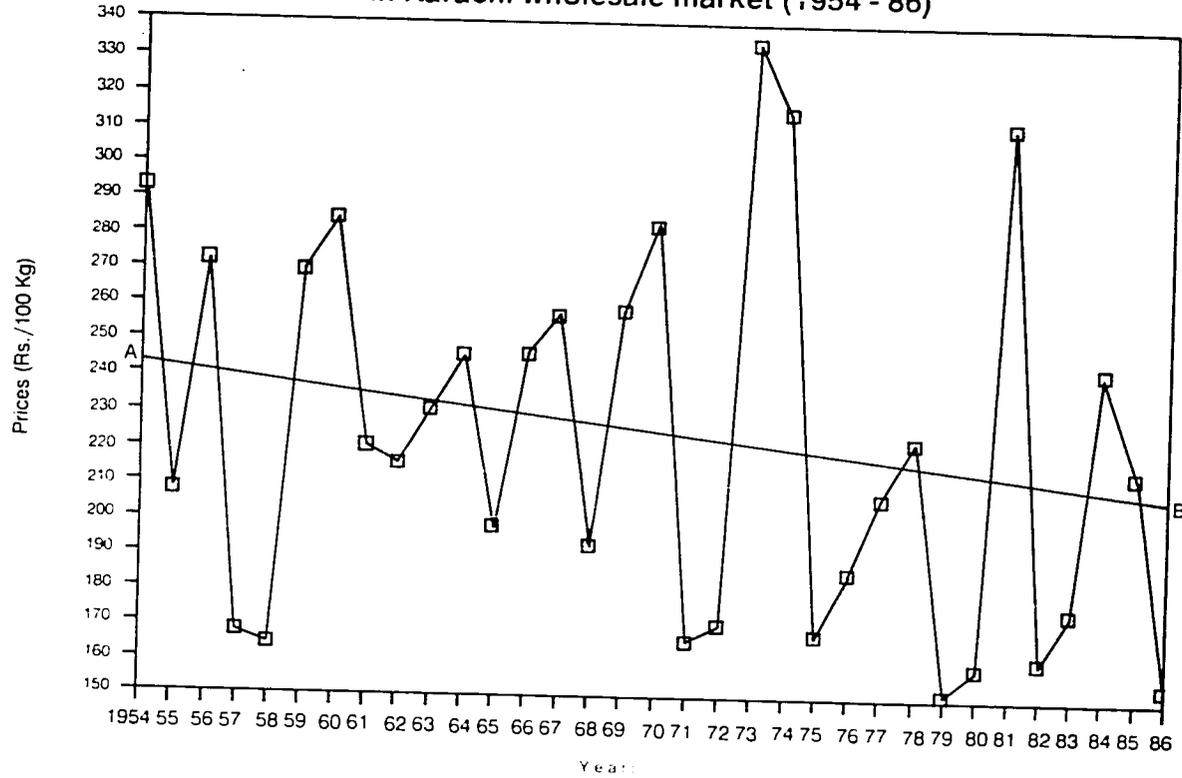


Source: Monninkhof & Kokab 1997

Constant prices. Base year 1986

Trend indicated by line AB, where $Y = 203.8 + 0.4 X$

Fig. 6: Long term price trend of potato with cyclical fluctuation in Karachi wholesale market (1954 - 86)



Source : Monninkhof & Kokab 1987

Constant prices. Base year 1986

Trend indicated by line AB, where $Y = 246.5 + (-1.4)X$

3. The acreage planted in September/October is determined by the prices in the same and the previous years. Two years of low prices will result in a smaller acreage planted. If in one of the two years, prices have been high then the autumn acreage planted will remain high.
4. The acreage planted in September/October is reduced after two years of low prices because:
 - a) farmers are now short of money and sell more of their cold-stored potatoes and keep less as seed in the months before the autumn planting* ;
 - b) farmers are discouraged by the low prices and switch to other crops.

The argument is supported by the data in table 13 overleaf which fit the facts of both seed imports and prices. However, it should not be taken as representing the behaviour of all farmers. There are distinctions between the specialist or traditional potato growers, who tend to make only moderate changes in planting levels, and other farmers who may switch in and out of potato, depending on price expectations. Even so, as demand is inelastic in the short run, relatively small changes on the supply side can have a very marked destabilising effect, causing prices to shift in a major way (see the diagram in Annex 9).

* Following one year of low prices, farmers may well retain more potato as seed because they reason that they do not lose much by not selling (i.e. low opportunity cost) and market seed prices may well rise the next year. However, with two years of low prices, the cash flow needs become paramount.

Table 13: Seasonal Price Levels, 1978 -- 1983

	1978	1979	1980	1981	1982	1983
Imports of seed	L	H	L	L	H	L
January output	L	H	H	L	H	H
Spring acreage	L	H	L	L	H	L
Spring output	L	H	L	L	H	L
June-October prices	H	L	L	H	L	L
Sep/Oct planting	H	H	L	H	H	L

Note: H = High Price, L = Low Price

A new cycle started in 1986-87 when market prices were at a low level. From February 1987 onwards potato prices moved up sharply. This sudden upswing in prices was caused by the sharp drop in acreage of the spring crop of nearly 80%, and aggravated by a serious late blight attack on the same crop. The combined effect was that very little seed was left for the autumn planting. As a result of the seed scarcity, farmers stopped the supply of table potatoes to the market and kept a larger fraction of their seed-sized potatoes for autumn planting. The 1988 high prices induced a very high level of planting and, despite floods at the beginning of planting the autumn Punjab crop, production in 1989 was at a high level. The result was that prices plummeted from a high of 600 rupees per 100kg at the farm gate in November 1988 to a low of Rs.100 per 100kg wholesale in May 1989. The government intervention agency, AMSL, were even selling low grade potatoes ex cold store at 50 Rs. or below per 110 kg bag in June 1989, i.e. less than storage costs, the alternative being to dump the produce at a total loss if marketing costs could not be covered.

5.2.4. Functional causes of price variations

It is a truism that agricultural production is inherently unstable. Potato in Pakistan is no exception. Yields vary from year-to-year because of favourable or unfavourable weather and

the presence or absence of disease or insect infestations. In Pakistan for instance, a low germination rate in the early autumn crop can sometimes be explained by the rotting of the planted seed as a consequence of high soil temperature. Later in the season the crop can seriously be damaged by frost. Flood damage is a risk in some places, lack of rainfall in others.

Furthermore both in spring and summer, late blight attack might create substantial yield losses of up to 40-60%. A strong aphid population during the spring crop favours the degeneration by virus of the seed kept for the autumn planting. All these factors vary in frequency and intensity from year-to-year.

Furthermore a substantial time gap exists between a decision to produce potatoes and to harvest. This is aggravated by the difficulty to produce autumn seed and thus the need to grow a spring crop for seed multiplication.

Relatively high or low prices may persist for considerable periods because of the inability of farmers to respond promptly to a change in price signals. There is also a lack of market information on which to base their decisions - which therefore tend to be made on historic data rather than on likely future activity.

The nature of demand for potato products is also a factor in price instability. With the reservations stated earlier (section 4.2), potato price changes may have little effect on consumer purchases in the short term, or what amounts to same thing, a change in supply induces a disproportionately large price change in potato, i.e. demand is price inelastic. For example, if the price falls by half, the farmer has to sell twice as many potatoes to earn the same gross revenue. In Pakistan, consumer reaction is nowhere near this level.

Finally as farmers become more specialized and incur large fixed investments, their output also may become less responsive

to price changes. They cannot afford to switch continually from crop to crop. This is the case particularly with the large farmers such as those around Okara in the Punjab, the major potato producing region.

