

**A COMPREHENSIVE ANALYSIS OF WHEAT PRODUCTION
AND BALANCING ITS DEMAND AND SUPPLY.....
PROBLEMS AND REMEDIAL MEASURES
(A CASE STUDY OF PAKISTAN)**



BY

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DEPARTMENT OF ECONOMICS
UNIVERSITY OF PESHAWAR
PAKISTAN
1999

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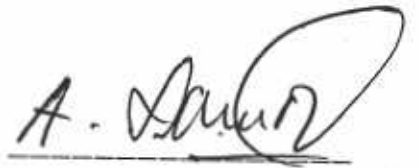
A thesis entitled; "A comprehensive analysis of wheat production and balancing its demand and supplyProblems and remedial Measures" (A case study of Pakistan) be accepted as fulfilling this part of the requirement for the degree of Doctor of Philosophy in economics.

Submitted by

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Supervisor/Internal Examiner



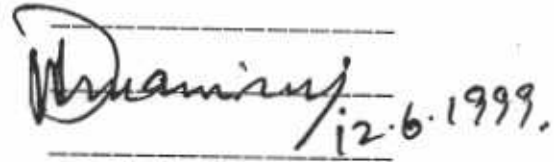
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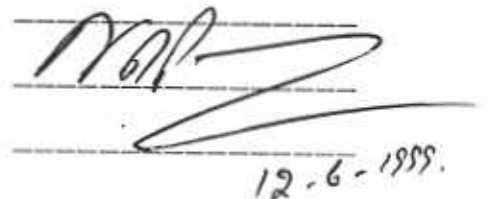


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ABSTRACT

Wheat is ^auniversally cultivated and produced staple food item of common use. In Pakistan, it is being used regularly. Its extensive and constant use has made people habitual of it and they cannot even bear its partial shortage or scarcity.

The purpose of the present study is to remove such transitory shortages between consumption (demand) and production (supply) to bridge the gap between them through efficient wheat policy. Consumption (demand) of wheat depends highly on population growth and changes in per capita income of the country. Population of Pakistan is increasing at a higher rate (2.7 percent), which is creating pressure on the cultivated land and thus adversely affecting production of wheat. Moreover, the per capita income is increasing at a rate of 11.9 percent which is raising the aggregate demand for better quality of wheat. Thus, a gap is created between demand and supply of wheat which is further widening with the passage of time. This problem can be solved through efficient government policies, which will bring self-sufficiency of wheat to the economy and may even lead towards exportation of wheat and earn foreign exchange in import – substitution.

Self-sufficiency in food grain production is the national goal. Pakistan enjoys a comparative advantage in wheat production, therefore, the self-sufficiency goal is theoretically valid. The essence of the findings of the present study is that the irrigation induced technological changes would accelerate the growth of wheat production, resulting in a gain of economic efficiency and achieving self sufficiency.

The key success to increase wheat production lies in rapid adoption of technology. The diffusion of biochemical technology (HYV, fertilisers,

pesticides, etc) is a more appropriate path towards technological progress than alternative labour saving mechanisation (labour – intensive and capital intensive techniques).

Production (supply) of wheat depends on the total land availability for the crop, irrigation facilities, climatic conditions and market price of wheat. Wheat is sown in the month of November-December, where in rain fed areas, we receive very little rain and which always brings a bad harvest. It is an exceptional case in Baluchistan and N.W.F.P. but bumper cropping in Punjab and Sindh have irrigation facilities.

Effort has been made in this study to achieve an equilibrium between demand and supply of wheat. For this, data has mainly been obtain^{ed} and used from government published agricultural bulletins, economic surveys, etc. Moreover a little primary data has also been used for the derivation of Cobb-Douglas production function and Marginal Physical Product of labour.

A very useful Auto Regressive Integrated Moving Average (ARIMA) model has been used in this study which has forecasted wheat production upto 2010 (13 years ahead). This will help the planners and concerned agencies in time importation of wheat.

The findings of the study are that both irrigation and technology would play the leading role in the growth of future wheat production. The government will also have to change its wheat policies in light of the new development. Specially it has to eliminate subsidies and check its role in the price formation. Finally if the recommendations of the study are adopted, Pakistan will not only become self-sufficient in wheat production but may emerge as wheat exporting country also.

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MOHAMMAD NAEEM.

Research Scholar

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CHAPTER I

INTRODUCTION

1.1 Outset

The fundamental human right is the right to live. The food policy of a nation can play a dominant role to ensure this right, especially, if it struggles to overcome the persistent problem of hunger and starvation. It equally becomes a matter of paramount concern to those responsible for the nation's welfare. Pakistan is among the few countries of the world, where majority of the people suffers from lack of food security. Millions of people are pre-occupied solely with survival and constant hunger, which is a reality in their every day life.

Greater production of food alone is not sufficient enough to solve the problem of hunger. Since the ultimate purpose of food production is for the people to consume, agricultural policy formulation should incorporate consumption and nutritional considerations. Historically this is not being the case in Pakistan. Agricultural policy in general throughout has remained production oriented. Actually, food production and consumption have their mutual influences on each other. Sound understanding of this inter relationship is, therefore, essential for developmental planning.

There are two main crop seasons in Pakistan *Kharif* and *Rabi*. The *Kharif* season starts from April-June and ends in Oct-December, while the *Rabi* season starts from Oct-December and ends in April-May. Food policy in Pakistan largely represents food grain policy. Among major food crops in *Kharif* are rice, maize, *jowar* and *bajra*. Similarly in the *Rabi* crops are *wheat*, *gram*, *barley* and *mustard*.

From the preceding paragraph it is to be observed that in Kharif the major food crop is rice, while in the Rabi it is Wheat. So for rice is concerned, it does not have any problem which is revealed from the following facts:

Rice

It occupies about 10.2 per cent of the total cropped area. For 1997-98, its production was 4325 thousand tonnes as compared to last year's production of 4305 thousand tonnes. It fetched Rs. 10032 million in exchange by exporting rice during the fiscal year 1994-95. Rice has been cultivated on 2313 thousand hectares as compared to 2251 thousands hectares last year, showing an increase of 2.8 percent. There is no shortage and exportable surplus is always available.

Wheat

Wheat the main staple food, is the single largest grain crop of the country. For 1997-98, the area and production have been fixed at 8.3 million hectares and 18.6 million tonnes, as against 16.6 million tonnes of the last year, indicating an increase of 12 percent. The bumper wheat crop is attributed to government's strick policy regarding wheat.

In 1996-97 the production of wheat declined by 3.1 per cent as compared to the last year production. To bridge this gap between demand and supply approximately Rs. 90 billion have been spent on importation of wheat and still the panic remained uncontrollable. (*Economic Survey 1997-98*).

In this study, efforts have been made to go deeper into the problems and identify the core reasons responsible for widening the gap between demand and supply of wheat, and also give remedial measures for curing the situation.

For this purpose data for several years have been compiled to evaluate and the cycles (ups and downs) of the production of wheat (demand and supply) and to formulate a policy for the future so that through planning wheat shocks to the economy could be minimized. For this end, regression model has been used to forecast future wheat requirements with scientific validity, which may help the planners to overcome future shortages of wheat.

The production of wheat cultivation for the last ten years (study period) is given in the table 1.1 below.

Table 1.1
Area, Production and Imports of Wheat for 10 years

Year	Area (000 hectares)	Production (000 tonnes)	Imports (000 tonnes)	Yield per hectare (kg)
1988-89	7729.6	14419.2	1802	1865
1989-90	7844.5	14315.5	1603	1825
1990-91	7911.4	14565.0	627.3	1841
1991-92	7877.6	15684.2	1640.4	1990
1992-93	8299.7	16156.5	2356.6	1946
1993-94	8034.2	15213.0	1408	1893
1994-95	8169.8	17002.4	2273	2081
1995-96	8376.5	16907.4	1931	2018
1996-97	8109.1	16650.5	2383	2053
1997-98	8378.0	18634.0	-	2224

- Source:
1. Economic Survey of Pakistan, 1997-98
 2. Agriculture Statistics of Pakistan, 1996-97

The table shows clearly that area and production of wheat are increasing each year but still like always are short of demand. To fill this gap between demand and supply, a significant quantum of, wheat is being imported with precious foreign exchange spent on it each year.

Pakistan is basically an agricultural economy and it is very astonishing to know that the country is not self-sufficient even in basic food items like wheat. Thus, the basic aim of this study is to devise policies to bring out self-sufficiency in wheat.

These observations suggest that the performance of wheat and rice are the primary determinants of the growth in agriculture and to a larger extent to the development of the economy. The present study of wheat essentially signifies wheat policy, focusing on the different attributes of wheat production and consumption in Pakistan.

Pakistan is a fertile region of the Indian subcontinent. Historically, this region (Pakistan) produced surplus food. However, the Malthusian syndrome gradually transformed Pakistan's economy in the absence of technological progress. Consequently, Pakistan has become food deficit region. Although wheat production has increased moderately over the past years, this has been more than negated by population growth. Shortfalls in food grain are met by imports, in view of the severe budgetary limitations of the government, whereas development efforts emphasize increase in wheat production to achieve self sufficiency (*Ghaffar 1983*).

1.2 THE PROBLEM

Pakistan is basically an agricultural country. It accounts for 25 percent of GDP, Provides employment to about 47.50 percent of the labor force and contributes 42 percent of the export earnings. Food policy in Pakistan largely represents food grain policy. Among food grains wheat occupies the peripheral position followed by rice, however, main concern of the study under review is with wheat policy.

Despite the fact that Pakistan has 4.07 million farms and 48 percent of the population engaged in farming, it has not been able to achieve self-sufficiency in wheat. Yet, Pakistan has been importing 2.4 million tonnes of wheat during 1992-93 to supplement domestic reserves and 1.40 million tonnes during 1993-94. During 1995-96, the import of wheat has been 1.93 million tonnes. While in 1996-97 again this reached a highest figure of 2.4 million tonnes. The deficit in wheat supply exists as the years pass. Pakistan, with few exceptions, has not achieved self-sufficiency in wheat. It may be noted that self-sufficiency is not a static phenomenal. It is a moving target, which depends on a variety of factors such as the price structure, income elasticity of demand, requirement of seed and feed etc. The import bill on wheat is estimated at Rs. 28 billion per annum, which is higher in subsequent year. It is disheartening to note that Indus Food Machine, once called granary of the Sub-continent, where 80 percent of land is irrigated, has now become a net food importer. A special wheat campaign has been launched and 1997-98, declared as the wheat year. As a result, a good crop is achieved in 1997-98. Again in November and December 1998, because of no rains, throughout the country may severely affect the crop of 1998-99 and

the import bill may rise again. Keeping this situation in view, the government of Pakistan has precautionally kept a reserve of \$ 140 million with US government for purchase of wheat in 1999.

According to economic theory, self-sufficiency is optimal only when a country has a comparative advantage in producing the commodity. There exists a good potential for increasing wheat production, but apparently, this is impeded by the slow rate of technology adoption, detrimental agrarian structure, weak infrastructure, and an inadequate level of water supply for wheat.

The key to increase wheat production in Pakistan lies in rapid adoption of technology, considering the large population and limited land base, the diffusion of biochemical technology, which is clearly a more appropriate path towards technological progress than devices of labor saving mechanization. The adoption of biochemical technology in wheat production critically depends upon the expansion of irrigated areas. Increasing use of the major inputs plays the role of a shift variable of production function, and contributes towards the increase in output. In this study, the role of irrigation-induced-technological change in wheat production is analyzed in the context of Pakistan. Moreover without an efficient distribution policy (an improved income distribution), greater food output is by itself unlikely to solve fully hunger problems (*Ghaffer 1983*).

A significant increase in food production would require expansion of effective demand to support it. The present level of low income, low purchasing power of the bulk of population may impede to sustain the production momentum. Thus a self-sustaining growth in food production

would require income generation and distribution devices. Thus, the research problem identified is that devoid constant efforts to improve upon the agricultural sector and to enhance wheat production, there remains the chronic phobia of wheat security, and self-sufficiency in wheat output awaits to be a phenomena as yet to be achieved, through viable wheat policy formulation in Pakistan

1.3 OBJECTIVES

The core objective of this study is to develop a strategy for Pakistan to achieve a sustained growth in wheat production that fosters greater economic efficiency and promote distributive justice in the society. There are four specific objectives.

- To assess the policy effects on price and production of wheat.
- To examine the overall economic efficiency and inter-sectoral distribution of benefits resulting from policy changes.
- To analyze the impact of alternative policies on poverty elevation, income distribution and self-sufficiency in wheat.
- Based on the results of the analysis to develop a broader sustainable wheat policy for Pakistan.

1.4 SCOPE OF THE STUDY

This study attempts to analyze the effects of technology and equity oriented policies on economic efficiency and distributive justice. Economic efficiency has to do with producing and facilitating as much consumption as possible with available resources, whereas equity has to do with how

equitably goods are distributed among individuals. Specifically the analysis involves the measurement of policy effects on equilibrium price, production of wheat, distribution of benefits among consumers and producers and poverty alleviation, income distribution and self-sufficiency in wheat production.

According to the first fundamental theorem of welfare economics, every equilibrium position of a competitive system is a Pareto optimal state of the economy. This is the efficiency property of a Pareto satisfactory mechanism. Thus, an equilibrium of demand and supply of wheat, satisfying optimality and bringing prosperity and harmony to the society, has to be achieved (*Ghaffar, et al, 1985*).

The self-sufficiency efforts in this study are based on the theoretical proposition that the effect of policy on economic welfare may be measured by estimating the changes in consumer's demand and producer,s supply (*Barkely 1992*). No food has entered the lives of so many people over the centuries and probably no food looms so large today in both economic and social significance. This almost dependence of the people on wheat, expose them to greater hazards and place them in a more vulnerable position. Those who grow wheat and those who consume wheat, far outnumber those who grow and consume the rest of the cereals. It is such a food like wheat which is eaten up three times a day without any interruption and still people are not saturated from its consumption.

Whether as being the principal crop or as the principal food of the people, wheat sways the scale, the prosperity and adversity of people. Wheat shortages from time to time necessitate the consumption of inferior grains or

other cereals. The reason for this heavy reliance on wheat by people is a complex phenomenon. Preference alone cannot offer the sole explanation. There are certain economic considerations also attached to extensive use of wheat. The basic explanation is undoubted economic. The grain products are everywhere cheaper in money or in labour to produce. The importance of *Roti* in different parts of Pakistan is very clear. Both area and production of wheat have greater percentage as compared to other crops in the economy. The share of wheat in the national consumption of food grain is 73 percent where very few developing countries show this heavy *wheat bias* in food consumption. Wheat consumption in Pakistan is growing at a faster speed. In 1965-66, wheat consumption in Pakistan has been estimated at 4.6 million tonnes, which increased to 19.03 million tonnes in 1997-98. This shows that in 33 years wheat consumption has increased approximately 5 times, which is a very great increase in wheat consumption. Moreover, it is very clear that aggregate demand function for wheat depends on so many factors. The most important among them are population growth and changes in per capita income. Now-a-days economists are seriously thinking to get a balance between food and population, which is a matter of anxiety for governments of the developing nations. Income is also one of the most important factors which influence food consumption. Per capita income is increasing with the passage of time at a rate of 11.9 percent bringing greater purchasing power to the consumers. It remained at its highest level during 1996-97 (\$ 457) per head. In this study, Gini-co-efficient and Theil-co-efficient have been calculated to see the phases of inequality trends. An increase in per capita income has direct influence on per capita wheat consumption.

The relation between consumption of wheat and income is not expected to be strong so regression analysis does not reveal a significant relationship because of wheat substitutes.

The production of wheat is greatly fluctuating since 1947. The deficit in wheat supply exists through the years. Pakistan has achieved self-sufficiency only a few times in 51 years. The production process and variation has thoroughly been analyzed since 1947 to 1998 and the effect of key agricultural inputs and condition of soil have been tested. The supply of wheat depends on the total land availability for the crop, irrigation facilities, climatic conditions and market prices of wheat.

On production side ARIMA model has been used to forecast the future production of wheat. *Box-Jenkins* and other economists for forecasting economic time series modelling have extensively used it.

Thus there are two broader aspects – consumption side and production side of wheat. The increase in per capita income is increasing aggregate demand for better quality of wheat. While the production of wheat (supply) is increasing each year but it is not matching with growing demand of wheat. So a gap is being created between effective demand and supply, which is widening and accentuating. This needs to be bridged, by policy implications, as being the main objective of the study.

1.5 METHODOLOGY

This section discusses sources of data, and the procedures used to obtain estimates of parameters for the model used. Data for this study have been drawn from several different sources including primary as well as secondary.

- i. The principal sources are the published reports of Pakistan Bureau of Statistics, such as the Statistical Year Book of Pakistan, Agricultural Statistics of Pakistan, Monthly Statistical Bulletins, Monthly indicators of current Economic situations, Economic Survey of Pakistan, Agricultural Policy Manuals, etc.
- ii. Moreover, primary data has also been used. For the collection of primary data, a very brief but precise interview schedule addressed to the sample farmers and pertaining to the following information has been devised, including;
 - Tenurial status
 - Total operational holdings
 - Area under wheat crop
 - Total wheat production
 - Selling prices of wheat
 - Total labour required for wheat production
 - Man days
 - Bullock hours
 - Tractor hours
 - Capital invested in wheat production, that is expenditure on Seed, Fertilizer, Irrigation water, etc.

Besides, the following information have also been included, Insecticides/pesticides, human labor, bullock labor, tractor use, costs of other implements, costs of farm practices (ploughing, cultivating, harvesting, threshing etc), and costs of other inputs (*Cheong, et al, 1984*).

iii. Sample Size

In case of primary data, it is anticipated that the basic characteristics of the wheat growers in the same ecological zone are homogeneous. As a principle, when the sample universe is homogeneous, a smaller sample is deemed even representative. Therefore, a small sample size selected truly represents the whole. It is suggested that a sample size of eighty farmers, randomly selected can yield desirable results.

iv. Sample distribution

The Pakistan Agricultural Research Council (PARC) has divided the whole country into various ecological zones. The basic climatic situation is similar in each zone, irrespective of various Provinces. It is therefore, proposed that due to constrain of time and resource paucity, the sample area may be confined to the different zones of NWFP. The Province was divided into two strata viz, *Wet* and *Dry* zones. Three villages from the wet zone and two villages from the dry zone have been selected randomly. A list of wheat growers has been prepared from each sample village. The total sample size of 90 has been distributed proportionately to the total number of wheat growers in each sample village. The following formula is used for the proportionate toilette distribution:

$$S_v = F_v n/N$$

Where

S_v = Sample size of each village

P_v = Total number of farmers

n = Total sample size ($n=90$)

N = Total number of farmers in all the five villages.

In the present study, the self-sufficiency of wheat production in Pakistan is evaluated on the basis of conceptual framework of demand and supply developed from economic theory. The Model is within Marshallian edifice of partial equilibrium analysis (*Barkley 1992*). It is assumed that the wheat crop is produced by numerous small producers and is sold to a mass of consumers, with its market approximated by perfect competition. This implies that the price of wheat is set by demand and supply in the market. Thus the basic objective of this study is to attain self-sufficiency or equilibrium of demand and supply of wheat in Pakistan.

1.6 THE CONSUMPTION SIDE OF WHEAT

Wheat predominates agricultural and economic life in Pakistan. It is the food which is being consumed thrice a day as a staple diet everywhere in the world. With the change in time, and extension of transportation, wheat is accessibly entering more and more into the daily life of the people. There are strong psychological, social and economical factors which tend to disfavour the entry of substitutes.

Wheat consumption in Pakistan is increasing at a very faster rate and its share in the national consumption was approximately 73 percent of foodgrain. In 1965-66, wheat consumption in Pakistan was estimated at 4.6 million tonnes, which increased to 9.2 million tonnes in 1974-75. In 1984-85, it mounted to 12.2 million tonnes (consumption = production plus imports). The sharp increase in per capita wheat consumption is primarily due to rapid population growth and changes in per capita income. Thus in the chapter on consumption, the effects of these two elements (population and per capita income) will be analyzed (*Brennan, 1989*).

Moreover, this part of the report focuses attention on wheat (food) requirement of Pakistan in two ways: firstly, the actual consumption of food and secondly, the requirements, which are, based on nutritional standards, regardless of the purchasing power and or food habits of the community. This study deals with the farmer, in the latter sense, there always has existed a food problem (*Azhar 1993*). In the former sense, these requirements would depend upon the food habits, per capita income of the people, and the population of the country.

1.7 THE PRODUCTION SIDE OF WHEAT

The production of wheat increases yearly but the production possibilities are highly limited because the yield per acre is still very low in Pakistan, as compared to those countries, which apply advanced technology. The variation in production is due to multiple reasons like irrigation water facilities, climate, technology and the land reforms, etc. which have been discussed thoroughly in the chapter on production.

In 1955-60, the production of wheat increased from 3.3 million tonnes to 3.9 million tonnes. From 1988-93, the production increased from 14.4 million tonnes to 16.2 million tonnes. In 1995-97, the production of wheat declined by approximately 3.1 percent as compared to the last years production due to persistent drought, less availability of quality seeds and lack of irrigation water. Wheat for 1997-98, stands at 18.6 million tonnes as against 16.6 million tonnes in the preceding year.

This shows that fluctuations in production are greatly affected by water availability, time of sowing, extension of land, proper use of agricultural inputs and technology. Moreover ARIMA model has been used to forecast wheat future requirements for the 13 years – from 1998-2010 which may minimize intensity of the problem of shortages and help the planners and policy makers to take appropriate measures to combat the problem.

Considering the supply side of wheat production and determining the impact of key inputs, the following type of Cobb-douglas production function has been applied.

$$Y_i = \beta_0 X_1^{\beta_1} X_2^{\beta_2} X_3^{\beta_3} e^{U_i}$$

Y_i = Wheat production (in mounds)

X_1 = Total area under the crop (in acres)

X_2 = Total labor required for the production of wheat (in man days)

X_3 = Aggregate capital invested in the production of wheat (in Rupees)

β_0 = Constant co-efficient showing the impact of technology on wheat production.

$\beta_1, \beta_2, \& \beta_3$ = Constant elasticities of respective inputs $X_1, X_2, \& X_3$.

U_i = Residuals

The above non-linear production function has been transformed into log-linear form and is estimated, applying the Ordinary Least Square (OLS) method with its usual assumption (*Pinckney 1989*).

ii. MARGINAL PHYSICAL PRODUCTS (MPPs) OF INPUTS

For the computation of Mpps of various inputs, the above estimated production function has been differentiated with respect to X_i . For example to estimate the marginal physical product of input land " X_1 " the partial derivative of the production function is calculated as follows:

$$\frac{\partial \hat{Y}}{\partial \hat{x}_1} = \frac{\partial}{\partial \hat{x}_1} (\hat{\beta}_0 x_1^{\hat{\beta}_1} x_2^{\hat{\beta}_2} x_3^{\hat{\beta}_3}) = \hat{\beta}_1 \hat{\beta}_0 x_1^{\hat{\beta}_1 - 1} x_2^{\hat{\beta}_2} x_3^{\hat{\beta}_3}$$

1.8 ORGANIZATION OF THE STUDY

1. The first chapter of the report covers the production and consumption of wheat, its related problems and prospects in Pakistan, the analysis has been carried out in quantified terms where feasible, supplemented by narrative exposition explicitly
2. The second chapter is devoted to choose and rationalize the policy analysis in light of the literature reviewed. It has then discussed the performance of the wheat economy, and the role of the leading factors in that performance.
3. The contemporary agrarian structure, its historical evolution and the implications of technological change in the present agrarian society constitute the third chapter.

4. Chapter four analyzes the demand side (wheat consumption) of measuring the actual consumption of wheat and the increase in population of the country and rise in per capita income, etc. are discussed in this chapter.
5. Chapter five concentrates on the supply side of the analysis. The conceptual framework and the analytical model has been explained which is followed by a detailed description of data and model ARIMA used for future wheat forecasting.
6. The results of the analysis and their description have been presented in the sixth chapter.
7. The final chapter presents conclusions and policy recommendations based on the analysis.

CHAPTER II

REVIEW OF LITERATURE AND POLICY ANALYSIS

Wheat production has a large circumfluence that encompasses its production, trade, distribution and consumption. The objective of this chapter is two-fold: firstly to review all the possibly available literature on the subject and secondly, to choose policy analysis for this research study.

Thus, this chapter has two sections;

- 2.1 A review of the relevant literature on wheat production and its affiliated issues and alternative options provided in first section.
- 2.2 The second section incorporates a profile of wheat crops and a discussion on the adoption of technology in wheat production, the role of irrigation and technology adoption and the potentials for future development.

2.1 REVIEW OF LITERATURE ON WHEAT PRODUCTION

In recent time, perhaps the most comprehensive and pragmatic discussion on food policy analysis is provided by *Timmer, Falcon and Pearson (1983)*. In their book, the authors describe how food systems function, and attempts to link issues of food production and consumption, with demonstrating the role of markets. Their legitimate concern with the problem of hunger and an earnest discussion on policy intervention that can improve the consumption and nutrition situation of the poor, are commendable.

In addition, the author identifies four basic objectives for a general national food policy, analysing:

1. Efficient growth in the food and agricultural sectors
2. Improved income distribution, primarily through efficient employment creation
3. Satisfactory nutritional status for the entire population; and
4. Adequate food security to protect against bad harvests, national disasters and uncertain world food supplies and prices.

In their edited book, *Gittinger et al. (1987)* present an assortment of articles on the relationships among agricultural income, production, distribution, consumption and nutrition. The collection concentrates on food distribution and consumption issues in the developing countries. The authors observe that *few governments have a ministry whose responsibility is to address all aspects of food policy*, and emphasize upon the adoption of an integrated food policy approach.

There are two broad set of policy instruments available to various governments for their food and agriculture sectors; price policy and technology policy. Price policy may include output-price support, output-price subsidies and input-price subsidies. Technology oriented policy encompasses biochemical technology, irrigation and water management, and mechanization of farm power.

Price policy is one of the major instruments to provide incentives to food producers, to influence resource allocation decision, and to redistribute incomes. Many neo-classical economists have emphasized the importance of

“getting prices right” so that efficient resource allocation in the economy can be achieved (*shultz, 1978*). However, in a collection of articles edited by *Eicher and staaaz (1984) Timmer, Mellor and Falcon*, they individually stress that getting prices right is complicated because food prices are a major determinant of the real income of the majority of the people in the less developed countries.

Krishna (1982) examines the interactions between price and technology policies, and challenges the recommendations of “price-fundamentalists” who believe that raising farm price is the key to agricultural growth.

In a book edited by *Ahmad and Mellor (1988)* the common view on price policy for the developing countries is that agricultural price policy can be effective only when it is used in combination with policy that enhances technological progress in agriculture.

In a recent book written by *Isabelle Tsakok (1990)* presents relatively simple approaches to help clarify key issues in agriculture caused by price structures. To suggests how price interventions may be redirected to achieve policy objectives more effectively, and to identify when further analysis may be necessary. These techniques do not involve complex modelling and sophisticated quantitative tools, but are discussed within basic economic theorem.

Agricultural production and price policy is a complex and controversial subject, and it can be analyzed from different angles and with varying degree of technical sophistication. Prices are powerful signals and powerful policy instruments.

Agricultural production and markets do not operate in a vacuum. Other factors interact in complex ways to affect the operation of markets and their prices that emerge. Key among these are the political and cultural systems, the distribution of power, knowledge and assets in institutions, and the intangible but powerful aspirations of leaders and nation for a good life. According to the author (*T. Isabelle*) agricultural price policy is the heart of economic development strategies --- hence the excitement of analyzing it and communicating the results, is really interesting and illuminating.

In a comparative study of five nations --- Argentina, Brazil, Australia, Canada and the United States --- *McGarry and Schmitz (1992)*, experts in international agricultural trade, analyze the institutions and policies supporting the international grain trade. There is special emphasis on macro-economic policy, their makers, the role of public sector, and the legal and regulatory pre contexts. This work is very essential and useful for scholars of agricultural economics and agricultural trade. Behind the statistical outcomes of international agricultural trade are institutions and policy-makers who shape their performance in the international market.

Policy-makers in Pakistan have become increasingly concerned about the effects of food grain production and price policies. The government's primary goal is to achieve self-sufficiency in wheat productions. It is reasonable to expect that price policies can exert dominant influence on production incentives.

Several studies are available on the effects of wheat production and price policies in Pakistan. Among these a prominent study is edited by *Cornelisse and Naqvi (1987)*. The study aims at providing maximum information on the

working of wheat market in Pakistan. Wheat market in Pakistan is a many fold splendoured phenomena. From the farm gate to the final consumer, there are numerous catalytic agents, whose economic behavior determines the size of the marketed surplus and the price that the producers charge for wheat and wheat flour. The government intervenes in the wheat market, mainly for fixing procurement price and for setting up an elaborate distribution system.

The problems of efficiency and social welfare, inextricably bound up with the functions of the wheat markets analysed in this study, are covering the following points.

- Contribution of various groups of farmer to wheat production.
- Functional groups of wheat trader who define the dimension and size of wheat market.
- Various means through which the wheat-trades make their presence *felt* in the wheat market chain.
- Sources used by consumers for obtaining wheat.
- Form of state intervention in wheat market and their effects.

An elaborate and in-depth analysis on Agricultural Development in Pakistan has been made by *Nazeer (1983)* in his paper, prepared for South Asian Studies. This study acts as a base for scholars and researchers in the field of agricultural development and provides a rapid survey of the issues of agricultural development in Pakistan.

The study gives an analysis of the trends in agricultural production over the past two decades, deals with future directions, and discusses the policy and

strategy aiming at the achievement of avowed objectives and physical targets. The author also discusses the agrarian reform and institutional change in agriculture and deals with the application of science and technology to agriculture.

A balanced wheat production should include both price and technology policies. Another special report edited by *Mehmood and Walter (1990)* analyses the Pakistan agricultural economy and its role in overall economic development. It is written for scholars interested in an in-depth description of the Pakistan agricultural economy with its related policy issues.

In this study, an economic picture, over time, is shown for farming and agriculture business by indexing production, input use and productivity. Through this perspective, one can see the basis for growth in both farm production and agricultural business services. In addition, a more detailed description of sector growth and structure of the agriculture economy is observed through a comparison of the input-output analysis.

In view of the critical role that irrigation plays in the growth of agricultural production in Pakistan, the equity and efficiency implications have recently received considerable attention from irrigation engineers, economists, and other social scientists.

Another important publication edited by *Eckert (1990)* and Sponsored by USAID, intended to strengthen the agricultural policy analysis function in Pakistan. This manual can be used as a ready disk reference for policy analysts. The manual makes several contributions on going policy analysis. It also provides a detailed description of the agricultural policy analysis

process. The intent is to see that important steps are not missed, nor sources of inputs and feedback overlooked. Moreover, the various cause and effect relationships within the economy that determine the breadth and strength of impact of selected policy decisions is described. Finally, necessary type of economic analysis and analytical models are identified and their uses related to the specific policy questions at hand are discussed.

In a descriptive paper, *Ghaffar (1983)* presents that imports from abroad have traditionally supplemented domestic production as a source of wheat supply in Pakistan. The purpose of this investigation is to study the historical development of wheat market in Pakistan. In the introductory section it is found that the wheat market during 1950's has remained largely in private hands and the government policy of compulsory procurement is aimed at discouraging speculation. In the 1960's, the policy of compulsory procurements has been replaced by a set of more comprehensive regulatory measures such as price support of wheat at higher than world prices, subsidized wheat rationing for consumers, expansion and extension of regulated markets and a ban on inter district movements of wheat. Although the government intervened increasingly in the wheat market, private trade continued to prevail through out 1960's.

In the 1970's, the nationalization of flour mills, the strengthened rationing system and establishment of procurement centres placed the wheat market control with the government. Through this control, the government has been able to suppress wheat market price for the farmers below the world price level and to charge higher prices from the consumers. Despite the fair

margin of mark-up, the government seems to have made little profit from wheat trade because of additional costs of running the procurement centres.

The study shows that government intervention depressed wheat production in Pakistan by 4 percent to 10 percent. Moreover, the development in transport and communication system has made significant contribution to improve efficiency of the wheat market. For example, increased circulation of newspapers, T.V and radio broadcasting has added to the knowledge and intelligence of farmers, consumers and market intermediaries. Similarly, a rapid growth and expansion of roads have gone a long way to keep marketing costs low.

The study also has discussed storage facility of wheat market. While private storage is inefficient, the government storage has been expanding, but at a much slower pace than dictated by the rise in the marketed surplus of wheat. Practically nothing has been done to improve the storage conditions at the farm level despite the fact that farm store as being the biggest part of wheat output, has caused excessive wheat storage losses.

In another technical paper by the same author, *Ghaffar (1983)*, it has been argued that domestically produced wheat is considerably under priced in Pakistan relative to imported wheat, agricultural inputs and other major agricultural commodities. If the government objective of food self-sufficiency is to be realized, then Pakistan's wheat prices may be close to the level of prices for imported wheat. Wheat prices should be maintained below world wheat market prices, as Pakistan is likely to emerge an exporter of wheat in the near future, if the price policy is redirected in favor of wheat.

Crop yields in Pakistan are still comparatively low. It is then recommended by *Ghaffar* that adequate and timely supply of critical agricultural inputs such as water and fertilizer at the cheapest possible rates is essential to expand their use and to set up crop yields. Availability of cheap fertilizer is likely to result in high growth rates of fertilizer consumption.

In order to minimize government participation, it would be better if stocks are obtained from private traders in a *Mandi* town rather than through the existing procurement centres. As demonstrated in this paper, the free market in the absence of government price distortions is quite capable of delivering better quality wheat flour at no more than ration shop prices. Finally, it is recommended in the paper that Pakistan may not indulge excessively in institutional approaches to economic development, for they involve huge amounts of resources but deliver very little. Emphasis on increased efficiency rather than increasing the administrative, research and extension staff has a high pay-off in the short as well as in the long run.

In an empirical study by *Cornelisse and kuijpers (1985)* analyse the issues of security and cost involved in maintaining a buffer stock in face of unstable production of wheat from year to year.

In this study, both the situations for Pakistan as a wheat export and structural importers are discussed. Suppose that Pakistan produces more than it consumes, the difference will be exported. In this case, a bad harvest simply means that the exportable surplus would be reduced temporarily. Inversely, if Pakistan is a structural importer, wheat must be obtained from abroad even in year of good harvests. In this case, a stock is to be maintained in order to guarantee a smooth supply of wheat over time.

In a highly technical article, *Pinckney (1986)* has demonstrated the possibility of using an optimizing algorithm for an analysis of Pakistan's trade, storage and price policies of wheat. Dynamic programming has been shown to be useful for developing a strategy for contending with fluctuations in wheat production. The result suggests the following points.

- The cost to the government of holding prices constant is quite high, much money can be saved by allowing fairly small increases in price-variability.
- Optimal policies are considerably more efficient than the price-band policies modeled here.
- Imports can be lowered considerably at small cost, but the cost rises the more, the imports are decreased.
- The free market solution is characterized by relatively high price-variability, but low costs.

In a more recent study of Pakistan input-output price policy, *Ghaffar (1995)* describes the input-output policy in Pakistan agriculture, study its possible effects on producers and consumers, with policy recommendations for rapid agricultural development and hence enhanced welfare of consumers.

On the basis of evidence produced here, it can be concluded that government policy in recent year is heavily biased against agriculture. As a result of government intervention, agricultural commodity prices in general remained well below their corresponding world market prices, input prices rose at a faster rate than commodity prices and agriculture witnessed falling rates of profit against rising and high rate of profit in industrial sector. This is the

basic cause of immense resource transfers from agriculture to elsewhere in the economy.

In order to reverse these trends, there is a need for halting active government intervention and for promoting the role of the private sector in production, marketing, trade and distribution of agricultural inputs and commodities. While the supremacy of the private sector must be upheld, the rules of the game must clearly be defined and the breach of law must be punishable by heavy penalties.

As a step towards right prices, agricultural commodity prices may be fixed on the basis of the trend lines of past parity prices. As such, there is little need for subsidizing the inputs. In fact stable and even falling prices of most of agricultural inputs can be assured, if the government takes note of the corruption and excessive profiteering and decides to pursue a cost reduction strategy.

The study also discusses the case of irrigation water, an equitable distribution of water, the compatibility of water delivery and water rate assessment bases, and the elimination of overstaffing are the primary issues that require immediate government attention.

In light of the above over view of literature, the present study attempts to analyze the effects of irrigation --- induced technological change on wheat production, price, economic efficiency, distribution of benefits between consumers and producers, self-sufficiency, inequity in income distribution and equilibrium of demand and supply of wheat production.

2.2 POLICY ANALYSIS IN CONTEXT OF LITERATURE REVIEWED

Agriculture is the largest commodity-producing sector in Pakistan. Within agriculture, wheat is the most important commodity, occupying more than 67 percent of the total area under food and crops, 29 percent of the total crops during 1996-97. It is one of the most widely consumed staple food of Pakistan. It, therefore, follows that perhaps every household participates in the operation of wheat market. Those who participate actively are farmers, village *beoparis* (merchants), commission agents, wholesalers, millers, retailers, ration shop holders, urban consumers and government operated wheat procurement centers (Cornelisse et al., 1987).

In 1996-97, the targeted production of wheat was 18.0 million tonnes. However, the actual production had been estimated at 16.6 million tonnes. The actual consumption is much higher viz. 19.0 million tonnes. The gap has been bridged through importation (2383 thousand tonnes) of wheat on which billions (90 billions) of foreign exchange has been spent, which is a very big problem for an agricultural country.

According to official estimate production of wheat for 1997-98 stands at 18.6 million tonnes as against 16.6 million tonnes last year, indicating an increase of 12 percent. The bumper wheat crop is attributed to the enhancement of support prices of wheat, disbursement of more agricultural credit to the growers for wheat sowing, availability of sufficient soil moisture at sowing time in *barani* areas, provision of quality seed to the growers and declaration of 1997-98 as wheat year by the government. Again the consumption target is more than 19.0 million tonnes as compared to the production of 18.6 million tonnes. This years, despite a bumper crop, it

cannot cope with the situation and a lot of wheat may be imported again (*Economic Survey, 1997-98*).

The problem is that there is discrepancy between demand and supply (supply is not matching with the demand). Thus, the objective of this study is to increase the supply of wheat at least to the level that it should meet the demand. If more could be produced than the quantity demanded, that may be deemed a great achievement.

For this paper, the policy is to balance the demand and supply together so that shortages of wheat could be eliminated. Thus, the analysis would need to be carried further by allocating separate comprehensive chapters to supply and demand sides of the wheat.

On the consumption side of wheat, it may be noted, that wheat enters every aspect of life and is looked upon in a number of ways by different people where they attach an emotional attachment and add a psychological aspect to wheat requirement. Its abundance brings delight and its shortages spells grief and famine for many. The importance of wheat can thus hardly be ignored. Pakistan is one of the biggest cultivators and consumers of wheat.

The area of food crops has increased to 12056 thousand hectares in 1996-97, in which the biggest share of wheat is 8109 thousand hectares or 67% of the area. While the production of food crops has increased to 22.7 million tonnes in 1996-97, the production of wheat is 16.6 million tonnes, or 73% of food crop production, showing the rising importance of wheat in Pakistan.

Why has wheat entered so deeply into the lives of people that it overshadows all the rest of the cereals. For this, the food habits of the people of Pakistan have to be taken into account. This has been dealt in the forthcoming chapter on consumption. There are different explanations, where the core one is economic. Wheat is relatively cheaper in terms of money or labour, to produce. Other reasons are institutional, physical, emotional and psychological. It therefore follows that production of wheat should balance the national requirement for it (*Azhar, 1993*).

On the consumption side, the stagnation in wheat production in Pakistan has also to be analyzed. Empirical studies reveal a decline of growth rate from 4.00 percent per annum to 2.65 percent during 1980-91. For the calculation of growth trends semi-logarithmic equations are used. In addition, the factors responsible for stagnation in wheat production are identified. Another crucial point, which needs thorough attention, is the pattern of wheat consumption in Pakistan. The share of wheat in the national consumption of food grain is 73 percent which is very high. The consumption of wheat is calculated by adding production in the country plus wheat imported from abroad. The whole consumption pattern is analyzed, along with present and past date, and found that it depends on so many factors. Among these the most important are population growth and changes in per capita income.

The number of people is the basic factor in determining food requirements. If population is increasing faster than food, then there is a shortage of food. Thus, the size of population will affect its wheat consumption. The population growth rate is 3.06 percent during 1961-81 against the current

rate in 1998 is 2.7 percent. By the terminal year of 2003, it is projected to slow down to 2.5 percent. Every addition to number of mouths leads to a corresponding increase in wheat requirements. The struggle to balance the increasing food requirements of an increasing population has so far not shown any positive sign on the economy of Pakistan.

Beside population, changes in per capita income have also great influence on food consumption. Per capita income has increased gradually in 51 years of Pakistan. It is estimated at \$ 4527 (Rs. 230877) in 1996-97, against \$ 4547 (Rs. 231897) during 1997-98, showing an improvement. Income inequalities have been calculated by using Gini-coefficients. The conclusion of which is confirmed by Theil-coefficients. The behavior of income distribution is further depicted by Lorenz curve. Data reveal that the income distribution in Pakistan is far better than many countries of the third world.