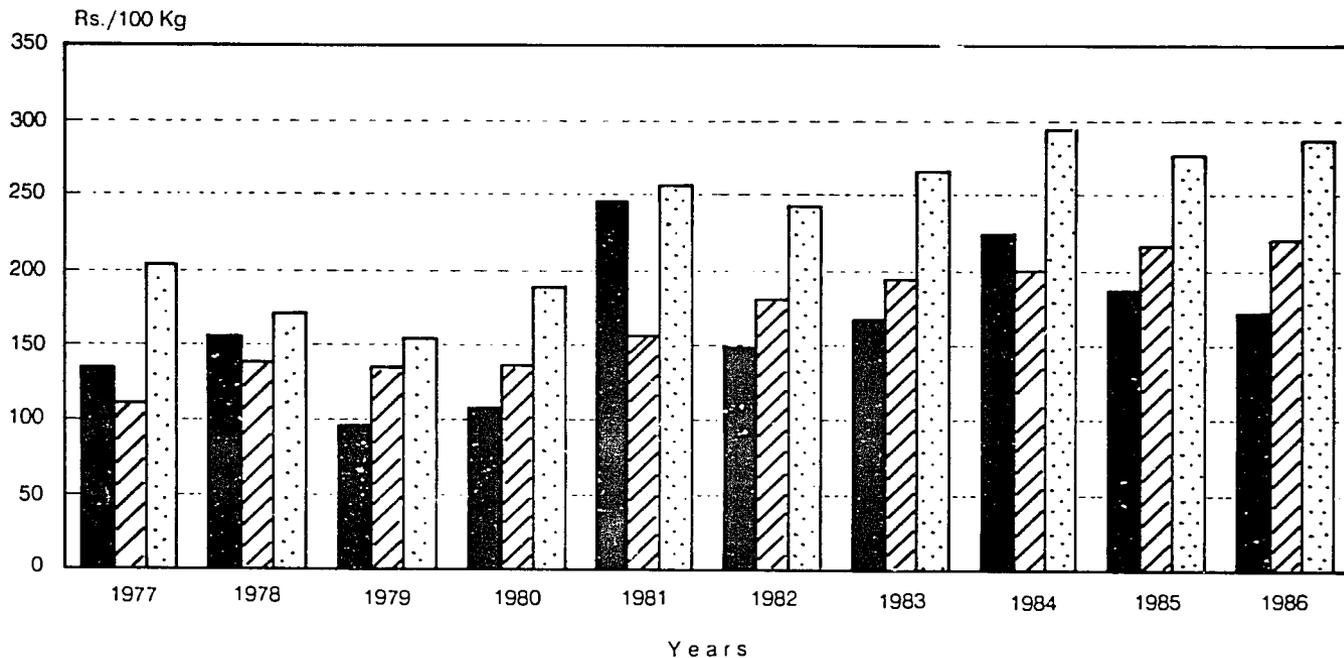
5.2.5. Trends in prices

Trends in potato prices are associated with general inflation, changes in taste and preferences of consumers, increases in population and income, and technological changes in production. The paper on Price Variations of Potato in Pakistan (Monninkhof and Kokab 1987) shows that the trend in potato prices in real terms is slightly positive in the Lahore market whereas in Karachi it is negative (figures 5 and 6). The Lahore and Karachi average wholesale prices between 1980 and 1988 are given in Annexes 4 and 5.

5.2.6. Relative Prices of Potato with those of Staple Foodstuffs

As was pointed out in section 4.5, potato is not considered a staple food in Pakistan. However it may have the potential to become a partial substitute, as it is for instance in Bangladesh (Scott 1988). Its relative price in terms of other foodstuffs may be the decisive variable in this. The trend in real potato prices, i.e. deflated against the wholesale food price index, (see section 5.2.5) shows no strong movement towards potato becoming cheaper in relation to other foods. If compared with wheat and rice (figure 7) no marked trend is evident. It is difficult to assess likely future market relationships through cross elasticities in a situation where wheat and rice prices are subsidised. However, it is clear that changes in relative potato prices have not so far caused any major shift in consumption away from the accepted staples, as has occurred in Bangladesh. Pakistan and Bangladesh are not parallel cases: per capita incomes are much lower in Bangladesh and it is to be expected that substitution effects are stronger there, with low income consumers seeking to

Fig. 7: ANNUAL AVERAGE WHOLESALE PRICES OF POTATO, WHEAT AND RICE AT LAHORE MARKET



■ Potato (Red)

▨ Wheat

▤ Rice (Irri)

maintain their nutrition levels by switching to the cheapest food source. It is indicative that researchers in Bangladesh found that the higher the household income, the lower was the demand elasticity coefficient for potato, i.e. there was a reduced sensitivity to price changes (cited in Scott 1988, pp 37). The 1988 PSPDP consumer survey found no evidence of similar behaviour in Pakistan (see section 4.2).

5.2.7. The Intervention System

Agricultural Marketing and Storage Ltd (AMSL), a parastatal organization backed by the Federal Cooperatives Bank, is charged by the Government of Pakistan to buy in potatoes when they fall below an intervention price set annually by the Agricultural Prices Commission*. The main indicator for this price is to cover the costs of production of leading growers. In 1989 the price was 50 Rs. per 40 kg. AMSL has intervened only three times: in 1983, 1987 and 1989. It will have to do so again in 1990.

In 1983, a loss of 72 million rupees was sustained after 65,000 tonnes were purchased. Many thousands of tonnes rotted after storage. An attempt to export 30,000 tonnes to the Gulf failed and the potato ended up being dumped in the sea.

In 1987, 14,000 tonnes were procured and later sold at a Rs.7.2 million profit, thanks to a fortuitous price rise. In 1989 AMSL were again directed to intervene. About 23,000 bags (2,400 tonnes) were purchased relatively late with the result that adequate storage was hard to find. Subsequently, because of poor storage conditions, the potato started to sprout and could only be sold at very low prices. Much of the produce in fact rotted.

The frequency of intervention by AMSL is determined by the potato cycle of normally three years and, as they only have onion

* PASSCO has also intervened four times since 1970 in the potato market, procuring a total of about 30,000 tonnes, but AMSL now has the specific role of intervention agency for potato.

as the other crop to support, then it is not surprising that their level of expertise is not what it could be. They are also subject to political direction which reduces the flexibility of response. It would be helpful if they had prior contractual arrangements with cold stores to make storage space available in anticipation of the need for intervention. However, this requires more formal planning than at present. The present system is largely ad hoc in response to crisis and political decision, with the result that AMSL staff have great difficulty carrying out their functions efficiently.

The policy-makers should be clear about what intervention can and cannot do and what the objectives are. It cannot eliminate by itself gluts and shortages, nor be of much benefit to the consumer. It cannot be used as a year-to-year buffer stock because of the limited time potato can be stored (up to 8 months maximum in Pakistani conditions). It could however provide support of the social security type to producers. A discussion paper on alternative measures to introduce market stability has been published by PSPDP (Smith 1989)*

The system has principally benefitted the large, more organized specialist farmers who in fact lobby very successfully for its retention as it means they can always cover their costs. In fact when it is decided to intervene, the prominent large growers and their representatives in the chambers of agriculture are directly consulted. The unorganized small farmers are not involved in this consultation process and benefit very little as, logistically, they cannot be reached by the system. The tax payers in most years of intervention lose heavily and the consumers have to pay more than they otherwise would.

The system as it stands inhibits the effective functioning of a market intelligence operation as, if the traditional specialist potato

* For example, one such measure is to control production by licensing potato growers and imposing production quotas on them (usually by area) backed by a system of inspection and fines. This is done in some European countries. However, this would be very difficult to enforce in Pakistan.

farmers' costs are fully covered, the impetus to switch to other crops is greatly lessened. This is what does in fact happen. In response to low prices, there is some reduction in output by these growers, who contribute the bulk of national production, because their seed provision is reduced, but it is dampened as their losses are minimized. They are also better cushioned financially than the small farmers and can ride out more easily the years of low prices. If they were encouraged to move in and out of potato production by the full effect of market forces, the incidence of glut would be diminished and the delicate balance of supply and demand would tend more towards the equilibrium.

If the system is to be retained, the intervention price should at least be set below producers' marginal costs to impose some market discipline on them to reduce plantings more radically than at present when seed purchasing indications are that a glut would be forthcoming. A too-high support price would tend to perpetuate gluts, as has happened with agricultural produce in the European Community.

5.3. Seed Potato Market

5.3.1. The demand for seed potato

This is a derived demand, that is, it is a function of the price of table potato - the higher the anticipated table potato price for the following season, the more seed will be purchased. In discussing this, it must be borne in mind that many farmers, particularly in the Punjab, retain tubers from their own harvest for using as seed*

There is no true seed market, except for the small quantities of imported and local certified seed. The so-called "market" seed is in effect table potato. Thus at times it is difficult to distinguish a separate market for seed, although market seed may be pre-

* These are normally the undersized tubers which would not attract as good a price as table potato.

sorted by traders to give some quality advantages over unsorted table potato. There is, however, no way of selecting out virus-infected tubers.

Certified imported seed is required for further multiplication. Typically, the produce from it is multiplied several times. The imported seed is distributed among growers through formal distribution networks established by importers. Formerly, there were 4 major sources: Punjab Seed Corporation, Jaffar Brothers in Lahore and the two Okara vegetable and potato associations. However, in recent years the number of importers has diversified and there are now around 12 importers of varying size (see table 15). The figures given in the table are taken from trade sources and vary somewhat from the official Foreign Trade Statistics.

Through these channels, around 1000-4000 tonnes of imported seed are distributed annually, although the volume varies markedly from year to year. The principal source of imports is the Netherlands, whose well-established position as supplier has made it difficult for other countries to break into the market even though there are no enforced restrictions on varieties able to be imported*.

Table-14: Estimated Normal Annual Seed Potato Requirements.

<u>Season</u>	<u>Quantity (tonnes)</u>
Spring	10,000 - 15,000
Summer	20,000
Autumn	<u>100,000 - 120,000</u>
Total:	<u>130,000 - 155,000</u>

Source: PSPDP estimates.

* Varieties for importation should be registered but very few are and there is no enforcement.