An increase in per capita income directly influences the wheat consumption of the people. Demand for wheat in Pakistan is income-elastic. A small increase in purchasing power leads to greater demand for wheat and vice versa. This direct relation between purchasing power and wheat requirement is to be seen in the light of food requirement to which the population is subject.

Presently, population is increasing at 2.7 percent which is creating incremental pressure on cultivated soil and production of wheat while the per capita income is increasing at the rate of 11.9 percent, enhancing demand for good quality of wheat, which may further be widened in future.

Moreover, a bigger portion of wheat harvested in Pakistan is lost in waste and is not available for consumption, which has further aggravated supply to the final consumers. Wheat losses occur at consumer farm levels, and improper storage. The remedial steps taken by the government have been discussed in the chapter on wheat consumption.

On the production side, there is considerable potential for increasing wheat production in Pakistan, notably through an efficient use of available resources and technology. In the short and medium terms, increased inputs, especially fertilizer, combined with better timings of water and simple improvement in farm practices such as weeding and increased plant densities can substantially increase wheat output.

In the long run, however, major efforts to strengthen the institutional framework for incentives may have to be part of a strategy to transform the agricultural sector, bring sustained and equitable structural change in wheat production which may further require significant readjustments in the land tenure and land revenue, as well as improvement in wheat research, extension, water management and marketing system (*Pickney, 1986*).

The production of wheat increases each year but at slower rate because the yield per acre is still very low. The variation in production is mainly due to the conditions of soils and use of agricultural inputs particularly irrigation water. The area under wheat cultivation has increased from 4.8 million hectares in 1959-60 to 9.3 million hectares in 1997-98. The fluctuation in area and production is due to a lot of other forces like climate, technology, irrigation water and land reforms etc.

The wheat trade also plays an important role in the production process. It influences the activities and characteristics of traders as a result of which marketable surplus is accumulated.

Auto Regressive Integrated Moving Average (ARIMA) model has been used to forecast wheat production upto 2010 by *Shazam Computer Package* with 95 percent confidence interval; which enables the planners to calculate the future requirement of wheat and avoid all severe problems of sudden wheat shortages.

The fluctuation in marketable surplus needs special attention, the size of which is determined soon after harvest. Wherever the wheat is sold, major portion of that has to come to the government storage, which is provided to the millers, who convert it into flour and make it available to the consumers (*Cornelisse, 1984*).

Data reveals that land reforms in Pakistan have influenced the wheat production immensely. The distribution of land to the farmers, gives birth to a strong middle class, who improve the land and work hard to increase wheat production.

The government has recently imposed a tax on agricultural income, which is effecting wheat production. As this tax is shifted to the tenants by the landlords, who are already living below subsistence level, so it adversely affecting their productivity.

The significance which wheat has come to acquire in the human culture extends far beyond that of providing nourishment for the human body. It is

closely associated with a number of human norms and arises a great many emotions – from simple pleasures to violent fantasies, from ordinary satisfaction to extra ordinary disquiet, etc.

CHAPTER III

AGRARIAN STRUCTURE AND PRODUCTION RELATIONS

In Pakistan, despite the increased investment in irrigation and other agricultural inputs, the rate of technological progress in agriculture has been slow. There is growing concern about the adverse effects of the existing agrarian structure on technological change in agriculture.

The pattern - client relationship based on a skewed land distribution pervades the rural social structure, and is believed to be the major impediment to agricultural development. This chapter describes the agrarian structure, investigates the organization of wheat market based on irrigation and technological change in such structure and explores alternative measures of wheat policy.

3.1 HISTORICAL BACKGROUND

The present agrarian society in Pakistan can be understood better when seen in historical perspective. Preceding historical epochs have moulded the agrarian society into its present shape.

Prior to the British colonization of India in the eighth century, private ownership of agricultural land did not exist in the present Pakistan. Land was held communally by the entire village, so that each household lived from subsistence production derived from the land allotted to the family. The peasants had the right to till the soil, and an individual's hold on land was more in terms of usufruct than ownership. Accordingly the peasants possessed and used their land holdings, while the sovereign authority

collected land tax from them. Sharecropping and cultivation by hired labour were absent in sub-continent agrarian economy.

During the Muslim rule of India (The Turko-Afghans from the twelfth century, and the Mughal from the Sixteenth Century), the village communities were unaffected by the establishment of a new government. The Mughals appointed Zamindars, (amirs) who were collectors of land revenue.

It was during the British colonial period that the absolute ownership of land was established (in the shape of feudalism). In present Pakistan, under the permanent settlement Act of 1793, the proprietary right of land was given to the Zamindars (landlords) who were required to pay a yearly tax to the British government. Thus, land became a unit of private property, which could be bought and sold. This fundamental change in the nature and rights of land property were responsible to eventually create hierarchy of the landlord, tenant and landless classes.

The state could auction a Zamindar's land, if he failed to pay his taxes. The British set their original tax assessment very high, as a result, many estates were soon sold for arrears. Land rapidly changed hands from the old Muslim aristocracy to a rising class of Hindu-merchants. Conflicts between landlords and tenants began to take place on religious basis (*Hartmann and Boyce, 1979*).

The merchants who became Zamindars were more interested in business and trade, and failed to pay due attention to the agricultural production of the land they owned. Agriculture was considered an undignified profession, thus

they neither participated in agricultural production nor cared for increasing crop productivity (*Ghaffar, 1983*).

The creation of parasitic landlords also led to the emergence of "under-tenures" and as this sub-letting of land accelerated, the defloration of the farmers went from bad to worse.

The peasantry had to bear the entire burden of maintaining their landlords and under-tenures. The Zamindars were mostly ruthless tyrants. In order to satisfy the rising demands of the Zamindars ~~farmer~~ they had to borrow heavily from money-lenders. Many farmers were unable to repay the increasing amount of debt and usurious interest, therefore, they had to dispose off their land. This process led to the emergence of rural landless class with scanty employment outside agriculture, the landless and small farmers were forced to remain in rural area, either as agricultural wage labourers or as share-croppers. The rural market for food grain developed with the creation of an ever-growing section of middleman further aggravated the situation.

In summary, the British colonization of Pakistan resulted in the extinct of the village communal system, agriculture became commercialized with different classes in rural society, i.e. from landlord to landless.

When the British finally departed in 1947, two independent nations, India and Pakistan were created. Pakistan consisted of two wings --- East and West. East Pakistan was segregated in 1971 and the discussion onward focuses only on the present Pakistan.

The traditional land system remained relatively unchanged in Pakistan where landlords dominated the rural society through economic, political and social powers. They control the small landowners through a system of traditional patronage. They determine who will benefit from rural development programmes and who will not (*Ghaffar, 1983*).

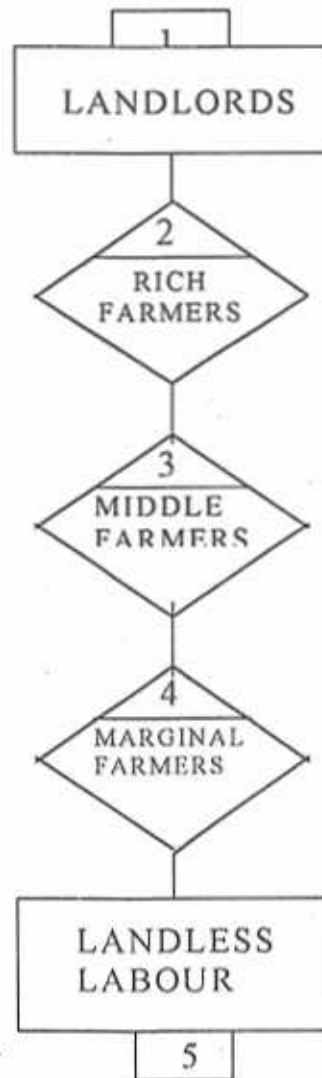
3.2 THE PRESENT AGRARIAN SOCIETY

In the existing agrarian society, the rural population of Pakistan based on their land ownership pattern may be divided into the following basic categories.

1. **Landlords.** This class does not work on the land except to supervise its workers. They enrich themselves through their relatively large land holdings --- the principal means of production. Hired labor is either used for cultivation or land is leased to share-croppers. Landlords usually receive half of the crop produced from share-croppers and alternatively do not provide any variable inputs (200 acres and above).
2. **Rich farmers.** They work in the fields but have more land than they can cultivate alone. They gain most of their income from land they cultivate with the help of hired labour or share-croppers. They enjoy a substantial amount of security and prosperity (50 to 200 acres).
3. **Middle farmers.** They earn livings mainly by working on their own land, though at certain times they may work for others or hire others too to work for them. They are generally self-sufficient in their food production. They have little or no cushion against adversity --- their land just support their families (100 acres).
4. **Marginal Farmers.** They own a little land, which is not enough to support them. They earn their livings mainly by working as share-cropper or wage laborers (below 50 acres).

5. *Landless Laborers*. They own no land except for the homestead, and some times not even that. Lacking draft animals and agricultural implements, they can seldom work as share-croppers and must depend upon wages for a livelihood. The landless maintain a minimum level of living by supplying their labour to the landed class. They are the poorest in the rural society (*Rabbani et al., 1978*). This whole situation is shown in figure 3.1.

FIGURE 3.1.
SKETCH OF PRESENT AGRARIAN SOCIETY



Majority of the farmers are either tenants, owner-cum-tenant households. The most common form of tenancy relationship in Pakistan is share-cropping. Share-cropping terms are generally 50 percent of the crop output at harvest. Landowners generally do not provide agricultural inputs or share in the cost of inputs. This fact demonstrates a major constraint on tenants in their use of new technology in agricultural production. The problem of landlessness is very severe in Pakistan. Data indicates that half of the households are functionally landless (*Nazeer, 1983*).

The process by which poor peasants become landless is based on the social relation of producers. A strong dependency relationship exists between small and large landholders. This relationship is created by the small landholders because of widespread indebtedness, mortgaging of land to obtain credit and losses of land after natural disasters that limit their ability to repay debts and meet family food requirements (*Cornelisse et al. 1987*). The landless and their growth in the number continue to be the principal dilemma for planners and policy-makers.

3.3 WHEAT SITUATION --- PAST, AND PRESENT

There are sharp fluctuations witnessed in the production of wheat in the past. Beginning with the *fifties*, stagnation in wheat output coupled with a growing population led Pakistan to emerge as a wheat importing country. Although domestic production of wheat showed positive growth rates between 1959-60 and 1964-65, these have not been sufficiently high to account for the increase in demand emanating from the rapid growth of

population and the rise in income. As a result the growth of import, continued unchecked during the Second Plan's period.

With the introduction of green revolution technologies of tubewell installation, tractors and the discovery of high yielding varieties (HYV), production of wheat witnessed a sharp increase and placed Pakistan close to the level of self-sufficiency in 1969-70, partly eliminating the problem of wheat imports. Because of the policy stalemate and bad weather conditions after 1969-70, wheat production stagnated once again during 1970-72 and 1974-75 and wheat imports bill began to surge up in 1978-79 (*Wolf, 1986*).

The consecutive record of wheat harvests of 1978-79 to 1980-81, however, had enabled Pakistan once more to realize the self-sufficiency target with only 20,000 tones of imports. There was very little reliance on imports of wheat upto 1983-84, but in 1984-85, it started again and reached to apex in 1985-86. Onward from 1986 to 1988, no wheat was imported. The process of importation started again in full swing after 1988-89, with severe intensity in 1992-93, 1994-95 and 1996-97. This process of ups and down of wheat production and consumption is shown in Table 3.1.

Table 3.1
Wheat production, Imports and Consumption in Pakistan (000 tonnes)

YEAR	Domestic Production	Imports	Total consumption
1970-71	6476	219	6695
1971-72	6890	705	7595
1972-73	7442	1369	8811
1973-74	7629	1052	8681
1974-75	7673	1617	9290
1975-76	8691	1044	9735
1976-77	9144	346	9490
1977-78	8367	1052	9419
1978-79	9950	1957	11907
1979-80	10805	554	11359
1980-81	11474	20	11494
1981-82	11304	136	11440
1982-83	12414	-	12414
1983-84	10882	-	10882
1984-85	11703	545	12248
1985-86	13923	1562	15485
1986-87	12016	-	12016
1987-88	12675	-	12675
1988-89	14419	1802	16221
1989-90	14316	1603	15919
1990-91	14565	627	15192
1991-92	15684	1640	17324
1992-93	16157	2357	18514
1993-94	15213	1408	16621
1994-95	17003	2273	19276
1995-96	16908	1931	18839
1996-97	16651	2383	19034

Source: Agricultural Statistics of Pakistan (1996-97)

The table reveals an important fact, that if there has been shortage of wheat for few years, the government counteracted them properly through policy action.

Thus, it infers that the problem of wheat shortage can be eliminated on permanent basis if each year proper wheat policy is devised and

implemented. The dark side of the problem is that, if for a particular year, bumper wheat crop is received because of more efforts, then next year proper attention is not paid. Thus, self-sufficiency in one year does not mean self-sufficiency forever. Next year more efforts would be concentrated, which then remains a continuous process.

The above analysis implies that Pakistan could be able to replace imports, with domestic production, if serious attention has been paid to wheat production and its marketing. It is also evident that the volume of marketed surplus of domestic wheat production has increased remarkably for many years, both in absolute and relative terms. It is supported by historical data, for example, Only 17 percent of the total food grain production had been marketed in Pakistan during the early 1960's (*Raquibuzzaman, 1970*). Based on procurement figures by the government, the percentage of marketed surplus of wheat comes to 29 percent for the year 1979-80. However, government procurement of wheat is only a part of the total wheat sales of the farmers, the above percentage is likely to be an underestimate of the actual marketed surplus of wheat.

Black-marketing and hoarding of wheat stocks have been some of the other evils, which are responsible for the man-made elements in scarcity. This part of smuggling, black-marketing and hoarding is greatly responsible for the acute shortages of wheat in the country and are most commonly felt in the wheat crisis environment.

The influx of Afghan refugees into Pakistan started in 1978 and is at its peak at 3.7 million in 1990. Pakistan is still hosting 1.818 million Afghan refugees in 1998.

While import elimination involves the restructuring of the whole marketing system, to meet the increasing demand of wheat, a considerable expansion and improvement of efficiency is needed. In addition, general improvement in market efficiency would also be essential for providing continuing incentives to the farmer without unduly rising prices for the consumers (FAO, 1970). This is because such a system discourages in exorbitant profit margins of the market functionaries and ensures fair prices for the producers and consumers alike.

The primary purpose of the present study is also to examine the responsiveness of the wheat market to a changing environment which in turn has greater implications for the future course of agricultural development.

3.4 ORGANIZATION OF WHEAT MARKET

Wheat is one of the most widely consumed staple foods of Pakistan. Each year a large amount of wheat is imported as shown in Table 3.1. Of course, there is deficiency in the production of wheat but there is another important reason for it which is the disorganized nature of wheat market, that leads towards importation of wheat. Elimination of wheat imports can, therefore, greatly elevate Pakistan's balance of payments problems.

The constituents of wheat market are farmers, intermediaries including, agents, wholesalers, beoparis (merchants), millers, retailers, utility stores and general consumers.

In 1950's private sector played dominant role in wheat market. Farmers sold their wheat stocks to the commission agents who forwarded the grain

through the wholesaler to the millers for processing, where the processed grain was marketed for the consumers again through private wholesalers and retailers. The farmer was and is liable to pay certain minimum charges of transportation and a market entry tax (*octroi*). In case of wheat sale in villages, the farmers still paid the transportation and *octroi* charges with and an additional item of fee to the commission agents (*Cornellise, et al, 1987*). Wheat prices are mainly determined by the forces of demand and supply and they indicate considerable variations during a year. Generally prices are high in the pre-harvest and low after harvest period. Wheat is hoarded by traders which is sold later at high profit margins. Market committees are formed, which are responsible for safeguarding the interest of various groups, maintain accuracy of weights and measures and supply information to the government regarding wheat. It is found that most of the market functionaries are indulged in fraudulent practices, while using incorrect weights and measures and charging very high prices for wheat.

The government devised a number of steps, so as to ensure fair prices for producers and consumers both and eliminate market malpractice's. In 1955, two regulations had been enforced --- the law of compulsory procurement of excessive wheat stock and the law of banning inter-district movement of wheat. The two laws aimed at curbing the hoarding or buying of wheat and restoring price stability in the market. During 1960, two more regulations had been passed. The price of wheat is fixed at a higher than world market price, to increase wheat production. Moreover, a rationing system is evolved to provide subsidized wheat to the farmers. In 1970's the rationing system was strengthened and expanded which procured wheat at less than world market price. (*Report of Review price Committee, 1991*).

It is considered necessary to create additional regulating market practices all over the country. The market committees of the regulated markets are given responsibility of displaying the daily whole sale prices of major agricultural commodities. To improve the market information of the farmers, daily prices of various agricultural commodities are also broadcasted from various radio and T.V. stations.

In 1972, most of the flourmills had been nationalized and were given under the control of the provincial food department, where the distribution was undertaken through rationshops. In 1977, the flour-mills had been denationalized and the private trade in wheat flour was restored. The main reasons for this action have been consumers demand for quality flour, checking of black-marketing and increasing the efficiency of flourmills. In 1972, the government established the procurement centres and in 1973, the Pakistan Agricultural Storage and Services Corporation (PASSCO) had been set up to share the working load of the procurement process. Thus, wheat procured by the government surged up from 3 percent in 1972 to 18 percent in 1973 and further to 29 percent in 1980 (*Ghaffar 1983*).

In the input market, irrigation water, tractors, electricity and gasoline products are already in the state monopolies. A similar development occurred in the market of fertilizers. In 1960's, the distribution of fertilizers had mainly been in the hands of the private sector. In 1970's, the government increased its share in fertilizers market, where the National Fertilizers Development Corporation distributed a greater portion of fertilizers.

Now-a-days fertilizers are sold mainly by the private sector. Price support policy for wheat is still in practice, where the support price implementing agencies are the Pakistan Agricultural Storage and Services Corporation and the Provincial Food Department (*Economic survey, 1997-98*).

By evaluating the interventionist policy of the government, it may be argued that all these developments took place to serve the best interest of the farming community. This is true to a limited extent and is to oversimplify the situation of the wheat market in Pakistan. Whenever the shortages of wheat got worsened in different parts of the country, a ban is imposed on the movement of wheat on inter – provincial and district level.

3.5 WHEAT PRODUCTION AND IRRIGATION

Pakistan has two main crop seasons --- *Kharif* and *Rabi*. Wheat is sown in the *Rabi* season, cultivated in October-November and harvested in the months of May – June.

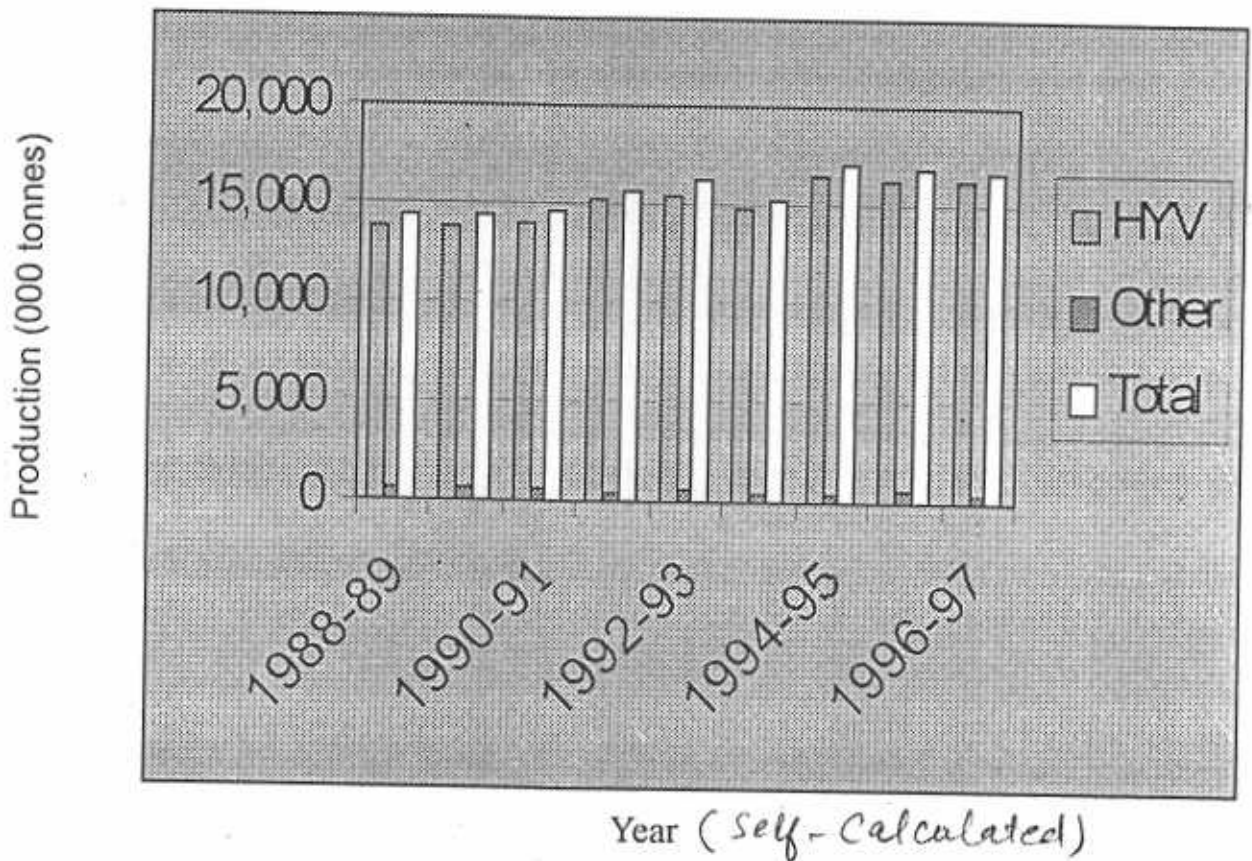
Type wise wheat is grown into two major categories in Pakistan; including (a) high yielding variety (HYV) and (b) Others --- comprising all others local or traditional varieties. In the high yielding varieties at national level are included Shahkar 95, Wadnak – 95, SR – 95, Bakhtawar – 92, Drawar – 96, Kohsar – 95, etc. The bulk of wheat production comes from HYV with a very small percentage obtained from others. The Table 3.2 presents, the trends in area and production of wheat crop in Pakistan (*Godden 1988*).

Table 3.2
Trends in Area and Production of Wheat

Year	Area "000 hectare"			Production "000 tonnes"		
	HYV	Other	Total	HYV	Other	Total
1988-89	7085.4	644.2	7729.6	13852.4	566.8	14419.2
1989-90	7279.4	565.1	7844.5	13792.7	522.8	14315.5
1990-91	7377.7	533.7	7911.4	14033.6	531.4	14565.0
1991-92	7369.5	508.1	7877.6	15164.1	520.1	15684.2
1992-93	7681.4	618.3	8299.7	15501.1	655.4	16156.5
1993-94	7558.1	476.1	8034.2	14767.6	445.4	15213.0
1994-95	7660.3	509.5	8169.8	16490.2	512.2	17002.4
1995-96	7803.0	573.5	8376.5	16310.7	596.7	16907.4
1996-97	7614.5	494.6	8109.1	16154.5	496.0	16650.5

Source: Agricultural Statistics of Pakistan (1996-97, P 6-7)

Figure 3.2
Trends in Wheat Production, Comparing HYV and Other



The area and production of high yielding variety (HYV) and others are separately shown. Figure 3.1, graphically illustrates the production of wheat.

A farmer may be considered to have adopted HYV technology in wheat production, if he has planted HYV wheat on his land. The adoption rate is expressed as a ratio between the number of farmers using HYV technology and the total number of farmers. Another index of HYV adoption is the proportion of wheat area (than cultivators) brought under HYV.

Both traditional and modern methods of irrigation are used in Pakistan. The network of irrigation in Pakistan comprises of canals, dams, tubewells and rain. The agricultural package announced by the present government provides the following reliefs to stimulate irrigation network:

- i. The lining of watercourses increasing from 4000 to 8000 per year.
- ii. A crash programme to be launched for desalting of minors and ensuring water reaching the tail sections. The concerned officials of the irrigation department has to take care of this personally.
- iii. Raising sections of canals, which are contributing to water-logging and salinity, under the National Drainage Programme.
- iv. Harnessing the water of hill torrents through diversions and utilization for rabi crops on a sizeable area throughout the Sulaiman range in the Northern Areas of NWFP, part of Punjab and Balochistan.
- v. Initiating schemes of small dams, sprinklers and drip irrigation projects for the barani areas.
- vi. Launching special campaign for rehabilitation and clearance of the chowked drains.

Some of the principal programmes to be implemented are surface irrigation, drainage and reclamation schemes, water-management programme, survey, investigation and research, flood protection and on-farm water management (OFWM) programmes.

It is expected that the water availability for Kharif and Rabi crops would reach 133.28 MAF during the 1997-98. For Kharif, would be 76.94 and for Rabi 56.34 MAF separately. The availability of canal water head during July-March 1998 is given in the following table 3.3

Table 3.3

Water Availability at Canal Head

(Million Acre Feet (MAF))

	Kharif 1997	Rabi 1997-98	Total
Punjab	32.88	18.45	51.33
Sindh	30.68	14.90	45.58
Baluchistan	1.36	0.76	2.12
Sarhad	0.66	0.32	0.98
Total	65.58	34.43	100.00

Source: Indus River System Authority, Lahore (1997-98).

Farmers are generally unwilling to take the risk of unpredictable rainfall during the critical period of HYV crops. So in *barani* areas HYV is not very suitable and the farmers sow mainly other local crop varieties. Rainfall variability during the peak time is crucial to the crop. Hence, in *barani* areas, lack of water from the panicle initiation to flowering stage often results in

crop failure. The risk of crop failure is greatly reduced if supplemental irrigation is ensured during the peak time.

Contrary to naïve belief, it is also clear that the farmers in Pakistan are certainly not laggards in the adopter categories. They are rational and in fact among the higher level of adopter groups in technology adoption.

Pakistan has one of the best canal network in the world, which supply water to the wheat crop. But still irrigation presently covers approximately 25 percent of net cultivated areas. Therefore, a huge wastage of cultivable land takes place, which is not being brought under cultivation due to lack of water supply. Thus, water resources in the country are under-exploited, with a high potential for increasing not only agricultural production but also employment and alleviation of rural poverty.

It is likely that the richer are largely the beneficiaries of water resources. The introduction of any technical improvement immediately widens the gap between the rich and the poor, whether it is in water supply, tubwells or irrigation. Since irrigation increases the productivity and the cropping intensity of the land, it is likely that the landlords with access to irrigation may acquire land in the irrigated area and may also evict share-cropping from irrigated land. *Hussain, (1970)* reports that there is a tendency for the wealthy to exercise power to acquire land in irrigated areas, which has occurred to some extent. It has been observed that in some cases, farms, which have previously been operated on a tenancy agreement, are taken over by the owners once irrigation got available to the land.

Apparently, the introduction of new irrigation technology, without taking counter corrective measures may lead to worsen the existing unjust situation in the rural areas. Modern irrigation technology has already created a class of water-lords from among the landlords, who possess even more economic, social and political powers to exploit the weaker rural farmers.

The direction of the effects of modern agricultural technology has been of aggravating disparities in the agrarian society. Fortunately, this direction can be altered. It may be possible to suggest policy measures that would alleviate the negative consequences of the spread of agricultural and irrigation technology in Pakistan, and at the same time would directly benefit the poor. Finally one measure may be to provide the rural farmers the credit and irrigation facilities. In this way, their income and purchasing power would increase, leading towards more productivity.

3.6 WHEAT POLICY OF PAKISTAN

The wheat policy of Pakistan is spelled out in detail as a segment of the general agriculture policy. A number of, policy modalities have been operated upon by a mixture of governments objectives for problems emerged, since 1980. Maintenance of food self-sufficiency with a preference for generation of exportable wheat surpluses have remained the government core objectives, its realization is becoming impossible because of the deteriorating situation of developmental resources. The expenditures on input and consumption subsidies are enormous for the government's budget as it accounted for Rs. 6.5 billion out of the total revenue of Rs. 39.4 billion, during 1979-80. For fertilizer Rs. 2.5 billion and for wheat Rs. 2.4 billion

subsidies have been the largest drain on national resources. The policy changes of 1980 are also enforced by the tied loan conditions for Pakistan by the IMF (Barkely, 1992). The measure taken follows as.

- i. It is decided that because of heavy burden on the budget, 1985 would eliminate input subsidies for agriculture. At the same time fertilizer, prices have increased by 88 percent from 1980 to 1982.
- ii. Wheat prices are increased to minimize the effects of fertilizer price increases and to maintain the momentum of growth of wheat output.
- iii. Elimination of wheat subsidy is pursued by raising wheat flour prices of rationshops from Rs. 1.21 per KG in 1979-80 to Rs. 1.35 per KG in 1980-81.
- iv. The emphasis of water resource development is shifted from long term to short term projects.

In order to improve upon yield per acre, a number of steps have been taken like growth in fertilizers, increasing institutional credit, supply of key agricultural inputs, expansion of network of agricultural cooperatives and creation of agricultural price commission (Khan, 1984).

Moreover, the following measures have been taken as part of wheat policy in Pakistan;

1. ***Water course Improvement:*** It has been observed that the programme is likely to increase water availability up to 210.22 MAF during 1997-98. Water being the scarce resource in agricultural production, the programme is capable of increasing wheat output and employment with no distributional problem. Some of the main projects implemented are surface irrigation, accelerated water management

programme, on-farm water management, flood protection programme and research etc. (Kuhnen, 1989).

2. **Administrative Measures:** The administrative measures are unlikely to have some appreciable effects on wheat production, because the creation of new organization on top of the prevalent one is not going to change the situation. Moreover, agricultural cooperatives have repeatedly been tried in Pakistan with poor results. Thus, as compared to the rising cost of administrative measures, they may have low contribution to the wheat production.
3. **Key Institution:** Some of the key institutions, playing a leading role in the development of wheat production are Federal Seed Certification (FSC) and Registration Department (RD), the Agricultural Development Bank of Pakistan (ADBP), the Plant Protection Department (PPD), the Agricultural Price Commission (APC), the Pakistan Agricultural Storage and Services Corporation (PASSCO), the Provincial Food Department, the Pakistan Agricultural Research Council (PARC), etc.
4. **Wheat price policy:** The policies followed in the developing countries about agricultural development are counter productive which equally apply to wheat price policy of Pakistan. Empirical data demonstrate that wheat price policy in Pakistan continues to depress wheat production (Ghaffar, 1983).

As fertilizer prices rose more rapidly than wheat prices, it resulted in reducing fertilizer application, and affected wheat production. A slow increase in wheat prices as compared to industrial and cash crop

prices signifies resource transfer to those sectors, which ultimately reduce wheat output.

Another observation regarding wheat prices is the difference between the prices of imported to that of domestically produced wheat, which puts an unnecessary strain on the foreign exchange resources. Moreover, if wheat prices are announced in advance of wheat sowing, it may affect wheat acreage.

In order to improve upon production efficiency, the Agricultural Price Commission (APC) has made important recommendations for supporting prices and yield per acre. Agriculture Price Commission has set up standing committees consisting of farmers, representatives of the Provincial chambers, associations of agricultural, trade and industry, researchers, and subject specialists for various crops including wheat.

For wheat, the support price implementing agency in Pakistan is the Agriculture Storage and Services Corporation limited (PASSCO) and Provincial Food Department (PFD). The Support prices of wheat crop for the year 1996-97 is Rs 240 per 40 KG and for 1998-99 Rs. 300 per 40 KG.

5. ***Plant Protection:*** To control locust and other Crop pests, the Department of Plant Protection carries out aerial sprays. Pests and insects cause heavy damages to crops. The Plant protection Department keeps regular vigilance and conducts surveys for control of locusts and pests in the country.

For this purpose, the Plant Protection Department (PPD) has 22 Aircraft's. It is estimated that during the year 1997-98, an area of

462,360 hectares to be sprayed as compared to 351,000 hectares in 1996-97 by the Plant Protection Department.

6. *Agricultural credit:* Agricultural credit provides financial resources to the farming community, particularly for the purchase of primary inputs such as seed, fertilizer, pesticides, machinery, and other equipments, etc. Government considers it an important instrument for achieving production targets and attaches high priority to ensure its availability to the farmers. Recently the government has decided to issue pass books to all farmers in order to facilitate them in obtaining agricultural credits easy basis.

Agricultural loans amounting to Rs. 23,328 million have been disbursed during 1997-98 as compared to Rs. 19,548 million during the corresponding period, showing a rise of 19 percent. The Agricultural Development Bank of Pakistan disbursed Rs. 15,528 million, the Commercial Banks Rs. 3,618 million and the Federal Bank for Cooperatives Rs. 4,181 million. The break down of loan advanced, is given in the following Table 3.4.

Table 3.4
Breakdown of Agricultural Credit

	Production Loans	Development Loans	Rs. (In million) Total loans
CBs	3520.489	97.139	3617.628
ADBP	9681.080	5847.371	15528.451
FBC	4173.440	12.120	4181.530
Total	17375.009	5956.630	23327.609

Source: Economic Survey of Pakistan (1997-98, P. 17)

7. *Agricultural Research*: Pakistan Agricultural Research Council (PARC) undertakes aids, promotes and coordinates agricultural research in the country. It is guided by five broad objectives:
- Self-sufficiency in foodgrains, sugar and edible oil;
 - Poverty alleviation;
 - Equitable distribution of productive resources and opportunities;
 - Non-exploitative use of natural resources; and
 - Environmental protection

The following new varieties of wheat have been developed at national level by the PARC upto 1997-98, including: shahkar -95, Wadnak -95, SR - 95, Drawar - 96, Bakhtawar - 92 and Kohsar - 95.

Government is really and apprehensively anxious about the lower wheat production. As it is clear from the above analysis that she exerting a lot of efforts in this regard, to improve the wheat production capacity, but so far not meeting with success in attaining wheat self-sufficiency. For the achievement of this goal, the government has to change its wheat policy in light of the new development schemes and their implementation (*Economic Survey, 1997-98*).

CHAPTER IV

THE CONSUMPTION SIDE OF WHEAT

4.1 IMPORTANCE OF WHEAT CONSUMPTION IN PAKISTAN

The rising importance of wheat has inspired the author to set up a comprehensive study of wheat consumption in Pakistan. Within agriculture, wheat is the most important single product – both as a staple food item and as a principal source of income.

On global scale, wheat is among the most primary products both by volume of production and extent to which it fulfills the basic need for food. This observation also exposes the role of wheat, which it plays in geopolitics (*Malik, et al, 1988*).

Wheat enters almost every aspect of human life i.e. physical, economic, social, religious and political and is being looked upon in a number of ways by different types of people. People also lend an emotional touch and add a psychological addiction to it in two important ways, which must be kept in forefront, as under:

- i. As the principal crop, wheat forms the backbone of the country. Its cultivation is spreading across the length and breadth of the nation's cropland and it's production is being the chief occupation of the people.
- ii. As far as farmer of Pakistan is concerned, wheat is his means of subsistence, his first vital need and principal profession, his medium of exchange and standard of value (*Cornellisse, et al, 1984*).

Wheat abundance is a measure of people's prosperity, welfare and happiness. Its shortages may spell actual famine for millions, in intensity, it can inflame passions and politics, destroy social and political stability, uproot time-honored institutions and disrupt life and polity. The importance of wheat can thus hardly be exaggerated. No food has a longer history than Wheat, which first drove Adam and Eve from paradise and ever since have kept their progeny toiling at producing it, distributing and consuming it. Moreover no food has entered the lives of so many people over the centuries and probably no food looms so large today in both economic and social significance. It concerns alike economist and the politicians, the nonprofessional and research workers, and all those interested in human affairs at large (*Nazeer, 1983*).

Wheat is the most valuable crop of Pakistan, and the prosperity of the majority of its people closely bound up with the wheat economy. Wheat figures larger in the daily life of a greater-number of the people of Pakistan than rest of the cereals. It is not only because both those who grow wheat and those who consume wheat far outnumber those who grow and consume the rest of the cereals, but also because, first, those whose principal food is wheat depend to a greater extent on wheat for food and nutrition than do those who consume other cereals and second, those whose principal crop is other cereals, practice a more diversified system of farming than do those whose principal crop is wheat.

This almost complete dependence of the people on wheat in the wheat producing regions, expose them to greater hazards and place them in a more

vulnerable position. It also attaches to wheat a peculiar character and significance. In these regions, wheat and life seem to stand and fall together.

As shown in Table 4.1 and 4.2, Pakistan occupies an important place in the wheat habitat, being one of the biggest cultivator and consumer of wheat.

Table 4.1

Wheat in the Distribution of Area Sown

Year	Area "000 hectares"		
	Food crops	Wheat	Percentage
1980-81	10745	6983.7	69.0
1981-82	11111	7222.9	65.0
1982-83	11257	7397.9	65.7
1983-84	11283	7343.2	65.0
1984-85	11256	7258.5	64.4
1985-86	11192	7403.3	66.1
1986-87	11678	7706.2	66.0
1987-88	10883	7308.4	67.1
1988-89	11737	7729.6	65.8
1989-90	11921	7844.5	65.8
1990-91	11933	7911.4	66.2
1991-92	11667	7877.6	67.5
1992-93	12191	8299.7	68.0
1993-94	11918	8034.2	67.4
1994-95	12296	8169.8	66.4
1995-96	12415	8376.5	67.4
1996-97	12056	8109.1	67.2

Source: Agricultural Statistics of Pakistan (1996-97), p 2, 3, 4

Table 4.2
Wheat in the Food grain Production

Year	Production "000 tonnes"		
	Food Crops	Wheat	Percentage
1980-81	16188	11474.6	70.88
1981-82	16319	11304.2	69.27
1982-83	17492	12414.4	70.97
1983-84	15853	10881.9	68.64
1984-85	16692	11703.0	70.11
1985-86	18462	31923.0	172.91
1986-87	17216	12015.9	122.07
1987-88	17471	12675.1	72.54
1988-89	19395	14419.2	74.34
1989-90	19313	14315.5	74.12
1990-91	19587	14565.0	74.36
1991-92	20634	15684.2	76.01
1992-93	21056	16156.5	76.73
1993-94	20916	15213.0	72.73
1994-95	22423	17002.4	75.82
1995-96	22748	16907.4	74.32
1996-97	22730	16650.0	73.25

Source: Agricultural Statistics of Pakistan (1996-97), p 2,3,4

From area point of view, the area devoted to food crops in 1980-81 is 10745 thousand hectares while in this share of wheat is 6984 thousand hectares (69 percent). The area of food crops has increased to 12056 thousand hectares in 1996-97, in which the bigger share of wheat is 8109 thousand hectares (67 percent)

From the production point of view, the total production of different food crops in 1980-81 was 16188 thousand tonnes, in which wheat production was 11475 thousand tonnes (70.8 percent), as compared to 22730 thousand

tonnes in 1996-97, in which the production of wheat was 16651 thousand tonnes (73 percent).

In both area and production, wheat thus occupies a significant place, which is clear from the above Tables and explanation.

In Pakistan, wheat forms 73 percent of the gross food crops production; signifying a greater percentage. It may thus be observed from study that wheat dominates agriculture and economic life in Pakistan. Whether as the principal crop or as the principal food of the people, it sways the scales of their prosperity and adversity – wheat asserts its supreme importance in the economy of Pakistan.

4.2 FOOD HABITS OF THE PEOPLE OF PAKISTAN.

Food has always played a fundamental role in man's struggle for existence. The dietary habits and food pattern of people depend upon a number of considerations. Besides the economic conditions and the physical environments of a country, depend greatly upon the religions and social customs and traditions relating to fasts, feasts, taboos and superstitions and upon matter of prestige, national association, tastes, prejudices, etc. These considerations should not be lost sight, neither should these be ignored while discussing substitutes or changes in the consumption patterns, nor ever in estimating the availability of food supplies.

In Pakistan, there is dominantly a grain diet where wheat over-shadows all the rest of the cereals – i.e., rice, maize, bajra, jowar and barley etc. The consumption of fruits and vegetables is also negligible. Pulses alone

supplement the ordinary man's diet to a considerable extent. In view of this very low consumption of other food items, the high proportion of food grain becomes at once necessary and understandable. Whether as the contributor of the bulk of the food or of the calorie intakes, wheat holds pride of place.

In Pakistan wheat is the staple diet, consumed morning, afternoon, evening, and like typical wheat diets every where, contains little else. It is of course a characteristic of all wheat diets that it supplies a greater percentage of the total calories and others foods contribute relatively lower calories. Hence people have to depend more and more on wheat for food and nutrition, both to maintain the present standards of consumption as well as to improve them (Ghaffer 1983).

With the change in time, and with an extension of transportation, wheat is entering increasingly into the daily life of the people, wheat shortages from time to time necessitate the consumption of coarser grains or other cereals. Coarser grains are regarded as *inferior grains*, Those who can avoid them, do! Those who cannot, aspire. Here *Dr. Samuel Johnson's Quotation* is worth mentioning- i.e. "*Oats is a grain which in England is given to horses, but in Scotland supports the people*".

Again, with the growing prosperity of the people, wheat consumption further expands. Its consumption is also bound to increase for purposes other than for direct food consumption, like wheat products of various kinds, and its uses for non-food, and industrial purposes.