Table 14 gives the normal annual seed potato requirements for the country. The Punjab spring crop, in which both imported and high hill seed are multiplied, has an estimated seed requirement of 10,000-15,000 tonnes. The high hills are the main suppliers (60-70%) of seed to the spring crop, although with the exceptions noted below, the bulk of the high hill production is sold as table potato. Kaghan Valley in NWFP occupies a special position since nearly all its produce is sold as seed. This is known as Balakot seed from the town at the foot of the valley which acts as an entrepot for the district's produce. The upper Kaghan Valley, where the Pak-German Seed Potato Project operates, has specialized in seed production. Hunza in the Northern Areas has also assumed particular importance in recent years as a producer of quality seed and in 1988 was the only hill area to produce certified seed. Some other districts in the Northern Areas are also producing uncertified seed on a small scale for marketing in the plains. Baluchistan has established its own seed market in the southern Punjab and also in Sind, where white potatoes predominate.

Around 20,000 tonnes of seed potatoes are required for the production of the high hills crop and this comes mainly from the plains or else is the farmers' own seed held over from the previous season.

The Punjab autumn crop requires around 100,000 - 120,000 tonnes of seed. This is derived from the spring crop and increasingly from farmers' own seed plots from the previous autumn crop. The Pak-Swiss Potato Development Project (PSPDP) has been instrumental in developing this practice with farmers in the Okara district. The eventual elimination of the spring crop as a seed source is a feasible long-term goal, particularly as PSPDP have demonstrated that early-harvested cut Hunza seed from the high hills summer crop, can be successfully introduced directly into the same year's Punjab autumn crop. However, it

appears the spring crop is increasingly being grown for consumption purposes. Thus in 1989 spring crop potatoes were sold in large quantity on the table potato market, exacerbating the glut in that year.

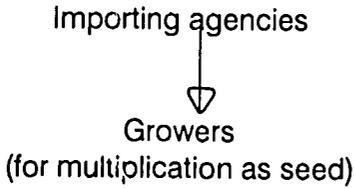
5.3.2. Supply system of seed potatoes

Potatoes being used as seed in the spring and autumn crops have different distribution channels. In particular the length of the chain, i.e. the number of intermediaries, varies greatly (see figure 8).

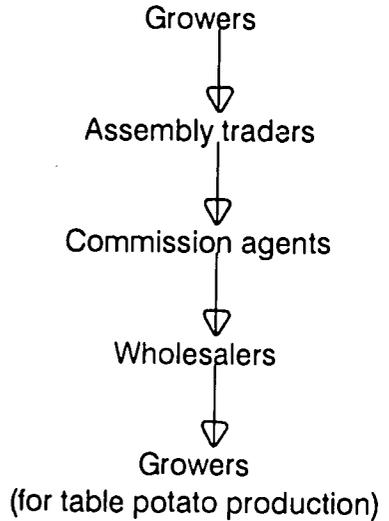
Figure 8: Distribution channels of seed potato

a) Distribution channel of seed potatoes for the spring crop

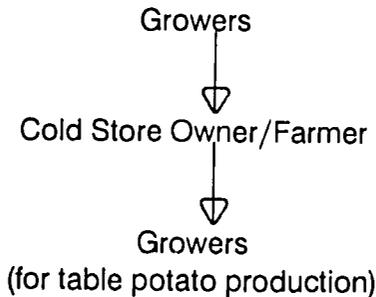
Imported Seed Potatoes



Local "Market" Seed Potatoes



b) Distribution channel of seed potatoes for the autumn crop





A typical truck used for potato transport, NWFP



Loading a camel in Kalam, NWFP

Both the imported seed potatoes and those which are temporarily stored in cold stores for planting in the autumn crop show a remarkably simple distribution structure.

The domestic marketing chain for table potatoes does not play an important role in the distribution of imported seed potatoes.

The seed potatoes from the high hills other than Hunza are supplied to the plains through a relatively lengthy marketing channel. The produce from these is however used mainly to supply table potato rather than for further multiplication. The main producer of Hunza seed distributes its certified seed through a network of agents in the Punjab.

Most of the cold-stored spring crop is used as seed in September, but some is sold for the table market over the summer months. Most of the seed put into cold stores is owned by farmers rather than traders, but the latter sometimes take speculative positions in the market by storing.

Table-15: Imports of Seed 1973-89.

Year	PSC	Okara	JBL	Total
73-74	630			630
74-75	2160			2160
75-76	1010			1010
76-77	775			775
77-78	970			970
78-79	2764			2764
79-80	1060			1060
80-81	1275	50		1325
81-82	3518	500		4018
82-83	1513	563		2076
83-84	744	449		1193
84-85	123	545	1400	4373
85-86	700	625	1850	3175
86-87	237	210	229	676
87-88	***	***	***	900
88-89	***	***	***	3600

Source: Trade sources.

*** Various importers.

The demand for imported seed for 1987 was sharply reduced (around 80%) after 2 years of low potato prices but picked up the following year in line with the high prices prevailing on the domestic market. The demand for imported seed is expected to decline as high quality local seed becomes increasingly available from the existing seed schemes, from the expansion of micropropagated basic seed through the tissue culture route, and from the extension of the large farmers' own seed plots. It is also likely, and desirable for the improvement of seed quality generally, that production on seed plots surplus to the farmers' own needs will be marketed generally through the wholesale markets, replacing the inferior "seed" currently available.

5.3.3. Seed Certification

For seed potato, the separate issue of certification arises. The Federal Seed Certification Authority has responsibility for certifying the quality of seed. At present it restricts its activities to those organisations requesting it, although ideally and legally all seed should be certified.

Measures are in hand to revise the existing standards to give quality guarantees to purchasers and at the same time give scope to seed producers to develop profitable businesses based on achievable standards. The certified seed currently produced in Pakistan is only in the order of 1,000 tonnes, however it is of comparable quality, or even superior, to imported seed. It is price competitive to imported seed and also attracts a premium over the uncertified products. As the reputation of domestic certified seed becomes established, it is to be expected that the price differential over uncertified seed will widen substantially.

5.4. Quality: Packing, Grading and Post-harvest Handling

Packing and grading add to the life and market value of perishable commodities. The primary purpose of packing is to protect the produce while in transit. In the case of potato, jute bags are normally used, both for local and export marketing. For local marketing, the size of the bag is relatively bigger, weighing around 85 Kg for hill potato and up to 110 Kg for Punjab potato. For export purposes, smaller size jute bags of 15 kg are preferred. The advantages in the case of jute bags include (a) their low cost and ready availability; (b) their tensile strength, able to withstand repeated handling; (c) the material absorbs spots caused by wetting; (d) they restrict demoulding and rupturing of diseased/damaged potato; (e) they have a comparatively longer life. The use of cotton bags has also been tried in Pakistan but they have proved unsuccessful.

The drawback of jute bags is that they afford no protection to crushing during transport, they do not allow the purchaser to see the produce and do not encourage sufficient airflow in store if proper stacking is not carried out. The use of plastic net bags, which are produced in volume in Pakistan, would permit the buyer to see the contents and enhance air flow. For seed potato, the prevention of damage during transport and handling is crucial and the optimum form would be wooden crates. However these are not used for domestic potato in Pakistan, although farmers clearly prefer imported seed in crates.

As regards grading, grading standards for consumption potato are non-existent. No serious efforts have been made to enforce proper grading to fetch better prices. There is a grading of sorts in the wholesale markets, the damaged, small-sized and poor appearance potato being separated from the unblemished and good-sized tubers. These poorer quality tubers sell at a discount varying between 7% to 25% or even more. In the Karachi wholesale market in June 1989, it was reported that superior quality fresh potatoes were attracting a price more than double that for fresh "fair average quality" potatoes.

At the farm level, the growers are not familiar with standard practices of grading. Wherever it is done, it is a mere separation of seed potato by size, without consideration of marketing aspects such as appearance. Mechanical grading is not practiced and probably is not appropriate in Pakistani conditions. Adequately supervised manual grading would be more likely to be cost-effective whereas mechanization would also reduce employment opportunities. At present, the crude sorting being practised does little to enhance market opportunities and benefit the consumer. There is a case for introducing and enforcing grades from the market point of view. This would give producers a higher price for improved quality, and would give consumers a better quality product. However the extra costs of grading may outweigh the benefits to the producer. What could certainly be encouraged to upgrade product quality is a more careful handling from the field,

into the store, onto the delivery truck and at the markets. More care would not cost anything. Potatoes at present suffer unnecessary damage from rough handling, so reducing product life and consumer acceptability. Grading is also essential for the storage and automatic planting of seed, in export marketing and in the development of high class produce for sale in supermarkets and other up-market outlets.

During transportation, the potatoes are sometimes damaged due to mishandling such as not covering the potato bags in transit. The rain may affect the potato tubers in the bags by spreading fungi and bacteria which cause rotting. However the actual losses of fresh potatoes were found to be relatively small in transit, damage being the main problem.

In the wholesale markets, the potato is often left in the open with no protection against the elements. Careful handling is unknown. The wholesalers and sub-wholesalers make allowance for damage to the tubers by sorting. In the Lahore market they class the good quality tubers as grade A and poor quality (damaged, diseased and under-sized) tubers as B grade potatoes. Thus they sell the whole lot of potatoes by discounting the sale price of inferior potatoes.