The reason for this heavy reliance on wheat by people is a complex phenomenon. Preference alone cannot offer the sole explanation. preference

itself is a by-product of long concentration on wheat. These reasons may be classified into two broad categories;

- i. Those who tend to favour the preponderance of wheat in the national diet. This is partly due to the physical environments of the country like soil, climate, etc, and partly due to the poor farmer in following the traditional pattern of crop production, the relative lack of availability of other foods leading to a heavy reliance on wheat for food and nutrition. Moreover, there is the driving force of habit and a feeling of security in following the traditional patterns of food consumption which are based on a life long familiarity.
- ii. There are strong psychological and emotional factors, which tend to disfavor the entry of substitutes. Familiar foods give a feeling of security. Conversely, lack of accustomed food that is associated with orderliness in life can cause anxiety and tension. What familiar food means and how difficult substitutes can be, are demonstrated by a number of historical incidents. As an example, taking the case of Irish people toward maize during the potato famine in 1945 and 1946. They rejected the maize, which was sent for their relief from America and even, in some instances starve rather than eat this strange food. The hungry population of Italy ate with great reluctance the pea soup powder imported from abroad. Wheat eaters, compared to the consumers of other food, are more faithful to this crop. Moreover, there are certain economic considerations also attached to extensive use of wheat. Wheat by the very nature of its production provides low cost subsistence. Beside this its pleasantness, power to satiate and great nutritional value, puts wheat into central place. And where lack

of purchasing power permits only cheap food to be consumed, there is no wonder that wheat will be dominant.

Bennett (1954) gives the economic as the basic explanation. His argument is like this: "some nations consume very little of the grain products. Other nations show the reverse behavior. The basic explanation is undoubtedly economic. The grain products are everywhere relatively cheap, in money or in labor to produce. Nations sufficiently advanced economically can afford heavy consumption of the more expensive foods. Nations insufficiently advanced economically must hold more strongly to the items of grain, which satisfy hunger at the least cost. Families within nations behave in the same way". This may be evidenced from the behavior of those families within the nation who already enjoy a higher economic status. Undoubtedly they do resort to the consumption of some more expensive foods, which may be considered to be replacing cereals to a certain extent. Greater diversity in food, by increasing the bulk of the food and widening the choice, undoubtedly reduces the marginal utility of comparatively less pleasant foods. But hardly ever to the extent that cereal should cease to preponderate. For instance, what can reduce the importance of *Roti* or *Chapati* (forms of bread) in the bread consuming region of Pakistan (*Qureshi, 1974*).

Moreover, heavy cereal consumption is an integral part of a food composition where small quantities of sharp, palate-tickling, preparation of other food items, so much relished by the people, are combined with heavy morsels of bread. Dietary habits are the product of greater and more diverse forces than merely the pull and push of the economic ones. It is also true that areas of heavy cereal consumption are mostly poor areas, too. However,

poverty is not the only cause of heavy cereal intakes. Perhaps poverty and heavy cereal consumption have the same root-cause namely institutional stagnation, which is a character of these regions.

As a matter of fact, all the reasons noted above have the same effect—the unavailability of other foods does so by reducing the alternatives physically, the emotional and psychological reasons do so by restricting the willingness of the people to change over and the economic reasons achieve this effect by restricting their ability to do so. Thus wheat is not only the staple food of the majority of the people in Pakistan but it is also a diet possessing peculiarities which bar substitutes and keep wheat in the central place. It, therefore, follows that supply of wheat should always at least balance the nation requirement for it (*Goldman 1989*).

It can be seen from Table 4.1 and 4.2 that both area and production of wheat have a greater percentage as compared to other crops in the economy of Pakistan. This also shows the trends in food habits with heavy dependence on wheat.

4.3 PATTERN OF WHEAT CONSUMPTION IN PAKISTAN

Agriculture is the major sector of Pakistan economy with majority of the population directly or indirectly dependent on this sector and about one fourth of GDP is contributed by it. During 1997-98 agriculture sector has achieved 5.9 percent growth compared with nominal growth of 0.06 percent in 1996-97.

In food grain is included, wheat, rice, jowar, maize, bajra and barley where

the dominant share is that of wheat, Rice and maize. The targets and achievement of important food grains are given in the following table 4.3.

Table 4.3
Production of food grain

“000 tones”

	Achievements 1996-97	Targets 1997-98	Estimated achievements 1997-98	Percentage change
Wheat	16651	19000	18643	12.0
Rice	4305	4394	4325	0.5
Maize	1259	1501	1251	-0.6

Source: Economic Survey of Pakistan (1996-97, P. 9)

According to the preliminary estimate production of wheat for 1997-98 stands at 18.6 million tones as compared to 16.6 million tones of the last year indicating an increase of 12 percent. But still it is below the target of 19.0 million tones. However, there is a good crop this year but still with no wheat self-sufficiency, and as usual, the country may be importing wheat this year too.

The year 1998 has been declared as a *wheat year*. To grow more wheat by the country a number of incentives have been given for more wheat production and the bumper wheat crop is attributed to the enhancement of support prices of wheat, disbursement of more agricultural credit for the growers of wheat sowing, availability of sufficient soil moisture at sowing time in barani areas, provision of quality seeds to the growers and deceleration of 1997-98 as wheat year by the government (*Economic Survey 1997-98 P. 9*).

Understandable

To make the analysis more deeply and thoroughly and to get a more explicit picture of wheat consumption in Pakistan, a reference is made to 1965-66 to see how much the wheat production has increased in Pakistan. This has been enumerated in Table 4.4.

Table 4.4
Wheat Consumption in Pakistan

Year	Production	Imports	Consumption "000 tonnes"
1965-66	3916	751	4667
1966-67	4335	1158	5493
1967-68	6418	1430	7848
1968-69	6618	16	6634
1969-70	7294	180	8474
1970-71	6476	219	6695
1971-72	6890	705	7595
1972-73	7442	1365	8807
1973-74	7629	1053	8682
1974-75	7673	1617	9290
1975-76	8691	1044	9735
1976-77	9144	346	9490
1977-78	8367	1052	9419
1978-79	9950	1957	11907
1979-80	10587	554	11359
1980-81	11475	20	11494
1981-82	11304	136	11440
1982-83	12414	-	12414
1983-84	10882	-	10882
1984-85	11703	545	12248
1985-86	13923	1562	15485
1986-87	12016	-	12016
1987-88	12675	-	12675
1988-89	14419	1802	16221
1989-90	14316	1603	15919
1990-91	14565	627	15192
1991-92	15684	1640	17324
1992-93	16157	2357	18514
1993-94	15213	1408	16621
1994-95	17003	2273	19276
1995-96	16908	1931	18839
1996-97	16651	2383	19034

Source: Agricultural Statistics of Pakistan (1978-79) and (1996-97 P. 50)

The share of wheat in the national consumption of food grain in Pakistan is very high (73 percent). Very few developing countries contain this rather heavy *wheat bias* in food grain consumption.

Table 4.4 indicates the actual consumption of wheat in Pakistan, which is calculated by adding production within the country plus wheat imported from abroad. In 1965-66, wheat consumption in Pakistan has been 4.6 million tonnes, which increased to 8.5 million tonnes in 1969-70. Thus in 5 years time, the consumption of wheat has nearly doubled itself. The reasons were political instability and bad situation in East Pakistan, which worsened the situation and prevailed up to 1971-72. In 1974-75, wheat consumption increased to 9.2 million tonnes. In this 5-year period, the slow increase in wheat consumption is because of the separation of East Pakistan. The population of the East Pakistan, which was approximately formed 50 percent of Pakistan's total population, reduced wheat consumption sharply after separation from Pakistan.

In 1979-80, wheat consumption increased to 11.4 million tonnes and in 1984-85, it rose to 12.2 million tonnes. Again in 1989-90, it increased 16 million tonnes and in 1994-95, to 19.3 million tonnes. The basic reason for which is alarming population growth and influx of Afghan refugees (*3 millions*)

In 1997-98, the consumption is estimated at 19.03 million tonnes. From the above discussion, it is very clear that aggregate demand function for wheat depends upon multiple factors. Among these the most important one are population growth and changes in per capita income.

4.4 CHANGES IN POPULATION AND ITS EFFECT ON WHEAT CONSUMPTION

Food is the basic requirement of human life. It is not available free, and has to be cultivated and ripened, which is a costly and lengthy process. Gone are the days when *manna* used to come from heaven.

There is a close relationship between food and population. The number of people is the basic factor in determining food requirement. If population is increasing at a faster rate than food, then obviously there is a shortage of food, which is a common feature in the Developing Countries, including Pakistan. If on the other hand population is increasing at a slower rate than food requirement, it brings prosperity, which can be seen in the developed countries like USA, Canada, etc. What is needed that fertility in home (increase in population) has to be balanced by fertility in fields (more agricultural output).

Moreover, we have to see the way in which the size, growth and the structure of the population of the country affects its food consumption.

Now-a-days the government of less developed countries is seriously contemplating to get a balance between food and population, which is a matter of anxiety, both for politicians and economists.

History reveals that an urgent ambition of conquest has been territorial expansion which is used for more food production with the basic cause of conflicts between the nations for capturing more sources of food supply, and

which is responsible for changing and shaping the courses of human history and civilization.

In 1901, as shown in Table 4.5, the population of Pakistan has been 16.6 million. According to the 1951 census, the population figure increased to 33.8 million, which has almost doubled itself in the 50 year period. This increase has been greater during the 30 years i.e. from census of 1921 to that of 1951. In this period, the rate of growth has been estimated at 1.4 percent per annum.

Table 4.5
Population Growth – I

Census Years	Population	Growth rate (%)
1901	16.576 17.585	-
1911	19.382 20.201	1.58
1921	21.109	0.86
1931	23.542	1.10
1941	28.282	1.85
1951	33.817	1.79

Source: Economic Survey (1996-97)

This rate of growth is about double the rate at which the population of the UK has been increasing during the same period and would have been further greater if Bengal Famine, World War-II. and Hindu Muslim riots have not occurred. The main reasons responsible for this high rate of population growth are;

1. As more medical facilities have been made available which increased excess of birth over death, and, more agricultural land is brought into

cultivation in different parts of the country because of the introduction of irrigation schemes.

2. The increase in population is also due to inflow of Muslim refugees in 1947, from India to Pakistan.

The situation is worsened after 1971 where the growth rate of population (3.69) has become highly explosive as indicated in Table 4.6

Table 4.6
Population Growth – II.

Census Years	Population	Growth rate (%)
1961	42.978	2.43
1971	65.321	3.69
1981	84.254	3.06
1991	113.780	3.10
1997	135.280	2.77
1998	139.024	2.70

Source: Economic Survey of Pakistan (1996-97, P. 9)

According to these estimates, the populations are doubled between 1961 and 1981, where it increased from 42 million to 84 million approximately. These figures show that in 1961-81 (20 years), population growth rate reach the dangerous zone of 3.06 percent. In 1991, the population increased to approximately 114 million, which further rose to 135 million in 1997. This shows that in last 6 years time, the population of Pakistan increased by 26 million.

Population of Pakistan is estimated at 139.024 million by January 1998. The current population growth rate is estimated at 2.7 percent, which is one of

the highest in the region. In 1951, the growth rate of population has been 1.79 percent per annum, which during 1972 climbed to 3.69 percent. Followed by a declining trend, it is estimated to have decelerated to 2.77 percent in 1997 and further to 2.70 percent per annum in 1998. By the terminal year, 2003 of the 9th Five-year plane, the population growth is projected to slow down to 2.5 percent (*Economic Survey 1997-98*).

The 5th population census has been under taken during 1998, as census data processing may take some more time, therefore on the basis of some Demographic (PDS) and Population Growth Surveys (PGS), projection of the population has been made and trends in fertility and mortality have been derived. Overtime, the crude birth and death rates have been declined. The crude birth rate which is 43.30 per thousand population in 1981, has declined to 37.6 per thousand in 1994 and is estimated to be around 36.00 per thousand in 1998, due to acceptance of family planning programmes and improvement in literacy rate and living standards.

The crude death rate which is 11.80 per thousand in 1981 has also declined to 9.9 per thousand in 1994 and 9.01 per thousand in 1998, due to improved health facilities.

The influx of Afghan refugees into Pakistan started in 1978 and is at its peak at 3.7 million in 1990. Pakistan is still hosting 1.818 million Afghan refugees in 1998. Due to continuing fractional fighting amongst various Afghan groups as well as non-availability of adequate economic opportunities and other socio-economic conditions, about 0.296 million fresh Afghans also have taken refuge in Pakistan during 1998. Beside this a great number of other refugees from east Pakistan, India and Kashmir has

entered the country. Thus all these refugees are creating more pressure on the wheat requirements.

As wheat provides the bulk of the national food, changes in the size and structure of population have a direct bearing on wheat requirements. Every addition in the number of mouths to feed leads to a corresponding increase in requirements for wheat. In Pakistan, the population has grown by 21.300 million during 1990-97, where the wheat consumption has increased by 2.086 million tonnes in the same period. Thus, every increase in population is also bound to aggravate pressure on wheat consumption, unless accompanied by a corresponding expansion in the supply of other cereals. Pakistan has now been for a long time a deficit wheat producing region and if the pressure of refugees still continue, it may add more to the difficulties of the nation to meet its wheat requirements.

With the expansion of the urban population and the growth of big cities, which may further swell with industrialization and pressure in the rural areas, there have grown up new areas of demand. This is more than merely a geographical extension of requirements. The urban people no longer provide food for themselves, rather they have to be provided for. For this, a constant and smooth flow of supply is required which means that large quantity of foodstuffs must move through commercial channels to supply the needs of this increasing non-self supplying population. This also necessitates in the supply of marketable food: an increase in total supply alone may not necessarily lead to an increase in the marketable surplus (*Cornelisse, 1987*).

Farming in Pakistan is still at subsistence level and the scale, on which wheat is being produced, for non-commercial, regular and ever increasing

provision to the urban areas raises serious questions. The rural areas where surplus wheat is produced also consume a greater percentage of it. Though the rate of increase of the rural population is lower than that of the urban, the increase in their absolute number is staggering. In the absence of technological change, it implies that small, and often fluctuating, marketable surplus may shrink further. This double pressure on requirements i.e. increase in the rural requirements leading to a shrinkage of supplies to the urban cities, and increase in the urban requirements, clamouring for an expansion of supplies in the towns, seriously aggravates the food problem of the country and is fraught with grave economic consequences.

Wheat Scarcity results in higher prices, hit hard the urban middle and poor classes, leading to strife and discontent. At a time when the nation has ambitious plans of economic development in hand, and development programmes are on their way, discontent prevailing among the lower class may have adverse consequences. The agricultural density per square mile of the cultivated land shows the concentration of requirement around areas favourable to production, which is particularly high in Pakistan. Any increase in this concentration may add further to the already very great pressure on land. In absence of any technological change, it puts serious limit to the attainment of requirements even by the rural masses themselves (*Gary Ender, et al, 1992*).

This pressure is further intensified and aggravated by nutritional density, which is the pressure of population per square mile of the area under food staples. The rate at which the nutritional density is increasing is a measure of the rapidity at which the rate of population growth is exceeding. The rate of increase in the sources of food supply lags behind increase in population.

The difference in the speeds of the two relative to each other is more important than the absolute figures. In Pakistan this rate is already very high (*Shaheen, et al, 1987*).

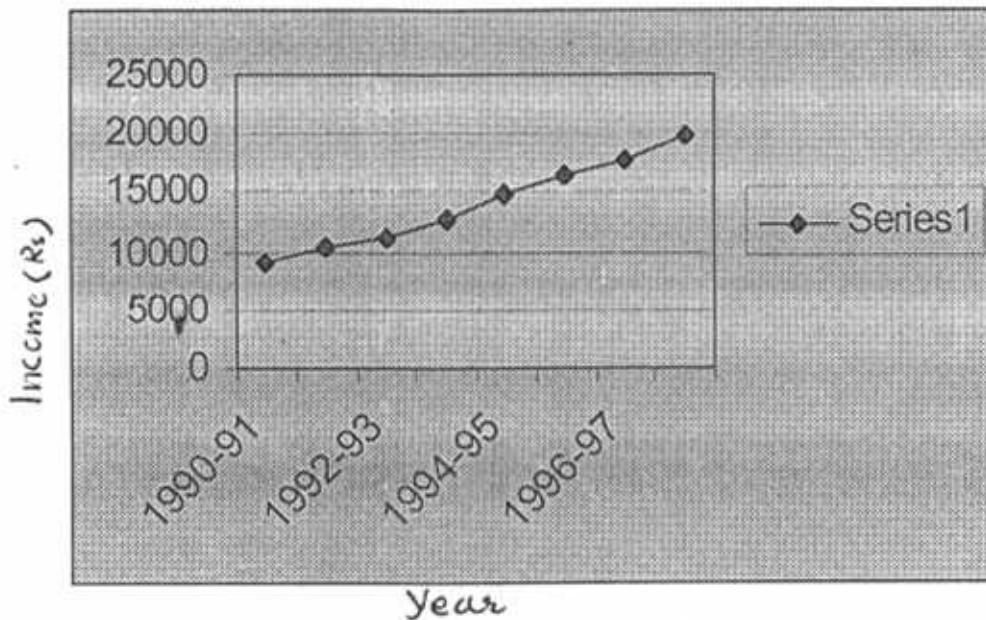
The economic implications of the increasing requirement of wheat in particular to other food items in general are very great. The same forces, which are adding to these requirements, also release other cereals in the utilization of the means of production. With an increase in population and urbanization there is bound to be an increase in the demand for those alternative uses of land, which cater for the provision of clothing, other items of food, and shelter. Thus increasing wheat requirement on one hand and increasing demand for the use of land and other factors of production for alternative purpose on the other will, greatly add to the scarcity of wheat, as well as, of other cereals, and result in higher prices. In a country like Pakistan, where majority of people live at subsistence level and where poverty has already broken their shoulders, rising food prices will further aggravate their miseries. Thus, the problem of demand of wheat due to an increase in population is further complicated by its attainment at lower cost. Every effort of the government to promote economic development, the pressure of population has tended to keep the problem at mere subsistence level in the front. The struggle to balance the increasing food requirements of an increasing population has so far not shown any positive sign on the economy of Pakistan.

4.5 CHANGES IN INCOME AND ITS EFFECTS ON WHEAT REQUIREMENTS.

In addition to population growth, changes in demand for wheat is contingent upon the changes in per capita income. Of all the factors, which influence food consumption, income is one of the most important which also effects, the kind and variety of food consumed.

Per capita income in real terms has increased (at constant 1980-81 prices) from Rs. 4227 in 1996-97 to Rs. 4347 during 1997-98, showing an improvement of 2.8 percent. Per capita income at current market prices increased to Rs. 19741 in 1997-98 from Rs. 17634 during 1996-97, indicating an increase of 11.9 percent as shown in Figure 4.1.

Figure 4.1



Source:- Economic Survey of Pakistan (1996-97, P. 43)

Per capita income in US dollar is at the highest level at \$488 in 1995-96, which substantially has declined to \$452 in 1996-97 but slightly, improved to \$ 457 in 1997-98. Per capita income from 1990-91 to 1997-98 is enumerated in Table 4.7

Table 4.7
Per Capita Income and Growth

Year	Per Capita income at current Market price		Growth in Rs (%)
	(Rs.)	(US \$)	
1990-91	9180	409	13.6
1991-92	10,433	420	13.6
1992-93	11,186	431	7.2
1993-94	12,672	420	13.3
1994-95	14,812	480	16.9
1995-96	16,398	488	10.7
1996-97	17,634	452	7.5
1997-98	19,741	457	11.9

Source:- Economic Survey of Pakistan (1996-97, P. 44)

Pakistan's growth record has remained impressive over a relatively longer period. It has achieved average annual growth rate of 5.7 percent since 1960. During 1985-88 Pakistan has achieved a high growth of 6.2 percent, which is accompanied with falling income inequalities, Gini-co-efficient fell from 0.355 in 1985-86 to 0.348 in 1987-88. The behavior of Theil-coefficient for the period 1985-94 also confirms the conclusions drawn from the Gini-coefficient, shown in Table 4.8

Table 4.8

Growth Rates and Income Inequality Trends

Year	GDP Growth Rates	Household Coefficient	Gini-	Theil Co-efficient
1985-86	6.4	0.355		0.23
1986-87	5.8	0.346		0.22
1987-88	6.4	0.348		0.23
1990-91	5.6	0.407		0.30
1992-93	2.3	0.410		0.27
1993-94	4.5	0.400		0.27

Source:- Federal Bureau of Statistics (1997-98, P. 43)

Since 1960, at least five phases of inequality trend could be identified. The first phase that spreads over to period 1963-71, shows that inequality in income distribution has narrowed, the ratio of highest to lowest 20 percent income group that decreased from 7.1 in 1963-64 to 4.9 in 1970-71. The second phase covering the period 1971-79 suggests a widening of income inequality, the ratio increased to 6.1 in 1979 from 5.4 in 1971-72. In the third phase 1984-87, the ratio has declined from 6.2 to 5.5, depicting an improvement in income distribution. In the fourth phase, (1987-91) the situation has worsened as the ratio climbed from 5.5 to 8.6. However in the Fifth phase of 1992-94, the ratio has declined from 7.8 to 4.4, enumerated an improvement in income distribution, shown in Table 4.9.

Table 4.9

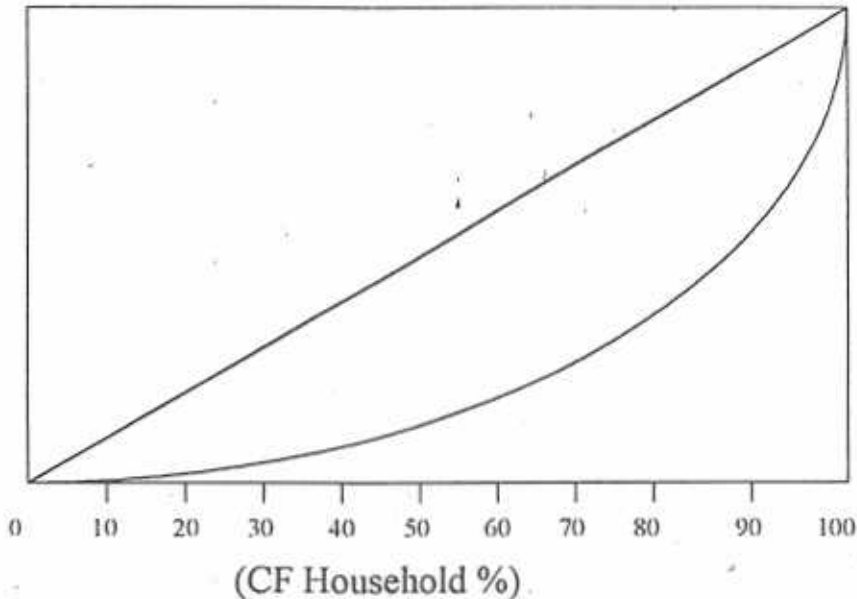
TRENDS IN INCOME DISTRIBUTION IN PAKISTAN

Year	House Hold income shares			Ratio of Highest to lower 20%
	Lowest20%	Middle60%	Highest20%	
1963-64	6.4	48.3	45.3	7.1
1966-67	7.6	49.0	43.4	5.7
1968-69	8.2	49.8	42.0	5.1
1969-70	8.0	50.2	41.8	5.2
1970-71	8.4	50.1	41.5	4.9
1971-72	7.9	49.1	43.0	5.4
1979	7.4	47.6	45.0	6.1
1984-85	7.3	47.7	45.0	6.2
1985-86	7.6	48.4	44.0	5.8
1986-87	7.9	48.5	43.6	5.5
1987-88	8.0	48.3	43.7	5.5
1990-91	5.7	45.0	49.3	8.6
1992-93	6.2	45.6	48.2	7.8
1993-94	9.2	50.6	40.2	4.4

Source: Economic Survey of Pakistan, (1997-98, P. 44)

The behavior of income distribution during the fifth phase (1992-93 to 1993-94) is depicted by Lorenz curve in Figure 4.2.

Figure 4.2
Lorenz Curve (1992-93 to 1993-94)



Absolute poverty, on the basis of calorie-intake index, has declined in Pakistan from 46.5 percent in 1969-70 to 17.3 percent in 1987-88. In the same period, rural poverty has declined from 49.1 percent to 18.3 and in the urban areas it declined from 38.8 percent to about 15 percent. However, since 1987-88, poverty is constantly rising in Pakistan. In 1992-93, 22.3 percent of the population had income below the poverty level compared with 17.3 percent in 1987-88. The rural poverty level at 26.2 percent and urban poverty at 21.3 percent levels in 1992-93 have also increased from the 1987-88 level (*Economic Survey 1997-98 P. 44*).

The latest available data on income distribution in 9 selected countries is presented in table 4.10.

Table 4.10

INCOME DISTRIBUTION IN SELECTED COUNTRIES

Country	Year	Household income shares		Ratio Richest 20% to poorest	GNP per capita US \$
		Poorest	Richest		
Pakistan	1993-94	9.2	40.2	4.4	480
Bangladesh	1992	9.4	37.9	4.0	240
China	1995	5.5	47.5	8.6	620
India	1992	8.5	42.6	5.0	340
Indonesia	1993	8.7	40.7	4.7	980
Malaysia	1989	4.6	53.7	11.7	3890
Philippines	1988	6.5	47.8	7.4	1050
Sri Lanka	1990	8.9	39.3	4.4	700
Thailand	1992	5.6	52.7	9.4	2740

Source: (World Development Report 1997, P. 45)

Table 4.10 indicates that the income distribution in Pakistan is far better than many countries included in the example such as Malaysia, Thailand, Philippines, China and India.

An increase in per capita income would fairly influence the food consumption of the people. Among food, wheat is such an item, which is used very frequently i.e. three to four times a day. So an increase in per capita income is directly proportional to wheat consumption. The initial effect of an increase in income in the developing countries where the food and nutritional conditions are not very good will add more grains to the diet. This may be followed by the addition of certain supplementary foods like vegetables or meat, and if the rise in income is maintained, there might take place some measure of replacement of the inferior by the superior grains. Assuming that people may adopt their dietary habits to their changing economic status, this might further develop into a stage in which the non-cereal foods may force down the proportion of the cereal foods, it may,

however, take a very rapid increase in incomes before substitutes can enter in such quantities to replace a greater portion of wheat (*Havinga, et al 1989*).

From past history, it is clear that wheat consumption has increased in Pakistan, where it might have replaced the inferior quality of wheat. In Pakistan demand for wheat is income elastic. A small increase in purchasing power leads to a greater demand for wheat and vice versa. Thus, low income is at present a factor tending to hold down the total number of food calories consumed and the number of wheat calories as well. This direct relation between purchasing power and wheat requirements is to be seen in the light of the enormous degree of food drain to which the population is subject, i.e. about 50 percent or more than that of the average family's budget is spent on food, in which wheat has a prominent place (*Mustafa et al., 1992*).

The relationship between consumption of wheat and income by households is not normally expected to be strong. Therefore, regression analysis does not reveal a significant co-relationship, presumably, because of the influence of wheat substitutes on level of wheat consumption. The consumption of wheat per head varies not more widely than the mean values even among consumers in the same class of income.

An increase of 12 percent in per capita income as projected in the near future promises a great increase in wheat consumption and wheat requirements. An annual increase of 2.7 percent in population is very likely to have an accelerating effect on wheat requirements.

It is thus concluded that population of Pakistan is still increasing at higher speed (2.7 percent), which is creating pressure on the cultivated land and thus adversely affecting production of food and specially of wheat.

Moreover, the per capita income is increasing at a rate of 11.9 percent, which is increasing aggregate demand for better quality of wheat. Thus a gap is created between demand and supply of wheat, which may further widened in future, which needs to be bridged promptly.

4.6 LOSSES AND STORAGE OF PROCURED WHEAT

A bigger portion of wheat harvested in Pakistan is lost (5%) and is not available for consumption. These losses are further aggravated in the process of supply to the final consumers.

Wheat losses at the consumer level are mainly incurred in stock clearing, pounding and cooking, during the preparation of food, which uses up excessive quantities of wheat. In this category, approximately 4 to 5 percent of the wheat produced is lost (*Faruqui, 1995*).

At the farm, wheat is lost in threshing, transportation, handling and storage etc. Storage losses at the farm level appear to vary widely with the type of the storage facility available and technique used. Various studies show different statistics in this regard, which is mainly due to different storage arrangement, for example, *Chaudhry* reports the loss at the farm level to be of the order of 1.6 percent for Pakistan. Another Study by the *Punjab Economic Research Institute* reports that 2.3 percent of wheat is damaged in Punjab. Thus, storage arrangement of higher quality can reduce such losses of wheat. Officially the losses of procured wheat due to storage are less than one percent but simulation suggest that not less than 5.1 percent wheat procured is lost by official institutions. This depends on the type of storage management applied and improvements in this respect achieved.

In the selling process, a significant amount of wheat is lost. The losses of wheat incurred in wholesale trade are moderate as compared to retail trade. Here again the main cause of wheat loss is improper storage. The handling of bags, which are often of bad quality, substance and are too heavy to carry, also, contributes towards such losses. It is estimated that about 8 percent of the harvest is lost in trading and milling activities (*Pinkney 1986*).

Thus, the total losses of wheat in Pakistan may be between 15-17 percent of the total wheat productions, which indeed, is a very large quantity. This loss cannot be avoided entirely though technically it is desirable. As several times, it has been done but the cost is always more than the benefit. Still, the loss can be minimized by improved handling, provision of standard storage and treatment.

A major portion of the marketed wheat is procured by government institutions and stored until it is released to flour mills. Apart from the amount of wheat retained by producers and stored by them for their own consumption, the government bears the main responsibility for wheat storage. The amount of wheat held by the government, to bridge the gap between two harvests is indicated by the size of the releases from the stocks (*Cornelisse et al, 1987*).

Thus, there is enough room for the construction of additional storage capacity to reduce the wheat losses significantly. The recent reformative measures taken by the government to increase storage capacity are in the right direction. Moreover, it is important that the government policy regarding storage facilities is consistent and coherent with its buffer stock and procurement policies.

CHAPTER V

THE PRODUCTION SIDE OF WHEAT

5.1 THE PRODUCTION AND AVAILABILITY OF WHEAT

Wheat is a staple diet of Pakistan. According to Economic Survey of 1996-97, nearly 75 percent of the country's food cropped area is allocated to wheat, which is the dominant winter crop in Pakistan. The production of wheat increases each year but the production possibilities are ~~severely~~ ^{acutely} limited because the average yield per acre is still very low, with large variation from the average as shown in Table 5.1.

Table 5.1
Yield Per Hectare

Year	1959-60	1965-66	1970-71	1975-76	1980-81	1985-86	1990-91	1996-97
Wheat	801	760	1,083	1422	1643	1881	1841	2053

Source: Economic survey of Pakistan (1997-98), p9

The variations are mainly explained by the condition of soils and the availability as well as the use of key agricultural inputs particularly irrigation water. It has been observed by *Naqvi, et al. (1986)*, that of the total wheat produced in a normal year, nearly 55 percent is kept for own consumption or paid out as wages in kind to farm workers, with only 45 percent of the wheat harvest is the marketable surplus available for distribution among consumers.

In Pakistan, wheat yield is lower than those countries which apply a more advanced agricultural technology. Even the prevailing low level of wheat yield per acre in Pakistan may not be sustained, if the increasing susceptibility of wheat crop to disease is not effectively brought down.

5.1.1 LAND UTILIZATION

As shown in Table 5.2, the total area of Pakistan is about 79.61 million hectares. Of this the total reported area is 58.51 million hectares, or 73 percent of the total area. In the total area 3.62 million hectares is under forests,

Table 5.2
Land Utilization in Pakistan (1997-98)
(Million hectares)

No.	Land Utilization	Actual	Percent
1	Total Geographical Area	79.61	100
2	Area Reported	58.51	73
3	Forest Area	3.62	05
4	Not Available for cultivation	24.39	31
5	Cultivable Waste	8.91	11
6	Total Area under cultivation	21.59 (5+6)=30.50	27 (5+6)=38

Source: Economic Survey of Pakistan, (1997-98, P. 10).

This is approximately 5 percent. Another 24.39 million hectares is not available for cultivation. This means a greater portion of 31 percent land cannot be cultivated. Thus, only 30.50 million hectares or 38 percent of total geographical area can be considered as country's total cultivable potential.

This is the sum of 21.59 million hectares (27 percent) under cultivation and 8.91 million hectares. The fact that there is such a vast cultivable waste is due to a number of reasons. First and the most important one is the scarcity of water, which is felt in specially during the winter months (November when wheat is cultivated). Even in the perennial irrigated areas, cropping intensity is low. The other problems responsible for the cultivable waste are water logging, salinity and soil erosion.

The following conclusions are derived from the above discussion:-

- A vast area of land remains uncultivated each year: Out of the total area of 80 million hectares (79.61 million hect.) only 38 percent is used for cultivation but presently only 27 percent is under cultivation, showing 73 percent of land as uncultivated in the country. Thus there is still scope for the extension of cultivation.
- The pressure on land is already very great, per capita cultivated area being about half an acre ($30.50 \text{ million hectare} \times 2.47 = 75.335 \text{ million acres} / 139.0 \text{ million population} = 0.54 \text{ Acres half an acre}$). Thus the extension of the area under cultivation as a means of increasing output per head or even maintaining it, has a limited scope for Pakistan.
- The share of wheat in the total cropped area is 37.1 percent. The area under wheat crop is 8.3 million hectares with wheat output 18.6 million tonnes in 1997-98.

5.1.2 AREA OF WHEAT

The area under wheat cultivation has increased from 4.8 million hectares in 1959-69 to 5.1 million hectares in 1965-66, which further increased to 5.9

million hectares in 1970-71. Again in 1980-81, it rose from 6.9 million hectares to 7.9 million hectares in 1990-91, where in 1997-98, it is expected to be 9.3 million hectares, (shown in Table 1.1).

It has been observed that the area under wheat cultivation is constantly increasing: it registered an increase of 4.5 million hectares from 1959-60 to 1997-98, the area under wheat is likely to expand further at a marginal rate (1.4 percent per year which is the past trend) because of the scarcity of additional water for irrigation purposes, and lack of incentives for the farmers; the emphasis, therefore, should be laid on obtaining larger quantities of wheat from vertical expansion with greater use of physical inputs rather than from a larger area (*Agricultural Statistics, 1996-97*).

5.1.3 PRODUCTION:

Production is increasing differently and independently of area. It is observed that area has increased substantially between 1959-60 and 1965-66 (277 million hectares), but production has increased only from 3.909 to 3.916 million tonnes. Again from 1965-66 to 1970-71, the area increased very slightly but production increased tremendously from 3.9 to 6.5 million tonnes. In 1980-81, the area jumped up by nearly one million hectares from 1970-71 but the increase in production has been only from 6.4 to 11.4 million tonnes. In 1990-91, the increase in area was 0.927 million hectares while increase in production is from 11.4 to 14.5 million tonnes. Again 1997-98, the increase in area (from 1990-91) is 0.467 million hectares, while the increase in production is from 14.5 to 18.6 million tonnes (*Economic Survey, 1997-98*).

This variation in area and production is due to a multiple other forces like irrigation water, climate, technology and land reforms etc. which have influenced the production (*Ghaffar, 1986*).

Inspite of the fact that Pakistan has 4.07 million farms and 48 percent of the population engaged in farming, it has not been able to achieve self-sufficiency in wheat, which is the basic food item of the people. The gap in the requirement and production of wheat is present all the time, Pakistan has to import 2.4 million tonnes of wheat during 1992-93 to supplement domestic reserves. During 1993-94, it has imported 1.42 million tonnes. During 1996-97, the import of wheat has been 2.4 million tonnes officially. The unofficial figure is 4 million tonnes, costing about 2.4 billion dollars or 113 billion Rupees. The deficit in wheat supply exists as the years pass. Pakistan has not achieved self-sufficiency so far.

In the past, wheat yield has been increasing at 2.2 percent per year, whereas the population is increasing at the rate of about 3 percent. Steps shall have to be under taken to increase the wheat yield at least to the level of the growth of population.

5.1.4 CAUSES OF CROP FLUCTUATION:

Pakistan inherited an agricultural economy at the time of partition. The cultivated area of Punjab is regarded as the breadbasket or granary of the subcontinent. The development of agriculture is ignored in the initial years, Inspite of the fact that agricultural sector remained the largest contributor to G.D.P. The production of wheat and other cereals are equally affected by the

ups and down of agricultural sector. The major causes responsible for the fluctuation in wheat production are described below;

1. **Partition:-** In the period immediately after partition, laden with turmoil and all-round dislocation, the production as well as availabilities of wheat could not remain unaffected. In 1947-48, production has been low due to unsettled conditions and the dislocation of agriculture. Standing crops have been badly affected by the movement of population. It is only after the agriculturist refugees settled down and got used to the new environment that conditions started improving. To all these is added, the 1947 floods in the Punjab and Sind which further aggravated the problem.
2. **The Bad year of 1952-53:-** This has been an exceptionally bad year where production of wheat dropped from 3.3 million tonnes in 1947-48 to 2.4 million tonnes in 1952-53. The reasons included first drought and afterwards floods, causing crop failures in wheat and all other cereals, thrust Pakistan into the grip of an unexpected cycle of food crisis. Besides the climatic factors, there have been certain other reasons too, like the low water level in the Indian controlled canals and the diversion of land from food to cash crops due to their higher monetary returns. As a cumulative effect, there has been a chronic wheat deficiency in Pakistan as narrated below (Pakistan Census of Agriculture (1983):
3. **The First Five Year Plan (1955-60):-** In this period the increase in food supply especially wheat is negligible because the agriculture sector as a whole has been neglected due to various reasons. The lack of adequate institutional credit system, absentee landlordism,

uneconomic holding, defective land tenure system and climatic conditions are among the crucial impediments that affected the wheat productivity. In this period, the production of wheat increased from 3.3 million tonnes particularly, in 1955-56 to 3.9 million tonnes in 1959-60.

4. *The Second Five Year Plan (1960-65)*: The government in this period has been determined to achieving self-sufficiency in wheat production, so it has taken a few effective steps like the agrarian reforms, adoption of modern technology, provision of credit facilities to enhance wheat productivity.

The well-phased policies of agriculture in general and wheat in particular did bear fruits. The output of wheat is increased from 3.8 million tonnes in 1960-61 to 4.6 million tonnes in 1964-65. The output of food grain as a whole is increased by 27 percent against the target of 21 percent (*Gotsch, 1973*).

5. *The Third Five-year plan (1965-70)*: There is a remarkable shift in wheat production, which increased from 3.9 million tonnes to 7.3 million tonnes. The use of adequate water and improved practices in wheat cultivation raised the production to all mostly in double quantum, during this period.

6. *Since 1969-70*, the wheat production has indicated a fluctuating growth pattern and on the whole presented a gloomy picture. The wheat production is increased from 7.3 million tonnes in 1969-70 to 7.6 million tonnes in 1974-75 and further to 8.4 million tonnes in 1977-78. There have been various factors responsible for the sluggish growth rate of wheat production. The strained relations between the tenants and the landlords, salinity and water logging, high prices of

inputs, natural calamities, less water availability, pests and plants diseases, use of low quality seeds, a separation of Bangladesh and political instability in the country etc, are responsible for low wheat yield in Pakistan during this period. On the whole, the agricultural growth rate also declined from 4.5 percent to 2.5 percent in the same period.

7. *The Fifth plan period (1978-83)*: There has been a steady improvement in wheat supplies. It has improved from 9.9 million tonnes in 1978-79 to 12.4 million tonnes in 1982-83. The improvement is mainly due to increased availability of water, larger fertilizer use, wider plant protection coverage and expanded use of improved seeds (*Economic Survey 1980-81*).
8. *The sixth plan (1983-88)*: Again there has been wide fluctuation in wheat production where it declined to 10.8 million tonnes in 1983-84. The wheat crop has been affected mainly because of a prolonged dry spell at the sowing, germination and time lag especially in barani areas. In 1985-86, the production of wheat increased to 13.9 million tonnes where self-sufficiency is achieved for a couple of years. In 1988-89, a bumper wheat crop of 14.4 million tonnes was resultantly achieved.
9. *The Seventh plan (1988-93)*: The production in this period has increased gradually, mainly due to government policies and good weather condition. From 1988-89 to 1990-91, almost the same target level of 14.4 million tonnes had achieved, which increased further to 15.6 and 16.2 million tonnes in 1991-92, 1992-93 respectively. The increase in production could be attributed to favourable weather and efficient use of inputs.

10. *The Eight Five year plan (1993-98)*: There has been a greater discrepancy between demand and supply of wheat during this period. In 1993-94 the production is estimated at 15.2 million tonnes. The weather was not favourable at the sowing time both in irrigated and in rain fed areas. There prevailed a protracted dry spell which adversely affected the crop, particularly its sowing in the rainfed areas. The biggest victim of the dry spell has been the rainfed region, which account for 10-12 percent of total wheat production.

For the year 1994-95, the production has been fixed at 17 million tonnes, which was achieved. In the rainfed (barani) areas good monsoon rains facilitated timely planting of the Kharif crop. Rains in December and January benefited both the rainfed as well as irrigated areas.

In 1995-96 and 1996-97, the production of wheat had declined by approximately 3.1 percent as compared to last year's production due to persistent drought, less availability of good quality seeds and lack of irrigation water.

Wheat for 1997-98 stands at 18.6 million tonnes as against 16.6 million tonnes of the last year, indicating an increase of 12 percent. The bumper wheat crop is attributed to the enhancement of support prices of wheat, disbursement of more agricultural credit to the growers for wheat sowing, availability of sufficient moisture at sowing time in barani areas, provision of quality seeds to the farmers, better favourable weather conditions and application of proper inputs (*Economic Survey, 1997-98*).