A greater area of loss is through storage and bad handling in-store. Inadequate storage practices can cause considerable losses.

Overall it is estimated that postharvest losses amount to around 10% of the crop, excluding the inevitable shrinkage but including on-farm losses. However, this does not take account of losses in quality which may amount in value terms to much more.

5.5. Means of Transport

From the fields to the roadside, the bags of potato may be man-handled or else carried on camels (in Kalam, NWFP) or

donkeys. The vehicles used for transport vary from jeeps and Suzuki pick-ups over short distances to 10 tonne capacity Bedford trucks for long distance. Journeys may take place during the heat of the day, particularly with table potato, although traders' practice with seed potato is to transport to the final market during the cooler months and then store locally. The potato bags are generally stacked sideways one on top of the other with no provision for separation to reduce crushing or improve airflow. Both seed and table potato are transported in the same way. There is no use of boxes or pallets in transit which would prevent damage from weight pressure.

5.6. Cold Storage

Most agricultural commodities are produced seasonally but their consumption lasts throughout the year. Storage plays a vital role in the marketing of these commodities. It contributes to a constant supply and it helps in stabilizing prices. Cold storage is essential for perishable commodities in the high temperatures experienced in the plains of Pakistan in Summer. The Punjab in particular has a widespread network of cold stores, sited in all the main potato producing areas and in the big cities. Some of the cold stores are owned by large farmers but the majority are owned independently.

5.6.1. Cold store distribution and capacity

The geographical and seasonal pattern of potato production has created a widespread system of cold stores which take a crucial position in (1) the supply of table potatoes to the consumer markets, (2) the supply of seed potatoes to the autumn and the high hill crops. The available storage capacity for potato is shown in table 16 but it should be borne in mind that these stores are not necessarily used exclusively for potato. Most cold stores, about 30% of the total, are of 2 chambers; 3 chamber stores account for 20%, 1 and 4 chamber stores each account for 15% of the total. The number of stores with 5 or more chambers is comparatively

few (20%). The Punjab, being the major producing region, has by far the most stores and capacity.

Table-16: Cold Storage Capacity per Province

	<u>Number</u>	<u>Capacity</u>
Punjab	283	350,000 t
NWFP	13	24,000 t
Sind	22	26,000 t
Baluchistan	2	1,000 t
	320	401,000 t

Sources: Cold Storage Surveys, PSPDP, 1985, and AMSL, 1987 (unpublished data).

5.6.2. Temperature control

The functioning of the cold stores can be improved, especially in temperature and humidity control. In particular, the potatoes are stored at too low a temperature (1°-2°C) while the optimal temperature is between 6°-8°C for table potatoes (4°C is optimal for seed potato). Sprout suppressant* will be needed at any storage temperature above 4°C. The too low temperatures block sugar consumption in the tuber and thus allow the accumulation of sugar. This results in the sweet taste disliked by consumers. These potatoes sell at a sizeable discount compared with fresh potato, the major detrimental factor being the sweetness. The consumer believes the cold stored potato can be distinguished from the fresh simply by rubbing the skin, which in the stored tuber does not come off. However it is also a fact that the skin of the fresh potato left to mature will also not rub off.

The low temperature is preferred by cold store operators as, if there is a power cut, there is no immediate threat to the

* The technical and economic feasibility of applying sprout suppressant under the conditions in Pakistani cold stores has yet to be investigated.

produce, in particular sprouting will not start at once. On the other hand, the lower temperature requires more energy as well as reduces the product's attractiveness to the consumer. If the risk of loss through a power cut can be avoided, say by using a standby generator, and by applying sprout suppressant, the costs of these may be more than offset by the higher price obtainable for non-sweet potatoes and the saving in electricity consumption*. Total demand may also increase as well. However, as in many cases the cold store owner is not the owner of the potatoes, there is no incentive for these measures to be taken.

5.6.3. Store Management

Care is needed in stacking the bags in store. They should be stacked singly on shelves where possible to avoid crushing and improve the flow of air, especially as poor ventilation is a problem in some cold stores. Overcrowding should be avoided. Ideally the use of jute sacks should be discontinued and the produce stored in bulk bins to improve airflow. However this would mean that the costs of rebagging would be incurred. Also there is a need to improve all the post-harvest handling systems as bulk storage of unselected and ungraded potatoes is risky. Potatoes are also sometimes stored with other produce in the same chamber. This should be avoided to prevent cross-contamination.

The economic performance of cold stores in the Punjab appears to be relatively good. The utilization rate of 80-90% is far higher than those found in NWFP and Sind. In the last two provinces an overcapacity exists of around 40-50% except in years of glut.

One important point with seed potato is that, on removal from the cold store, it is necessary to allow the tubers to acclimatize to the ambient temperature by placing them in an

* It would also help to have an appropriate insurance cover.

appropriate chamber for at least 48 hours, a period which can be extended up to 10 days. This would avoid physiological damage through too rapid exposure to high temperature (it can exceed 40°C in April/May to September in the Punjab).

5.6.4. Storage Costs

The cost of storage is normally born by the farmers although traders sometimes store. In 1989 at the beginning of the season in the Punjab (February), it was 55 Rs. per bag for the storage period until September but the great demand for space pushed the price up to over 100 Rs. per bag by March for a two-month storage period. Storage costs comprise a major proportion of the marketing costs of the autumn crop. From table 11, the proportion of storage costs amounts to about 50% of the marketing costs.

5.7. Exports

Exports have declined greatly from over 40,000 tonnes in 1979-80 to minimal amounts by 1988 (table 17). The main markets were Afghanistan and Iran, but the internal situation in these countries led to a virtual cessation of trade. At most, a few thousand tonnes of potatoes are now exported annually (see Table 16) and in 1988 the nadir was reached when only 20 tonnes were exported. This, however, was to be expected as domestic prices were at record levels and it would have made no economic sense to have exported.

Pakistan has a very poor reputation in the export markets for quality and reliability. At producer, trader and government levels, a number of measures need to be taken to achieve the necessary quality improvements and control. The export trade requires grading, appropriate varieties for target markets, export standard packing, organizations for export trade, adequate shipping facilities to the Gulf and South East Asia from Karachi, etc. To develop and sustain an export trade require considerable

investment and a willingness to accept losses in the initial years and a relatively low return when domestic prices are high. No sustainable export trade can be developed if Pakistan can only offer potato in years of glut when prices are low and if the product quality is poor and with a short shelf life. It would be unreasonable to expect the average farmer to become export-oriented, even assuming he could afford the necessary outlay. Who then will promote this trade? In other countries, there are marketing boards and the like but in Pakistan no such organisation exists although AMSL has a remit. AMSL's actions have usually been linked with the short term expedient of dealing with a glut, rather than building up a durable trade year in, year out. However in 1989 AMSL promoted contacts between the Okara Potato Growers Cooperative and a selling agent in the Gulf to produce export quality potatoes on a sustainable basis on medium term contract.

The Gulf States currently offer the best prospect for table potato, particularly if it can be provided in the off-season of other suppliers, but the potential export market is probably not more than 10,000 - 20,000 tonnes. Also Iran may once again become a good market in years of low prices, allowing potatoes to be exported by road without the cost and complications of sea transport, nor the need to upgrade quality as with the more demanding Gulf markets. It is reported that the Government of Pakistan has undertaken negotiations with the Government of Iran to resume exports.

Price competitiveness is a basic factor. In 1988 the high domestic prices meant that it was not worth exporting and it seems that the low price level required to export table potato is not an incentive for growers to produce with export in mind. A potentially more interesting opportunity may lie with the development of seed potato exports. These would have a high product value and offer good margins as international seed potato prices are generally high, the standard being set by the Dutch export trade. The prospect of good returns is essential in order to

attract the infrastructural investment necessary and it is far more likely to come from seed exports than table potato exports.

Table-17: Potato Exports 1976-88.

Year	Quantity (000' t)	Value (million Rs.)	Value per tonne (Rs./ t)
1977-78	7.69	10.83	1408
1978-79	23.33	25.52	1094
1979-80	41.26	54.87	1330
1980-81	4.85	8.88	1831
1981-82	3.21	5.79	1804
1982-83	7.38	14.34	1943
1983-84	3.46	6.40	1840
1984-85	2.66	6.03	2267
1985-86	1.30	2.14	1646
1986-87	2.48	3.73	1504
1987-88	0.02	0.04	1800
1988-89 P	0.60

Sources: GOP Foreign Trade Statistics.

P: Provisional.

5.8. Imports of Table Potato

Imports of table potato are generally negligible but in 1988, as a result of high domestic prices, an estimated 10,000 tonnes of Indian potato were imported, mainly for the Karachi consumer market, although a proportion was sold as seed. This had disastrous results for the small farmers who bought it as seed because the potato failed to tuberise, the varieties being physiologically incompatible with local conditions as well as the tubers being disease-infected. To all intents and purposes, Pakistan is now self-sufficient in table potato and, to give a measure of protection to farmers from incidents as in 1988 with Indian potato, it would be sensible to ban all imports of table

potato. Seed imports should be restricted to properly certified seed only.

In 1989 no potato was imported from India, although it was reported from Baluchistan that limited quantities of potato from Afghanistan were available on the Quetta market at very low prices.

5.9. Processing

It is estimated that less than 2 per cent of the table potato production is used in the processing industry. The main industrial product is chips. The chip manufacturers require a year-round supply of fresh potato to avoid the quality problems arising from using cold-stored potatoes. During the summer, the scarcity of fresh supplies causes major difficulties and the plant of the major chip manufacturer is forced to operate well under capacity*. This particular firm's products are of exportable quality - some exports have been made to the Gulf. The foil packs and the flavouring ingredients are imported from Europe and constitute the major costs of the product. Nevertheless the manufacturers consider that using these imported components is necessary to maintain their quality image in the market. They also have a pricing policy of distributing the product nationally at the same recommended retail price, irrespective of differing distribution costs. At the same time, they admit they cannot fulfil orders but maintain the widespread market network for when business expands.

Other processed potato products include dehydrated potato and potato flour but the market is very limited, the former only being used by the Armed Forces.

In addition to the more formal industrial sector, there is considerable production at the cottage industry level of snacks

* Medium or long-term supply contracts with growers would overcome this but there is a reluctance by both growers and processors to commit themselves too far ahead because of price fluctuations.

such as pakorra, chips etc for street sale. The capital requirement and operating costs for such miniscule businesses are very small - a frying pan and cooking utensils, a small gas cooker and cooking oil are all that are needed in addition to the raw material. Financial labour costs are nil if the household members do the cooking. It is to be expected that the informal processing sector will expand further. The popularisation of western-style foods, including french fries, among certain sectors of the upper and middle-class will aid the growth of potato consumption in the restaurant, hotel and catering trades. However, in terms of the total demand for potato, these consumers account for only a small proportion, although market expansion could be very promising.

6. CONCLUSIONS AND RECOMMENDATIONS

The area under potato has increased dramatically although in recent years it has slowed. There is however room for improvements in yield and cost reductions through various measures but there is a delicate balance between supply and demand. Substantial increases in supply in a situation of price inelastic demand will inevitably lead to large price falls and potato will only continue to be attractive to farmers if reductions in unit costs outweigh the resultant lower prices.

Pakistan's rate of potato consumption is 2% to 4% that of the developed nations of the world. There is perhaps a potential to increase per capita consumption to several times the present level but this would require a major change in the dietary habits of the Pakistani consumer. This could be accelerated if the real price of potato is significantly reduced, although a sustained shift to lower prices would imply that producers improve their efficiency considerably. This is possible and should be pursued as potato could play an increasing role in Pakistan in meeting the food needs of a growing population and reduce the need for food imports.

The main taste factors which presently influence the consumption of potatoes are its freshness and lack of sweetness. To encourage greater frequency of consumption any of the following could be pursued:

- promoting the varieties suitable for longer storage and reducing sweetness;
- providing information on new ways to incorporate potatoes into local diets including processed products;
- increasing availability still further by encouraging wider market distribution of fresh potato on a more regular basis;

- grading potatoes and appropriately packaging them at the retail level to offer consumers better quality and choice.

To widen producers' options and also consumer choice, white-skinned potato should be test marketed in Lahore and red-skinned potato in Karachi. To gain market acceptance a discount may need to be initially offered. Increased processing would add value, increase shelf-life and hopefully increase the off-take. There could be scope for media advertising campaigns for processed products. The most promising target markets are in the urban areas and probably the middle classes, who are more flexible in their dietary habits and have the purchasing power.

Price stability more than high prices is considered as a major incentive to potato production. In this context, there is more a case for improving market intelligence to the producers than for implementing an active intervention scheme or trying to enforce production-restricting schemes such as exist in Western Europe. It is recommended that the intervention system be superseded by a greatly improved market and crop forecasting and outturn information service, administered by AMSL. This would enable farmers to plan their next season's planting in the light of current activities in the sector, thus enabling farmers to adjust to prevailing and potential market conditions rather than historic ones. It could act to smooth out the cyclical movements of glut to shortage, low price to high price. It would also assist policy makers in their planning.

Normal private stockholding and speculative storage will tend anyway to remove potato from the market at low price periods and to increase supply from store at high price periods. This free market alternative would improve economic welfare, give the consumer and tax payer a better deal and allow better resource allocation.

If the intervention system is to remain, the suggested price should be set below the marginal costs of production to induce some market discipline in the larger producers who at present are cushioned by having their production costs covered by the intervention price. There also has to be a readiness to allocate much more funding to enable sufficient purchases to be made to induce stability. This however will be costly. Moreover, if it is decided to institute a major intervention scheme, the effect may be to perpetuate gluts if the support price is set too high. Lastly the storage expertise of AMSL should be improved and they should be given more flexibility to intervene at any early enough stage.

For the small farmers, the intervention system has been of little help as the quantities they can offer individually are not enough to be handled effectively by the system. They also typically have cash flow problems as they need cash at harvest time both for financing social events such as marriages and paying for inputs of the subsequent or previous crop. This means the farmer has to sell and consequently he may have to take a lower price. Institutional credit facilities need to be developed to overcome this. Credit specifically for storage could enable potato to be retained by the small producers until higher price periods.

In addition to widening domestic market opportunities, the option of exporting has to be considered. However, potato will only be exported on a sustainable basis if it competes on quality and price in the international markets. Iran may offer an outlet in time of glut and low price for the sub-standard potato generally on offer from Pakistan. To export elsewhere, improvements in handling, grading and shipping are essential, as is an internationally competitive price which is maintained irrespective of high domestic prices.

A similar problem exists with post harvest handling. As Seymour (1988) remarks "Post-harvest Technology is the neglected part of production and marketing of fresh horticultural

produce in Pakistan". Storage, transportation and handling in the wholesale markets all need to be upgraded to prevent unnecessary damage and enhance consumer acceptability. For costly seed potato, transporting in wooden crates should be considered and for table potato in general, the potato could be transported in bags as at present but with partitions in the trucks to improve airflow and reduce crushing.

One could argue a case for a Marketing Board, as in the UK, to carry out a number of industry-wide tasks. These could include consumer promotion, market intelligence, crop limitation schemes, intervention, grading, storage, export, even research. However most of these functions, where practicable or desirable, could be undertaken by existing organisations such as AMSL or by Growers Associations. The only area which would not be covered is consumer promotion but it would not be worth establishing a separate organisation just for this. Nor would it be cost effective to set up a parastatal, with all the usual bureaucratic apparatus, to take over roles which were more properly those of the private sector.

The situation with seed potato is more promising as domestic production is making very tangible headway in replacing imported seed. However, the standard of seed available on the general market i.e. that for table potato production rather than further multiplication, is of variable quality and there is scope for considerable improvement. The seed plot schemes of a few larger farmers should be encouraged so that once their own needs are met, a new and greatly expanded source of supply of improved quality seed becomes widely available in the markets for purchase by the medium and small farmers.

The marketing system for potatoes operates reasonably effectively, giving a fair return to producers and low margins to intermediaries who make their money largely on high turnovers. The efficiency of distribution is such that Punjab potatoes can be found on sale in the small town of Skardu, remote in the

Karakoram mountains in the far north of the country. The defects in the distribution system are more with the way the potato is handled than with the system as such. The situation of widely fluctuating prices has as much to do with inadequate market intelligence and a failure to react to market signals as with any structural deficiency. It is a phenomenon common worldwide with perishable commodities and is associated with decision-making using historic data rather than future intentions (as could be gauged by seed orders etc). The only cost effective long term way to deal with the problem is to educate farmers into more informed decision-making and by planting alternative crops in years of likely excess supply. The free market solution is more likely to achieve a better resource allocation than introducing market distortions through intervention, even if efficiently administered.

In the long run, the volume of consumption of potato is bound to grow. Therefore, with the increasing adoption by farmers of cost-reducing technology and the provision of better market intelligence, the market prospects and profitability over time for potato producers appear promising, despite the risk of periodic low prices. The crop seems set to increase in importance and has an encouraging future as a valuable cash crop and a potentially major food source.

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Official Statistics of Potato in Pakistan

	<u>Punjab</u>	<u>NWFP</u>	<u>Baluchistan</u>	<u>Sind</u>	<u>Pakistan</u>
	(Area in '000' hectares)				
1965-70	10.5	4.1	3.2	1.2	19.0
1970-75	14.0	5.7	2.9	1.2	23.5
1975-80	21.4	7.6	2.9	1.1	33.0
1980-85	32.4	9.7	4.7	0.9	47.8
1985-86	45.9	10.6	5.4	1.0	62.9
1986-87	43.2	11.7	4.8	0.8	60.5
1987-88	41.7	8.8	6.9	0.7	58.1
	(Production in '000' tonnes)				
1965-70	103.6	35.6	35.6	9.1	183.9
1970-75	158.9	56.8	24.9	9.9	250.4
1975-80	249.0	70.1	26.6	8.9	354.6
1980-85	327.4	93.3	59.5	8.3	488.4
1985-86	427.8	104.3	77.7	8.6	618.4
1986-87	387.3	124.5	75.0	7.5	594.3
1987-88	383.3	95.2	78.4	6.3	563.2
	(Yield per hectare in tonnes)				
1965-70	9.9	8.5	11.1	7.5	9.7
1970-75	11.3	9.9	9.4	8.6	10.7
1975-80	12.0	9.2	9.1	8.5	10.8
1980-85	10.1	9.6	12.5	8.8	10.2
1985-86	9.3	9.8	14.4	8.6	9.8
1986-87	9.0	10.6	15.6	9.4	9.8
1987-88	9.2	10.8	11.4	9.0	9.7

Source: Agricultural Statistics of Pakistan 1982 & 87/88.