It is thus concluded from the above discussion that the supply of wheat depends on the total land available for the crop, irrigation facilities, climatic conditions and market price of wheat. With the expansion of more wheat area, yields are not expected to increase much because less suitability of land would be brought under cultivation, assuming the most suitable land may be cultivated first. Another problem is scarcity of irrigation water. Wheat is sown on two types of land, irrigated and non-irrigated land. In some of the perennial irrigated areas, productivity is not very good because of water-logging, salinity, soil erosion and pests diseases. Moreover, wheat is sown in the month of November, where in rainy (barani) areas receive very little rain which always brings a bad harvest. But even then if all the agricultural potentials of the country are utilized, the area sown per head of the population would still be very less because the supply of land is fixed while the population is increasing at the rate of 2.7 percent per year.

State intervention in the domestic food grain market has been practiced upon all over the world due to a variety of economic, social and political factors.

In Pakistan, government intervention in the wheat market aims at ensuring that the wheat producers get a reasonable price of their product (as there is a wide fluctuation in market price), ^{and} the middlemen's ^{role}, storage and marketing activities remain within reasonably profit limits and the additional food supplies generated are being made available to the consumers at large. For this, the government has employed a series of policy instruments like elaborate procurement system, milling of wheat and the distribution of wheat and flour through a network. These policies change with time. Even though in some cases actual policies have failed to achieve the intended results, the

rationale of state intervention in the wheat market seems to rest on the following arguments (*Butt, et al, 1987*):

- i. The high availability of the market price of food and the possibility of high concentration of market power among private traders in a situation of free trade requires that government should act as a stabilizing force with respect to prices.
- ii. To save the masses from exploitation, the government provides subsidy to the wheat consumers, which also result in a higher price for the producers.
- iii. To minimize the wheat losses that occur at different points connecting farmers with consumers, the government also provides transportation and storage facilities for wheat procuring after harvest.

These activities enable the government to influence the prices received by the producers as well as those paid by the consumers and to regulate the behavior of the private traders in the wheat market. All these policies are interrelated. The size of the buffer stocks that the government holds and the level of wheat procurement it embarks upon is interrelated decisions. The storage and transportation requirements are directly relating to the level of procurement, the size of wheat stocks and the duration for which these stocks may be held. Special attention must be paid to the ban on inter-provincial mobility of wheat, which keeps the price of wheat in the deficit provinces higher (*Opdam, et al, 1982*).

Despite the fact that private traders do their Job at a reasonably low cost, it does not follow that state may withdraw from the wheat market immediatly. Both government and the private sector should continue to function but state

should gradually divert its activities to provide more incentives and facilities to the farmers for wheat production, to improve procurement policies, and bring efficiency in the storage and milling activities. Finally, after making proper arrangement, the government should leave the scenario to the private sector.

The various uses that farmers make of wheat are domestic consumption, payment in kind to workers, feed, seed and expected losses. Mainly farmers domestic consumption is the largest single own use of wheat. The share of own consumption is fairly high and there is relatively little difference in this respect between the three Provinces. Payments in kind to labour and miscellaneous uses also absorb a significant portion of wheat harvest. As the other uses of wheat are still fairly large, the aggregate share of the marketed surplus in wheat production appears to be low in Pakistan.

Wheat is also used to pay the wages of the seasonal, permanent or other workers. The basis of payment appears to differ with the type of labour. Harvest labour is paid on a per acre basis, while the threshing labour is paid a pre-determined proportion of the wheat processed. Farmers prefer to use family labour rather than employing other workers. They apparently succeed best in this policy for jobs other than threshing and artisans work, as wheat payment for these other jobs rise more than proportionally the wheat production. Employment of permanent worker is concentrated on the largest farms in areas with better soil. It appears that wage-payments by tenants are only slightly lower than those by owners on farm of corresponding size (Naqvi, et al, 1986).

Among the miscellaneous uses, the proportions of wheat retained for seeds and feed are equally important. These uses absorb 3-5 percent of the total wheat production. The proportion of wheat retained for seed is a little high. In N.W.F.P.; the primary data collected in this context for this study reveals that the percentage of wheat reserved for seed tends to increase with farm size. Contributions in kind to meet religious obligations constitute approximately 2 percent of the harvest. Storage losses are also approximately one percent, (officially), except in N.W.F.P., where these losses are a little high. One of the weakest points in the wheat distribution process is the lack of efficient and high quality storage facilities. Private storage is inadequate in quantity as well as quality. Both wheat farmers and private traders face serious problems in storing wheat for longer period. To remedy the situation the public sector storage facility has been expanded at a rapid speed. *M.A Chaudhry* in his study calculated these losses at 15-17 percent of the marketed wheat, while *Naqvi, et al*, describe wheat losses due to poor storage alone are about one-third of the total losses of wheat. The official estimate is only one percent (this figure related only to storage in the government owned *godowns*).

A striking question that needs to be addressed at this point is regarding the desirability of state intervention in wheat market. For this, the efficiency of the private sector and the cost to the economy, have been seen in case of non-intervention. The problem of efficiency may be resolved in the long run, initially prices may shoot up temporarily because of discrepancy in demand and supply, but ultimately in the long run, both prices and production may settle down. The cost to the society is obvious. More burden may fall on the poor and their miseries may further be aggravated, so what needed is a

gradual withdrawal of government from wheat market, leaving the arena free to the forces of demand and supply. In the mean time, government should both increase employment opportunities, and per capita income. This may enable the poor class with more purchasing power and thus in the absence of government help, they may be in a position to cooperate with the situation.

5.2 PAUCITY OF WHEAT PRODUCTION IN PAKISTAN

Stagnation in wheat production in Pakistan is so obvious that hardly needs any evidence. But still *Azhar's* analysis of Table 5.3 reveals a decline of the growth rate of wheat production from 4.00 percent per annum during 1967-68 ---- 1979-80 to 2.65 percent per annum during the 1980-81—1990-91 and it further declined to 0.66 percent a year during 1988-89—1991-92.

Table 5.3
Growth in Area, Yield and Production of Wheat

Period	Area	Yield	Production
1949-50—1966-67	1.64	0.08	1.72
1967-68—1979-80	0.91	3.09	4.00
1980-81—1990-91	1.03	1.62	2.65
1988-89—1991-92	0.33	0.33	0.66

Source: Economic survey of Pakistan (1997-98). p 51

Growth trend has been calculated by using semi logarithmic equation; $Y = e^{a+bt}$, where Y represents production, area and yield, t represent the number of year from the base period of the series and b represent the annual rate of change in the logarithm of Y. (*Azhar 1993*).

The factors, which are responsible for this stagnation of wheat production, are enumerated as follows;

1. **Coordination in Agencies:** Experts have observed that unless various measures are adopted concurrently in a coordinated manner, by various agencies involved in this regard, the problem of stagnation in wheat production may not be solved.
2. **Late Sowing:** Approximately half of all the wheat area is sown late which results in low productivity of the crop. There are plenty of reasons which are responsible for late sowing and low productivity. *Byerlee, D. (1991)* report that delayed wheat planting is generally estimated to lead to a loss of 1 percent in yield per day beyond the optimum planting date and may be the major cause of low and declining productivity of wheat.
3. **Increase in Wheat Crop:** The increase in wheat crop has resulted from increased area under the crop. Total cropped area in Pakistan in 1980-81 has been 19.33 million hectares, in which the area of wheat was 6.98 million hectares. It has increased in 1996-97 to 22.93 million hectares, again the share of wheat is increased to 8.10 million hectares, (which in percentage of food grain is more than 65 Percent. In terms of area under cultivation the economy has reached near the climax, and a further increase in food grain, production must come from higher yield per hectare than bringing additional area under the crop.
4. **Prices of Fertilizers:** The constantly increasing prices of the fertilizers has affected the output and productivity of wheat. During the last 5 years, the depressing effect of the higher fertilizers prices has exceeded the incentive effect of higher support prices of wheat.

The result is lower use of fertilizers and ultimately low yield of wheat crop.

5. ***Soil Testing Facilities:*** The lack of soil testing facilities and the ignorance of the farming community about the importance of balanced fertilizer application have reduced the productivity. As more high yielding varieties of wheat are used, which extract more nutrients and deplete the soil quickly, this needs constant replenishing of the soil on regular basis.
6. ***Price as Well as Non-price Factors:*** Price as well as non-price factors are equally responsible in enhancing wheat production. On one hand, high prices of output and low prices of inputs can pull agriculture out of stagnation. On the other hand non-price factors such as public expenditure on agriculture research, effectiveness of the extension services, investment in physical infrastructure, efficient supply and distribution of modern inputs may boost up wheat production.
7. ***Cash Crops:*** The high profitability of cash crops has adversely affected the production of wheat. The result of this is either late sowing of wheat or a complete replacement of wheat by more profitable cash crops.
8. ***Water Shortages:*** Water shortage is also responsible for low wheat production because irrigation is the key of agricultural growth and the main organ of raising productivity. On one hand because of cold weather, less water is available in rivers. On the other hand, wheat is sown in the month of November where generally we receive very little rain in this month. Thus, less availability of water reduces the crop yield.

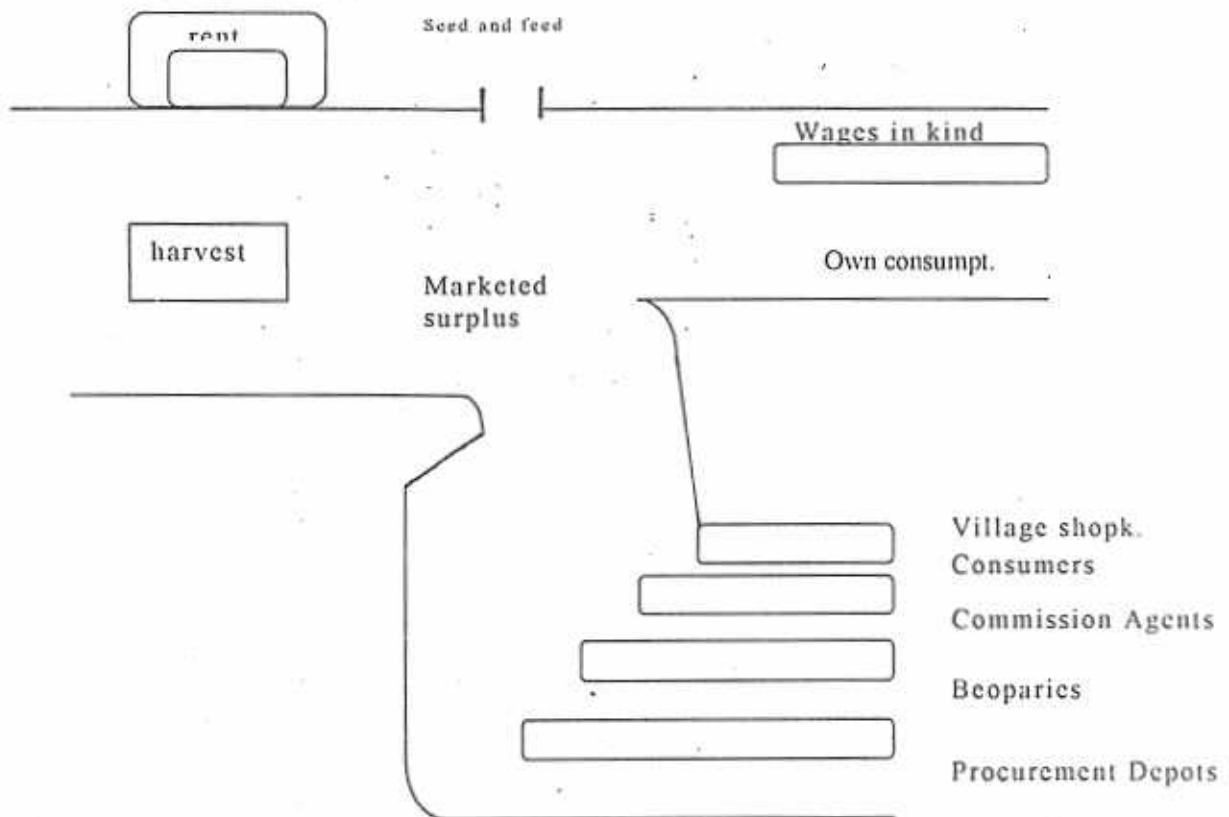
9. **Agricultural Research:** The importance of agricultural research has not been fully recognized in Pakistan. Not much is being done due to shortage of funds and lack of trained personnel. The funds allocated for agricultural research are so meager that it is mostly ^{disbursed} consumed in salaries, etc. and very little is left for actual research development.
10. **High Quality Seeds:** The availability of certified high quality seed is very limited and moreover they are so expensive that they are out of the reach of an ordinary farmer. Seeds of mix quality are sown over 90 percent of the wheat area, which has arrested the increase in productivity of wheat.
11. **Sufficient Funds:** Government has always laid emphasis on agricultural development but never allocates sufficient funds, and devices for honest distribution which is the basic cause of low agricultural productivity. Modernization of agriculture requires increase attention to the development of road, marketing system, storage, co-operative, agricultural education and research (*Azhar 1983*).

5.3 WHEAT TRADE IN PAKISTAN:

A large part of the wheat harvest is used by farmers for their own consumption and another part of about 10 percent is paid to the agricultural workers as wages in kind. The remaining part is mostly sold and eventually reaches potential consumers after a series of transactions in various trade channels. For both the consumers and the producers, the proper functioning of the wheat trade is a matter of primary importance. Here our principal concern is with the network of wheat flowing between farmers, traders and consumers, in order to bring out the composition and relative importance of individual flows (*Thobani, 1979*).

The flows of wheat in Pakistan is shown in Figure 1. The width of flows in the diagram correspond with their relative size. The flow of rent payments is shown by a loop, because payments by tenants are receipts of land owners and thus don not leave the activity. This also applies to the flow of wheat used as seed and fodder, but as this flow reduces the volume availability for consumption and sale, it thus leaves the activity. It can be added that the seed component constitute approximately 4 percent of harvest, indicating that farmers still depend to a greater extent on wheat seed retained from the previous harvest, which reduces the availability of wheat for consumers (Cornelisse, et al, 1987).

Figure 5.1
Flow Diagram of Wheat Trade in Pakistan



The flow in the diagram related to own consumption travels the shortest distance and is always a biggest chunk of the harvest. Moreover, payment of

wages in kind to permanent, seasonal and other workers also make a considerable portion of the harvest.

The marketed surplus deserves more attention which again is a greater portion of the harvest. The aggregate figure of marketed surplus shows a wide variation in the degree of market orientation among individual farmers. It has been observed that the percentage of wheat sales out after the wheat harvest of individual farmers is a function of the area of land used for wheat, tenurial status, quality of soil, income from other sources, and the distance of the near market. Thus there are farmers, selling practically all the wheat they produce to the buyers of wheat and then purchase flour from the market. This category constitutes a small portion of farmers while majority of the wet area farmers are self-sufficient in wheat. A major portion of barani area, farmers are hardly self-sufficient in wheat.

Figure 5.1 shows the importance of various market outlets, where significant differences exist between groups of farmers in terms of the categories of traders to which they sell wheat. It is observed by *cornelisse, et al*, in their wheat survey that the village shopkeeper buy a very small amount of wheat as compared to other buyers. However, to farmers with small land holding, village shopkeepers are of considerable importance, whereas for large buyers, they are least important. A similar observation for *beoparis* who buy a greater portion of wheat of small farmers but a smaller portion of the wheat of large farmers. This differentiation reflects the specialization among traders in the wheat market.

5.3.1 CHARACTERISTICS OF WHEAT TRADERS

The four groups of private wheat traders show clearly distinct characteristics in terms of the function they perform. The following are the major components of the trade activity, with traders role and their characteristics given below.

i. *Village shopkeepers:-* Wheat trade is an extra activity of village shopkeeper, who buy and sell wheat in very small quantity. They mostly receive wheat as a payment for the groceries sold to farm households. Shopkeepers buy wheat from small farmers at a lower price as compared to other traders. They sell the product mostly to *beoparis* and commission agent. They sell a small fraction of the average size of the transactions of other dealers.

Shopkeepers run their business single-handedly and many of them also trade other than wheat. Their area of operation is mostly their own village, where they travel a short distance for wheat collection but in many cases wheat is brought to the shops by the farmers themselves. Their means of transportation is economical because the roads to farms are generally poor and the size of their purchases is very small. The shopkeepers collect small quantities of wheat, where through more and more accumulation they are converted into larger quantity. They are moved to convenient places where they can be transported by faster means of transportation. Storage is of very little importance for lack of adequate facilities. Moreover, the shopkeepers do not have any role in price formation process. In reality they are price takers in sales transactions, the prices paid to farmers are derived by subtracting a margin from their sale prices. They provide either small

amounts of credit or sell groceries to the farmers (clients) which is repaid along with interest in the form of wheat.

ii. *Beoparis*:- The beoparis buy mainly from farmers and only very little from other traders. Their main objective is to collect bigger lots which they buy from individual farmers and then transport them to the market place. On the other hand village shopkeeper buy mainly from small farmers while *beoparis* buy from all farmers (small and large, both). Their purchases are considerably larger than those of the village shopkeepers. They pay a higher price to the farmers for their wheat because they purchase bigger lots and thus their per unit cost is lower. They sell their lots to the procurement centers, to the commission agents and the millers.

They are not in a position to dictate price so they are price takers. They provide very little credit to the farmers because of their limited financial means. They have to sell their product immediately because they don not have enough storage capacity.

Besides wheat they also trade in other agricultural products such as cotton, rice, sugar cane, etc. Moreover, they employ labour both on permanent and casual basis.

iii. *Commission Agents*:- They are agents between buyers and sellers of wheat. They are generally engaged by sellers of wheat to find suitable buyers for them. Their profit is the commission, which they earn by finding a buyer for them. The lots they deal in are larger than the shopkeepers and *beoparis* and similarly their transaction prices are also higher.

They trade in other agricultural products also which depends on the locality in which they reside and operate. They also provide enough credit to the farmers which is adjusted in the form of crops where in some cases the farmers are slightly exploited also. Their influence on the price is very little

because they are not directly involved in the purchases. They are mediators who simply facilitate the process and receive their commission. The bulk of the purchases in which commission agents partake are directed to the procurement centers and *mandis*.

iv. *Wholesalers*: They collect wheat from other traders and distribute it to the final users. They are also involved in other activities like transportation, etc and have enough influence on wheat lots. They resemble in many features with the commission agents, for example, both concentrates their activities in *mandi*-towns, their volume-traded and purchase prices are in the same order and their employment patterns are also similar. The difference between them is that the wholesalers buy primarily from other traders. Moreover, they provide credit to the customers much less regularly than the commission agents. As they supply the major portion of their lot to the millers, who have interest in regular supply of wheat, so they keep stock of wheat for a longer period than other traders. They have their own storage system, which is filled during the harvest season and then regularly supplied to the millers, thus they can influence the price of wheat to some extent (*Cornelisse, et al, 1987*).

The characteristics of the various agents discussed above are summarized here with an evaluation of the characteristics of the wheat market. It appears that private wheat trader aim at maximizing their income, by raising the rate of turnover. Buying and selling transaction are completed in rapid succession.

Mark-up charges appear to be reasonable owing to keen competition among the wheat traders. The market price is announced by the government and

wheat traders are reduced to position of price takers in both the buyers and sellers market. Any deviation from this price is mostly local, which depends on the size of the lot and distance of the farm and the *mandis*. Given the distance between the farm and the procurement centres, small farmers obtain lower prices for their wheat than larger farmers. However, the general trend is that the private traders cannot exploit the farmers. The low level of wheat procurement in the N.W.F.P. is a result of the very considerable gap between wheat production and wheat consumption. Even with the large amount of the wheat transported by the distribution system, wheat prices are much higher in N.W.F.P. as compared to other Provinces. (Rs. 240-350)

Slight differences in wheat prices are present but the variance of these prices appears to be very moderate.

The various activities of wheat traders seem to meet the requirements of different categories of farmers. Of course, there exist a difference between the price obtained by the producers and the price paid by the consumers. There are various reasons responsible for it, like storage costs, transportation charges and miller's grinding margin (the cost of grinding wheat), etc.

The process of price formation is dominated by the government, which provides an umbrella coverage to the consumers from traders exploitation. The government also assumes the responsibility for the storage and transportation of wheat. The role and interference of government in the wheat market is obvious and has its own justification. But it has been seen in the developed countries like USA and Canada and also in some developing countries that if there is least interference from the government side in the

wheat activities (when the forces of demand and supply are left free), in the long-run, it has very positive effects on the economy.

In case of Pakistan, such withdrawal of government should not be immediate, but gradually the government should withdraw by refining the system, and leaving it ultimately to the private traders.