Annex-2

Percentage Distribution of each Province in Total Potato Area and Production.

Province	Area Contribution %	Production Contribution %
Punjab	71.8	68.1
NWFP	15.1	16.9
Baluchistan	11.9	13.9
Sind	1.2	1.1
Pakistan	100.0	100.0

Source: Based on information from Agricultural Statistics of Pakistan 1987/88.

Annex-3

Area and Production of Potato in Pakistan in Different Seasons.

Crop season	Area (ha)	% of Potato area	Production (t)	% of total Potato production
Spring	11018	22	137709	14
Summer	11989	24	227152	22
Aut/Win.	27269	54	649853	64
Total:	50276	100	1014714	100

Source: 1. The main source of area data is Agricultural Statistics of Pakistan 1983.
2. Production data derived from yield estimation surveys of Pakistan-Swiss Potato Development Project, PARC, Islamabad, 1984-85

**Average Wholesale Prices of Potato
at Lahore Market (1980-88)**

(Rs./100 Kg)

Months	1980	1981	1982	1983	1984	1985	1986	1987	1988
Jan	66.9	145.6	137.5	85.6	112.5	123.1	120.0	117.5	221.0
Feb	51.5	130.0	128.1	86.3	144.4	159.4	121.3	110.0	197.5
Mar	45.0	152.5	137.5	88.8	221.3	173.8	114.4	115.0	270.0
Apr	75.0	192.5	133.8	108.8	269.0	183.8	110.0	185.0	332.0
May	58.1	200.0	120.0	140.8	273.8	165.0	127.5	290.0	400.0
Jun	102.5	263.8	136.3	150.0	271.9	195.0	179.4	287.5	470.0
Jul	145.0	300.0	170.0	166.3	276.3	211.3	195.0	362.5	485.0
Aug	145.0	316.9	170.0	206.9	284.0	204.0	257.5	390.0	453.0
Sep	145.0	405.0	170.0	206.9	267.5	105.0	245.0	370.0	502.0
Oct	158.8	420.0	175.0	262.5	265.0	227.0	207.5	400.0	507.0
Nov	236.3	410.0	172.5	222.5	291.0	246.9	225.0	465.0	553.0
Dec	162.5	262.5	126.0	115.6	156.9	129.4	145.0	243.0	357.0
Mean	116.0	266.6	148.1	154.3	236.1	184.5	170.6	278.0	395.6

Source: Agricultural and Livestock Products Marketing and Grading Department, Karachi.

**Average Wholesale Prices of Potato
at Karachi Market (1980-88)**

(Rs./100 kg)

Months	1980	1981	1982	1983	1984	1985	1986	1987	1988
Jan	76.2	122.4	135.4	89.6	127.5	142.2	137.2	121	229
Feb	60.4	118.8	125.0	77.5	137.3	188.9	134.8	132	213
Mar	63.8	131.3	124.8	85.3	155.4	178.6	119.2	127	242
Apr	60.7	160.5	111.7	87.2	203.6	197.5	108.9	173	271
May	75.0	197.2	126.3	109.1	271.5	206.3	130.2	248	393
June	81.9	242.1	139.4	145.5	271.3	239.1	154.0	253	406
July	87.5	285.0	143.9	151.9	274.9	253.1	170.0	266	439
Aug	100.0	320.0	133.9	167.5	257.7	241.8	185.0	245	411
Sep	110.9	332.5	125.9	212.5	306.9	203.3	157.5	382	458
Oct	176.3	333.8	139.3	206.3	299.8	204.6	140.0	366	497
Nov	238.0	325.0	125.2	277.7	215.0	222.7	225.0	439	551
Dec	142.9	185.0	94.3	170.8	130.9	168.1	180.0	265	357
Mean	106.1	229.5	127.1	148.4	221.0	203.9	153.5	251	372

Source: Agricultural and Livestock Products Marketing and Grading Department, Karachi.

**Description of Dealers in NWFP Trading
in Vegetables Including Potato.**

Village Dealer: a supplier of inputs (on credit and/or cash terms). His credit is repaid either in cash after harvest or he takes a portion of the producers' crop as payment. If the latter, he generally sells to a commission agent. This dealer may also do some "road-side" buying in small amounts.

Commission Agent: most common and active of all middlemen and is a vital link in system because he gives to small farmers production credit not readily available elsewhere. He generally takes produce on consignment, may transport, and sells to wholesaler, mini-wholesaler, other commission agent or food processor. He deducts his advances to the producer plus interest, commission and service charges before making a final settlement. Commission agents seldom give any accountability for final weights, prices or details of their charges. A commission rate of 6% is generally accepted in NWFP markets for such services, however, this does vary considerably. Flat rate charges per bag are also common.

Wholesaler/Jobber: operates almost exclusively in the wholesale markets. He buys from a few medium/large producers but more generally from the village dealers, preharvest contractors, commission agents, or other wholesalers. Most of his sales go to mini-wholesalers and/or retailers. "Service charges" here vary from 0.5% to 1.5%. Wholesalers collaborate closely with commission agents. Wholesaler/jobbers at times buy/store vegetables for their own account.

Mini-Wholesaler: supplies the least of all services, absorbs less risk and proportionally charges more than all the other middlemen. He buys in the wholesale market for sale to primary

or secondary (small shops or mobile salesmen) retail markets. In most cases, his job consists of delivering produce from a wholesale market centre to a retail centre. He may work for either a wholesaler, commission agent or for his own account. Where this man is a part of the system (as in most major wholesale markets), the result is a 25-50 percent increase over wholesale price.

Retailer: these may be large central market operators, small, street shop vendors or push cart and other small mobile peddlers. Consumers frequent central retail markets as they do smaller, maybe more conveniently located shops. Wholesale and retail markets are generally open 7 days a week and close for only a few holidays.

Many of the middlemen described may function in 2-3 capacities within the system i.e. a commission agent may also function as a preharvest contractor and a wholesaler. Wholesalers, jobbers, brokers, commission agents and even preharvest contractors may operate throughout Pakistan. The system is complicated even more by unique practices such as "donations" from each lot of produce auctioned in most wholesale markets. The producer absorbs this donation to commission agent groups or other middlemen quasi-associations as he has no option to do otherwise.

Source: Marketing Consultancy for Malakand Fruit and Vegetable Project, February 1989.

Marketing Kalam Potato to the Punjab Plains

A1. INTRODUCTION

Kalam valley is one of the most important potato growing areas in the northern hills of Pakistan. The Pakistan-Swiss Potato Development Project conducted a study on marketing Kalam potato to the Punjab plains during October 6-16, 1988. Each step in the movement of potatoes from Matiltan (Kalam valley) to the market of Lahore was recorded.

The study focused on the following objectives:

- to examine the movement of potatoes from the hills to the Punjab plains;
- to collect data on the costs and margins involved;
- to estimate losses if any;
- to find out the difficulties faced during the transportation of potatoes from hills to the plains;
- to suggest policy guidelines for improvement of the prevailing situation.

A2. METHODOLOGY

Data were collected by both interview and observation. No formal questionnaire was administered but the data were solicited through unstructured dialogue. The study commenced by observing farmers' post-harvest practices in the fields of Matiltan (Kalam valley) area and collecting economic data from the producers. The researcher then travelled from Kalam valley to Mingora on a potato truck to observe how the bags were handled and transported to the regional market. Information was then obtained from traders in the Mingora wholesale market. Thereafter the researcher travelled with a loaded truck to Lahore wholesale market, observing all aspects of transportation. In Lahore, the

second largest city of Pakistan, information was gathered on the marketing system there. Finally the retailers who ultimately received the Kalam produce were interviewed.

A3. The Market System

A3.1. At Farmers' Fields

After harvesting, it was noted that the farmers fill the bags in the field with ordinary and small size tubers at the bottom and large sized on the top as a cosmetic measure (the traders are fully aware of this). Empty second hand bags are generally purchased from Mingora at the cost of Rs. 12/- to 15/- per bag. Sewing of potato bags after filling is done by the farmers themselves. Weighing of potatoes was not done at farm level. The bags were transferred from the farmers' fields to the nearest roadside by camels.

Three bags of potatoes were loaded on each camel. Loading on the camels and the cost of carrying the potato bags to the road side was Rs. 2/- to 12/- according to the distance, which was usually not more than 3 Km.

Camel drivers were not local people. They came to Kalam valley from the Sakhakot and Mardan areas only during the potato harvest season and specifically for carrying potato.

The bags were stacked at the roadside if a truck had been organised for transporting these to Mingora. Otherwise the bags were stored in an ordinary room near the road for a few days until trucks were obtained.

One or more of the farmers hire the truck, according to their number of bags. Loading on the truck cost Rs. 120/- for the whole truck. Labourers were employed who were generally local people. A normal truck load was 100 bags.

The cost of truck hire to Mingora varies according to the distances. The following were the different transportation rates:

<u>Route</u>	<u>Rs. per Truck</u>
Utror/Matiltan to Mingora	1200/- to 1300/-
Ushu to Mingora	1100/-
Kalam to Mingora	1000/-

Farmers do not consign their potatoes directly to the Punjab and so only pay the transport cost to Mingora.

There are no permanent pickup points from where potato bags are loaded on the trucks. The loading points were simply the nearest roadside place to the farmer's fields.

There are three forest checkpoints on the Kalam-Mingora route where checking of the illegal transport of timber is done with the help of a 7-8 ft. long iron rod. Those trucks are exempted who pay Rs. 2-4 at each checkpoint, situated at Kalam, Behrain and Fateh pur.

Octroi charges at Fizza gatt, adjacent to Mingora, were Rs. 30/- for the truck load. The transit tax was Rs. 210/- which is refundable if all the bags were sent to the Punjab or Peshawar by transferring to another truck in Mingora.

A3.2. At Mingora Market

For those trucks delivering to Mingora market, the unloading cost Rs. 1/- per bag. The potato was sold through a commission agent by open auction. One of the bags was opened during auction to sample the quality in the presence of the purchasers.

The sale price at Mingora market was Rs. 37000 - 39000 per truck of 100 bags of potato. The commission agent charged Rs. 3/- per bag as his commission from the farmer. Farmers were not

necessarily bound to sell their produce to those commission agents from whom they got credits for buying inputs. Neither the weighing of bags nor of the truck is practiced.

Payment (in cash) was made to the farmer after auction, within 1-2 days. During this period lodging arrangements for farmers were made and paid for by the commission agent-cum-wholesaler.

Dealers from nearby places (like Mardan, Sakhakot and Peshawar) purchased potato through commission agents on a loan basis and after selling this at their stations they paid the purchasing cost to the commission agents without any extra charge.

A very small number of truck loads are sold in the Mingora market. More than 90% of the trucks reaching Mingora continue through to the Punjab plains.

A3.3. Trade for The Punjab Plains

The actual direct sale of potato for the Punjab is physically made outside the Mingora market. Farmers deal at the roadside with the Punjab traders. The traders check the potatoes before buying, by opening any bag or bags.

After an agreement is reached on a price for the whole truck load, transfer of the potato bags is done from one truck to another, the vehicles being parked back-to-back for this purpose.

The payment for transferring the potato bags from one truck to another is at the farmer's expense. Transfer charges were Rs. 120/- for a truck containing 100 bags. The cost of truck hire to the Punjab is at the buyer's expense and covered from within the wholesale margin.

The trucks on which potatoes are transported from Kalam valley to Mingora are not allowed to go to the Punjab plains because of their limited route permit.

Payment is generally made on the spot by the Punjab traders to the farmers without the intervention of commission agents. The weighing of potato bags at this stage is also not practised.

A3.4. Mingora to the Punjab Plains

The truck took about 17 hours to travel a distance of about 550 Km from Mingora to Lahore. During this journey, there were only four stops: one for dinner (20 minutes) at Jalalabad, one for breakfast (20 minutes) at Sarai Alamgir and two for taking tea (each of 10 minutes) at Taxila and Gujranwala.

It was observed that the potatoes were not covered on the truck. Due to this the rain can affect the potato bags.

The transport charges of potatoes from Mingora to Lahore were Rs. 2200/- to 2500/- per truck.

The weighing of the truck, loaded with potato bags, was done only for the payment of octroi charges at the Octroi check post, Lahore. It was calculated, at this stage, that the average weight of the bags of Kalam potato was 85 Kg per bag, a little less than was expected.

Table A shows the different charges and payments made during the transportation of potato bags from Kalam to Lahore.

There were eight check posts between Kalam and Lahore. At these posts the illegal transportation of timber was controlled. For this purpose the inspector checked with a long iron rod by inserting it from the top to the bottom of the loaded truck. Sometimes the rod may pass through potato bags and can

damage the potatoes. But this is only done with trucks actually suspected of the illicit trade. Most of the truck drivers give Rs. 2/- to 10/- in order to avoid this trouble.

Table A. Charges and Payments made During Transport of Potato From Kalam to Lahore.

<u>Type of Payment</u>		Amount in Rs. (for whole truck Responsible of 100 bags)
-- Loading on truck in Kalam valley	Farmer	120/-
-- Transferring to another truck	Trader	120/-
-- District tax	Trader	360/-
- Forest check post charges	Trader	26/-
- Octroi charges	Trader	150/-
- Weighing	Trader	10/-
- Toll or Transit tax	Truck owner	65/-
- Police charges	Truck owner	20/-
- Bridge Tax	Truck owner	30/-
- Unloading at Lahore market	Trader	75/-
Total		976/-

N.B. Excluding fuel costs and other vehicle related costs such as maintenance and depreciation, driver wages etc.

A3.5. At Lahore Market

Unloading charges at Lahore market were Rs. 75/- per truck which were paid by the trader.

The trader sold the potato bags through a commission agent (commission agents may work also as wholesalers).

The selling of potato bags is done through open auction in the afternoon at the auction platform of the market. The commission agent/wholesaler pays the trader in cash after the auction.

Buyers called *Pharias* (semi wholesalers) check the potato bags during auction by opening one or more of the bags. The selling price at auction was Rs. 440/- per bag.

Besides *Pharias*, some traders from different small cities and towns of nearby areas also buy potato through the auction.

Pharias take the bags to their platforms within the market after auction. Retailers from all over the city come and buy the potato from the *Pharias* the following morning. *Pharias* grade the potato into two categories, grade A for high quality potatoes and grade B for diseased, damaged and undersized potatoes. Quantitatively these were almost 50% each. The sale prices of these graded potatoes were:

Grade A Potato	Rs. 28/- per 5 Kg
Grade B Potato	Rs. 26/- per 5 Kg

Pharias weigh the potatoes while selling to retailers. Retailers buy potato in the quantity ranging from 15 Kg to 40 Kg. Payment to the *Pharia* is by cash and on the spot.

Retailers take the potatoes with other vegetables to their shops on donkey carts, horse-drawn tongas or Suzuki pickups. The transport charges were about Rs.-/20 per 5 Kg of potato per kilometer.

The retailers buy potato once or twice per week. The retail sale price was Rs.8/- per Kg for high quality and Rs. 6/- Kg for low quality potato .

The weighing was done only at the Pharia and retail levels, otherwise during the whole process of buying and selling the potatoes were not weighed.

The losses of whole tubers were found to be minimal throughout the marketing chain. The wholesalers and Pharias make allowance for damage to the tubers by grading. Thus they sell the whole lot of potatoes by discounting the sale price of inferior potatoes.

A3.6. Market Margins

It was noted during the study that the gross market margin was the highest for the retailer, i.e., Rs. 1.60 per Kg of potato which was about 30% (table B). This may be because he bears the greater risk of losses and relatively higher unit costs. The trader's mark up is higher than the wholesaler's as he has to cover the cost of transport. The wholesaler's margin is low but he has a much greater volume of business.

A3.7. Marketing Costs

Table C shows a typical cost pattern of marketing potatoes from the growers to the wholesaler/retailer.

Table B. Gross Market Margins.

Market Levels	Purchase price (Rs./Kg)	Sale price (Rs./Kg)	Gross margin (Rs./Kg)	Gross margin (%)	Share of Mkt margin (%)	Share in consumer price (%)
Farmer	--	4.46	--	--	--	63.7
Trader	4.46	5.25	0.79	17.7	31.10	11.3
Pharia/Semi-Wholesaler	5.25	5.40	0.15	2.9	5.91	2.1
Retailer	5.40	7.00	1.60	29.6	62.99	22.9
Consumer	7.00	--	--	--	--	--

Table C. Marketing Costs of Kalam Potato.

Item	Per bag of 85 Kg	(Rs.)
Farm gate price		350.75
Empty bag	12.00	
Filling of bag and loading/unloading on camel	4.00	
Loading on truck	1.20	
Transport to Mingora	12.00	
Transferred to other truck	1.20	
Transport to Lahore	23.50	
District tax	3.60	
Octroi	1.50	
Forest check post charges and various tolls/transit charges	0.91	
Miscellaneous charges	0.69	
Unloading at Lahore market	0.75	
Market fee	0.40	
Commission charges	27.50	
Total marketing costs		89.25
Wholesale price		440.00

Marketing costs, expressed as a percentage of the wholesale price amounted to approximately 20%. This will however vary as market costs are related to the volume of produce sold, not to the produce price.

Source: Kokab 1989.

Comments on the Constraints of the Existing Marketing System

Two reports by USAID and the Asian Development Bank provide a summary of the constraints identified by many observers:

USAID Views: The efficiency of fruit and vegetable marketing in Pakistan varies widely across the marketing system. Some marketing problems arise from production practices, lack of on-farm storage, rudimentary harvesting and packing methods, and relatively wide swings in output from year to year. The segment that links the producers to local markets or primary distribution points seems to function relatively efficiently. At the wholesale marketing level, the system is less efficient due to the congested and dilapidated conditions of most fruit and vegetable market places, as well as the large number of relatively small transactions that take place before the goods finally reach the consumer. Nevertheless, it should be recognised that all of these transactions are accomplished with marketing margins that are not excessive when the risk involved and the inadequacy of the facilities are taken into account. Similarly, the wholesale marketing system has shown an ability to handle the increased volume of fruits and vegetables that flow through it, though the physical condition and congestion in particular markets impose absolute limits on the volume of produce that can be absorbed as well as on the efficiency of the wholesale marketing systems. There is thus considerable need for improvement of the entire marketing system.

ADB Views: Wholesale market places are generally poorly designed, entirely too small with no storage facilities, located in the centres of towns, villages and major cities. Congestion, confusion, filth, disorder and reputed malpractices best describe most wholesale market places. Commission agents and

wholesalers "manage" the wholesale markets. Auction "biddings" start in some markets as early as 4.00 a.m. Few producers are ever permitted to enter the market place. Price may vary over 100 percent within 2-3 hours. Trading is generally over for the day before 8.00 a.m. This organised confusion and congestion is to the benefit of wholesalers/ commission agents who are far better informed as to prices, markets, available storage etc. than the small unorganised, poorly informed producer.

Source: Quoted in Marketing Consultancy for Malakand Fruit and Vegetable Project, February 1989.

A Predictive Model of Price Inelastic Demand and Price Elastic Supply.

It is not the intention to develop complex theoretical models here but this annex may throw some light for policy makers on why the market behaves as it does. An uninformed pursuit of yield maximisation may actually lead to a fall in farmers' incomes if no account is taken of demand elasticities in the market place.

Price Elasticity* is a measure of the proportionate change in output supplied or demanded in relation to changes in price. If a price change leads to a less than proportionate change in the quantity supplied or demanded, then the response is said to be price inelastic. Conversely where there is a more than proportionate rise or fall in the quantity, the response is termed price elastic. Any elementary economics text book can explain the theory more fully.

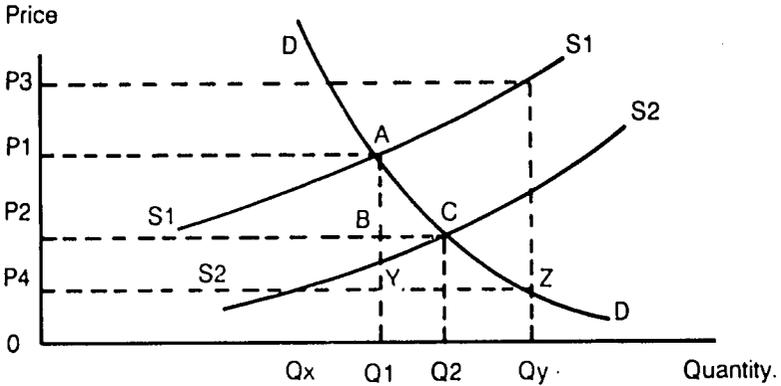
In the case of potato, the supply nationally** is relatively elastic as it may vary greatly from one season to the next, as happened between the 1988 spring and summer and the 1988 autumn crops. Shortages caused high prices in 1988 leading to a glut in 1989 (and very low prices). But the gluts and shortages, and the related prices, reflect the inelasticity of demand upon which we commented earlier (Section 4.2). The following diagram, demonstrates the logic. The aggregate demand curve DD is inelastic, the aggregate supply curve $S_1 S_1$ is elastic.

*The Elasticity Coefficient E =
$$\frac{\Delta Q \times (P_1 \times P_2)/2}{\Delta P \times (Q_1 + Q_2)/2}$$

where Q = quantity, P = price

** That is the aggregate effect of behaviour in the society. Individual response may differ. Specialist potato producers in Pakistan tend not to be very responsive to price changes. The major effects are due to a large number of non-specialist producers who switch into and out of the crop, so destabilising the market.

The Effects of Production Changes in a Situation of Price Elastic Supply & Price Inelastic Demand.



The equilibrium price where supply and demand are in balance is at P_1 . If the price for whatever reason increases to P_3 , then suppliers will want to produce Q_y . If there are no available stocks to start satisfying demand, so bringing the price down towards the equilibrium level, then the danger is that producers will believe that price P_3 will be the long run price and they will want to plant more, up to quantity Q_y . Should this happen and Q_y is produced, then a glut occurs and the market can only be cleared at the low price of P_4 . The producers would have been better off at the equilibrium price P_1 where the extra revenue P_4 from the higher price, represented by the rectangle P_1, P_4, Y, A , greatly exceeds that lost through reducing output (Z, Y, Q_1, Q_y). [The farmers would be even better off by artificially restricting the output to below the equilibrium level (for instance at Q_x)]. The clear gainers at quantity Q_y are the consumers who get more potato at a lower price than if supply and demand were in balance.

In the circumstances of elastic supply and inelastic demand what would happen if technological change occurred, as in

following yield maximisation policies? Would this serve producer welfare more or would the benefit accrue more to consumers?

In the diagram let us suppose technological change causes the aggregate supply curve to shift down to S_2 S_2 as yields increase and unit costs* diminish. Producers will want to produce more at any given price level rather than restrict output. The new short run equilibrium would be at price P_2 where quantity Q_2 is produced. But farmers' revenue will have fallen by rectangle $P_1.A.B.P_2$ -- rectangle $B.C.Q_2.Q_1$. Thus farmers will have invested more to produce more but end up earning less**. This is the same rationale as with investing in improving handling - **it is not worthwhile if the extra cost involved is not compensated by a higher level of revenue.**

In our example, if all farmers*** improved their technology to increase yields and did not reduce the potato area farmed to take account of demand conditions, each one instead anticipating an infinitely elastic demand, then they would all be worse off and there would be a transfer of welfare to the consumers. Unit costs would have been reduced but **revenue would have fallen even more**. Society as a whole may benefit with more production at lower prices but it would not pay the farmers to improve their technology unless they were compensated in some way. However, likely responses would be that, as prices fall, producers would switch some of their potato-growing land to other crops, so

* Unit costs are total costs, otherwise called average costs.
output

** Unit costs will fall but total costs may rise and total revenue will fall. Only if total costs fell by more than the fall in revenue would there be gains for the farmer but as the area cultivated may not be reduced and technological innovation normally costs money, then it is to be expected that total costs will rise rather than be reduced. Profit maximising behaviour would be to reduce potato cultivation in these circumstances and switch to another crop.

*** If only some farmers innovate and their increased output is small in comparison to total output, prices will be little affected and they will then be gainers. Otherwise the "fallacy of composition" operates -- what is reasonable for one producer in isolation is not sensible if similar actions are adopted by a significant proportion of the others.

widening income opportunities. The more inefficient, less progressive farmers may turn away from potato cultivation as they could not cover their marginal costs at the new lower level of marginal revenue unless they too resorted to technological change. It is conceivable, if more unlikely, that the increased yields may cause prices to fall to low enough levels to induce exports and this may help offset the limitations set by domestic demand. In any event, the **producers' economic response to higher-yielding technological innovation should be to reduce the area planted to potato, not increase it.**

The message to policy makers is that crop maximisation alone is not the answer to the nation's agricultural problems*. A consideration of the relative price elasticities of supply and demand will indicate its likely success for producers (the most favourable for them is when demand is relatively more elastic than supply, i.e. the opposite to the apparent case in potato). A better way to assist potato farmers would be (1) to encourage, if possible, a greater consumption of potato so shifting the demand curve outwards; (2) to have good market intelligence so that supply and demand are kept more in equilibrium; and (3) to introduce technological improvements in a selective way, not to promote more production per se in a single crop but to allow a more diversified production at lower unit costs. This would open up more opportunities for farmers, stressing comparative advantage in a competitive environment and permitting land to be released for other purposes. This approach of allocating productive resources to best effect (even to non-agriculture uses if need be) will benefit both consumers and producers and thus increase the total welfare of society. See also Smith (1989) for a

* To some extent the same arguments apply to cost-reducing techniques which do not rely on yield increases but with the important differences that (1) in order to increase production, other land has to be available, (2) if production is not expanded, the total costs will fall rather than rise. Therefore the likelihood of price falls are much less and the chances of widening the gap between total costs and total revenue more promising. The fundamental difference is that, in this case, supply is relatively more inelastic because of land availability. The supply curve in the figure becomes tilted upwards more steeply.

discussion on policy options to induce price stability in the potato market.