5.4 ESTIMATING FUTURE YIELDS USING ARIMA MODEL:

In this study, ARIMA Model has been used to forecast the production of wheat in Pakistan, which is an empirical modeling and forecasting of the time series data. Here the concentration is on the univariate time series model known as Auto-regressive Integrated Moving Average model (ARIMA) given by *Box and Jenkins*. These models have been widely used for forecasting economic time series data. (*Faqir, et al, 1989*).

The wheat production data have been taken from Economic Survey for the years 1947-48 to 1997-98 with the objective to estimate wheat production upto 2010-2011 (13 year ahead of actual production). The ARIMA Model is denoted by (p, d, q) where (p) is the order of Auto-regressive process, (d) is the order of homogeneity and (q) is the order of moving average process. The degrees (p, d, q) have to be determined before any estimation. This is done by studying auto-correlation function using some judgement and some trial and error. The plot of the 2nd differenced series shows that the parameter d is 2; the correlogram of auto-correlation function of the 2nd differenced series falls off quickly after lag 1, so $q = 1$. The correlogram for the partial auto-correlation function of the 2nd differenced series fall quickly after lag 2,

so $p = 2$, which suggests the following values for the ARIMA model (2, 2, 1).

The general form of the ARIMA (p, d, q) is;

$$V^d Z_t = c + (\varphi_1 V^d Z_{t-1} + \dots + \varphi_p V^d Z_{t-p}) - (\theta_1 a_{t-1} + \dots + \theta_q a_{t-q}) + a_t$$

Here (c) is a constant, (V) is difference operator (Z_{t-1}, \dots, Z_{t-p}) are past series values, the (φ 's) are the co-efficient to be estimated of the auto-regressive model.

The model ARIMA (2, 2, 1) is estimated using the SHAZAM's computer package.

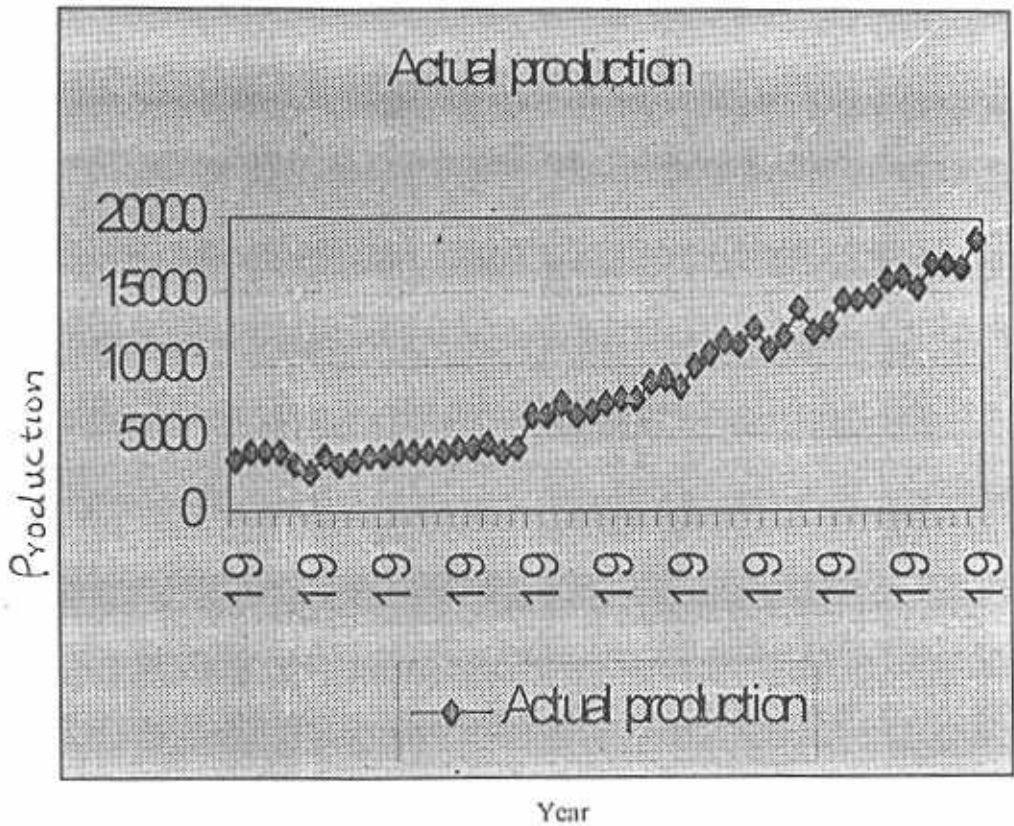
For this purpose, two tables have been constructed, where table: 5.4. contains data from 1947-48 to 1997-98 and table 5.5 contains wheat forecast for 13 years. The ARIMA model also calculates the predicted values which are very closer to actual values. The difference of actual and predicted values are the residuals which are calculated in the model. It shows the variation of predicted values from the actual values (*Deolaliker, et al, 1993*).

Table 5.4.
Actual and Estimated Values of Wheat Production.

No.	Years	Actual production	Estimated values	Residuals
1	1947-48	3354	-	-
2	1948-49	4038	-	-
3	1949-50	3924	3880.168	43.832
4	1950-51	3933	3753.043	179.957
5	1951-52	3010	4127.608	-1117.608
6	1952-53	2405	3549.306	-1144.306
7	1953-54	3645	3099.434	545.566
8	1954-55	3186	3156.470	29.529
9	1955-56	3370	2740.293	629.706
10	1956-57	3638	3509.168	128.83
11	1957-58	3564	3409.085	154.915
12	1958-59	3907	3511.938	395.06
13	1959-60	3909	3836.994	72.006
14	1960-61	3814	3831.534	-17.533
15	1961-62	4027	3968.947	58.053
16	1962-63	4170	4058.477	111.523
17	1963-64	4162	4096.249	65.75
18	1964-65	4591	4221.754	369.245
19	1965-66	3916	4518.379	-602.378
20	1966-67	4335	4190.183	144.817
21	1967-68	6418	4558.342	1859.658
22	1968-69	6618	5325.073	1292.927
23	1969-70	7294	5928.250	1365.750
24	1970-71	6476	7475.147	-999.147
25	1971-72	6890	7163.543	-273.542
26	1972-73	7442	7596.271	-154.271
27	1973-74	7629	7406.398	222.601
28	1974-75	7673	7764.129	-91.128
29	1975-76	8691	8070.907	620.093
30	1976-77	9144	8667.745	476.254
31	1977-78	8367	9005.611	-638.611
32	1978-79	9950	9166.682	783.317
33	1979-80	10587	10099.32	487.679
34	1980-81	11475	10125.22	1349.785
35	1981-82	11304	11526.69	-222.687
36	1982-83	12414	11820.29	593.709
37	1983-84	10882	12802.08	-1920.082
38	1984-85	11703	11917.78	-214.780
39	1985-86	13923	12702.94	1220.063
40	1986-87	12016	13027.22	-1011.217
41	1987-88	12675	12693.80	-18.799
42	1988-89	14419	13989.23	429.767
43	1989-90	14316	13812.63	503.370
44	1990-91	14565	14294.41	270.692
45	1991-92	15684	15331.68	352.312
46	1992-93	16157	15799.55	357.448
47	1993-94	15213	16244.38	-1031.376
48	1994-95	17002	16341.57	660.429
49	1995-96	16907	17342.74	-435.740
50	1996-97	16651	16878.97	-227.972
51	1997-98	18634	17670.06	963.940

Source: Economic Survey of Pakistan (1970-71 to 1997-98)

Figure 5.2.



The actual values are plotted on x-y plane shown in figure 5.2. It shows that actual production has increased from 3.3 million tonnes to 18.6 million tonnes in 51 years (*Pinstrup, et al, 1985*).

The ARIMA model (2, 2, 1) is estimated with the following information through shazam package as under:

Number of observations = 51

Degree of differencing = 2

Number of AR parameters = 2

Number of MA parameters = 1

No constant term is in the model

Mean of series = 26.51

Variance of series = 0.2000

Standard deviation of series = 1414

R-Square = 0.7267 R-Square Adjusted = 0.7089

Variance of the estimate = 0.56420

Standard error of the estimate = 751.13

Moreover, the following parameter estimates are also derived.

Parameter Estimates

Parameter	Estimates	Std. Error	T-Stat
AR (1)	-0.58839	0.1336	-4.405
AR (2)	-0.52062	0.1343	-3.877
MA (1)	0.87505	0.87505	13.39

BOX-PIERCE-LJUNG PORTMANTEAU Test Statistics

Q (12) = 12.4 (DE = 9) P = .191

Q (24) = 27.8 (DF = 21) P = .145

Q (36) = 35.4 (DF = 33) P = .357

The modeling of the time series involves the following steps. Model specification, Model estimation, Diagnostic checking and forecasts. The Box-Pierce-Ljung Portmanteau statistics for wheat production is calculated for Q 12, is 12.4 and has the probability of (.191), which indicates that it is non-significant at $SL = 0.05$. Hence, the fit is good.

The model specification provides two plots. One is auto-correlation residual and the second one is cross correlation between residuals and differenced series with lag and leads. The correlogram for the partial auto-correlation

function of the second differenced series falls-off quickly after lag 2, showing the ARIMA (2, 2, 1) is good for this data. The observed correlation is 0.978, so the normality of residuals is assured.

The same model is used for calculating 13 years ahead forecast with 95 percent confidence interval, shown in Table 5.5.

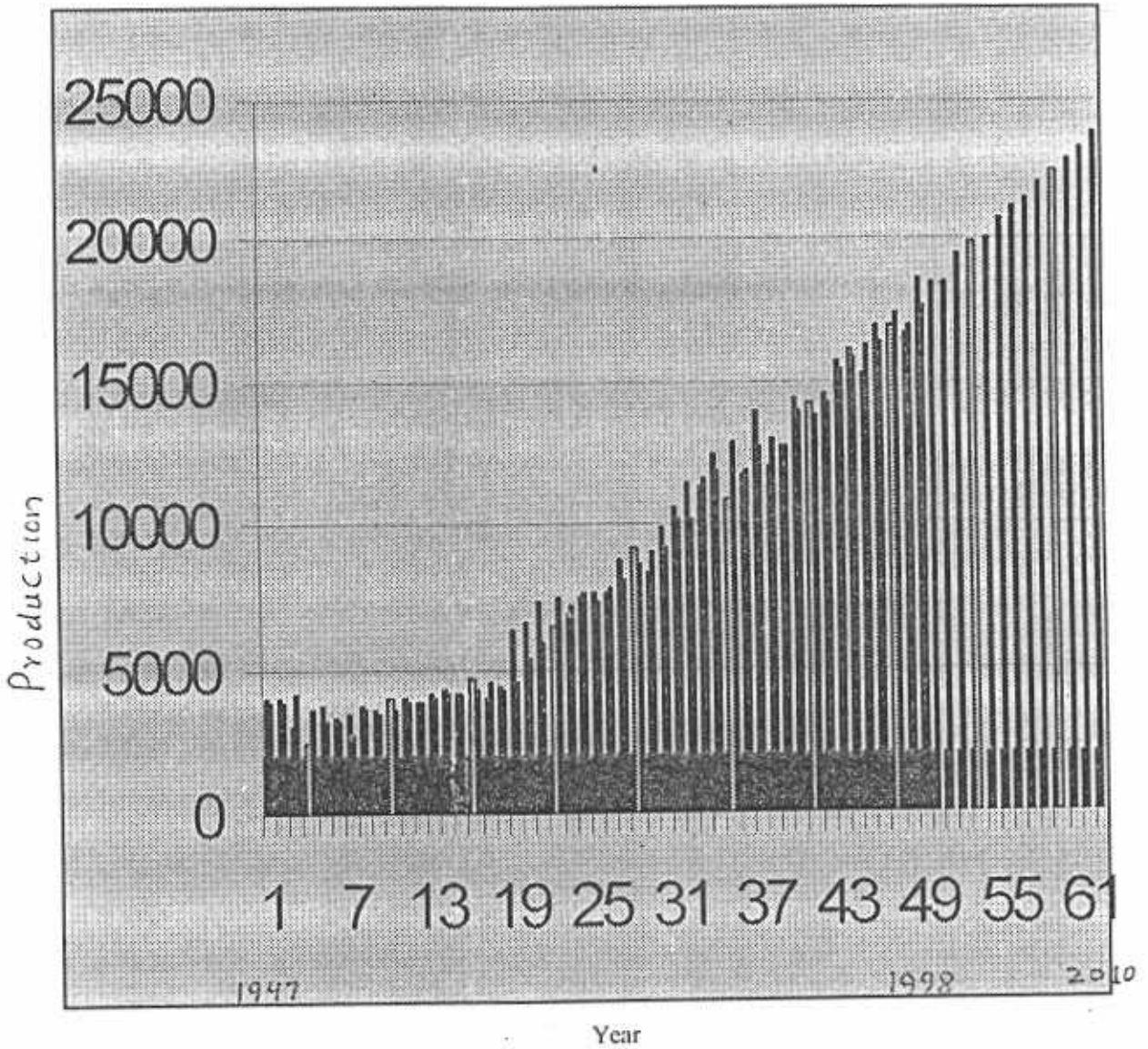
Table 5.5
Forecasts for Wheat (13 steps ahead)

No.	Years	Lower	Forecast	Upper
1	1998-99	17093.3	18539.9	19986.6
2	1999-2000	16860.6	18502.3	20144.1
3	2000-2001	17765.5	19512.8	21260.2
4	2001-2002	17738.8	19877.3	22015.7
5	2002-2003	17656.2	20076.2	22496.2
6	2003-2004	18074.0	20708.8	23343.6
7	2004-2005	18221.7	21172.4	24123.1
8	2005-2006	18248.9	21509.7	24770.5
9	2006-2007	18466.7	22009.3	25551.9
10	2007-2008	18617.8	22479.2	26340.5
11	2008-2009	18690.9	22882.0	27073.1
12	2009-2010	18825.8	23339.8	27853.7
13	2010-2011	18947.5	23800.1	28652.7

The data of the forecasts, actual production and predicted values are plotted on X-Y plane, in the form of graph, shown in Figure: 5.3. The graph shows that the forecasts are reasonable as compared to the past situation and the predicted values overlap the actual values to a greater extent which show validity of the model (Azhar, et al. 1974).

Figure 5.3

Graph of Actual, Predicted and Forecasts



The actual production of wheat crop since 1947-48 to 1997-98 have been used. The predicted values and residuals are also calculated, which show that the actual and predicted values overlap to a greater extent. The forecasts from 1997-98 to 2010 (for 13 years) are also calculated in the model which would enable the planners to calculate the future requirements of wheat and take appropriate remedial measure in this regard. Pakistan is basically an

agriculture country but is importing wheat since a long time, this forecast for 13 year ahead, may minimize the problems which arise by the sudden jumps in production. The government may also be guarded from wheat crisis, if the forecasted amount is at least kept in reserves each year.

5.5 MARKETABLE SURPLUS OF WHEAT.

When wheat is harvested then it is put to alternative uses. The uses distinguished here are for farmer's own consumption, payment in kind to workers, other uses like seed, feed and storage losses and finally sales of wheat. The surplus wheat, which is not used by the farmers himself and is ready for sale is known as marketable surplus, which is sold in the market.

The size of marketable surplus is determined soon after harvest. Wheat sales by farmers are mostly done in May and June and probably some part of the sale materializes by the month of August. In N.W.F.P. the sale of marketable surplus is much lower because major portion of the produce is domestically used by the farmers themselves and very little is sold out in the market. Where ever the wheat is sold, major portion of the marketable surplus has to come to the government storage's where it is supplied to the mills and converted into flour which is made available to the final consumers. It has been observed that small farmers tend to sell their surplus wheat much earlier than the larger farmers.

As a result of the practice of payments of rent in kind, the amount of wheat made available by tenants is consistently smaller, than that supplied by owners for the same size of farm and the quality of land even though tenants tend to use a lower proportion of the total production than owners do for

payments to labours and miscellaneous uses of wheat. Similarly, marketed surpluses are typically lower on low-quality than on high quality farmlands (Cornelisse *et al.*, 1987).

The ratio of marketed surplus to total production rises significantly with the size of the farm, which show a positive relationship between them. The main reason explaining the positive relationship between marketed surplus and farm size is the relatively large share of own consumption in total wheat production on small farms. Some statistical tests have been conducted by Cornelisse, *et al.*, of the behaviour of the marketed surplus of wheat in Pakistan. Their findings are that incomes in the saline and rainfed areas are much lower than in non-saline areas. At such low income levels, the marginal increment in income may reduce the marketable surplus by erasing own consumption of wheat. Moreover, the distance from the farm to the *Mandi* or procurement centre significantly affects the marketed surplus which shows that the marketing costs increase with the distance of farms from the *Mandi*. Again availability of wheat per family member is positively and significantly related to the marketed surplus. In some case many farmers buy more wheat than they sell, so that the marketable surplus in such cases is negative, still, as large farms tend to have a larger marketable surplus than small farms, and as large farms occupy a larger area of agricultural land than small farms, thus the amount of wheat traded in the market mainly originates in large farms.

The volume of wheat produced and marketed is much smaller in N.W.F.P. so here the purchases of wheat are reported mostly by small farmers, especially by tenants and in areas with low yields. In the rainfed areas of the

Punjab, purchases of wheat by farmers constitute a greater percentage of the total sales. These areas are not self-sufficient in wheat (*Afzal, 1992*).

5.6 EFFICIENCY STATUS OF WHEAT-GROWERS AND ESTIMATION OF COBB-DOUGLAS PRODUCTION FUNCTION TO ASCERTAIN SUPPLY OF WHEAT.

5.6.1 INTRODUCTION

One of the important determinants of wheat policy is the supply of wheat, which in turn is affected by the crop production. The production of crop is significantly influenced by the production process (technology) adopted by farm operators. Among various factors, the type/category of farm has an important role on the adoption of line of production. The focus here is to determine the line of production in wet areas (irrigated farms) and dry areas (un-irrigated farms), the technology used by different types of tenurial status and farm sizes. Here also the stages of production are examined in the farms being operated. The marginal physical products (MPP) are also determined over here. The econometric model developed for this purpose is discussed in the subsequent section.

5.6.2 THE COBB-DOUGLAS PRODUCTION FUNCTION

The appropriate mathematical form in case of production function for agricultural crops is Cobb-Douglas type of $Y = A^\alpha L K^\beta$. This type of production function helps in deterring the constant output elasticities of various inputs. Which in turn identify the stage of production on scale of

returns. The estimated Cobb-Douglas production function can be used for the computation of marginal physical products of different factors of production. Detail of the specification, estimation, verification and interpretation of the model are highlighted below (Battese, et al, 1993).

5.6.3.i SPECIFICATION OF THE MODEL

This sub-section specifies variables of the model, its mathematical form, and the expected signs and magnitude of the parameters estimated. The quantity of wheat output in *mounds* is obtained for each sample and thus the dependent (indigenous) variable, "Y" is determined. The major factors of production or the explanatory (exogenous) variables are identified for each sample farm. These variables comprise of the area of land under wheat crop (owned or rented in) "X1", the man-months of labour inputs (the sum of imputed man-months of family labour and actual man months of hired labour) "X2", total cost of consumable inputs (seeds, insecticides, pesticides, fertilizer, and water etc.) "X3" and the cost of capital assets (farm machinery and implements etc.) "X4", thus the production function is:

$$Y = f(X_1, X_2, X_3, X_4)$$

As far as the mathematical form of the function is concerned, the non-linear Cobb-Douglas relationship is considered the appropriate form for the agricultural production function. For the purpose of this study the general form of the model is

$$Y = b_0 X_1^{b_1}, X_2^{b_2}, X_3^{b_3}, X_4^{b_4} e^{U_i}$$

In log linear form it can also be denoted as

$$\ln Y = \ln b_0 + b_i \sum \ln X_i + U_i$$

Where the intercept “ b_0 ” indicates the rate of technology, the parameters “ b_i ” shows output elasticities of various inputs and the error term “ U_i ” the effect of those factors which are not included in the model.

On the basis of economic *priori* criteria, it is obvious from the very nature of relationship between the expected signs of the parameter estimates corresponding to different explanatory variables would be positive and their individual expected magnitudes would be less than unity.

5.6.3.ii. ESTIMATION OF THE MODEL

Applying the Ordinary Least Squares (OLS) method (with its usual assumption and BLUE properties) the three different production functions are estimated with the help of computer. In logarithmic form the estimates and their standard errors (shown in parentheses), and in the Anti-log form (upto two decimal points) and the other relevant results obtained from the data, are presented in tables 5.6 and 5.7.

5.6.3.iii. VERIFICATION/EVALUATION OF THE MODEL

The co-efficient of multiple determination “ R^2 ” of all the three models indicated that the FITS are good. As is obvious from the corresponding R-squares that 71 percent variation in wheat production “ Y ” on irrigated farms, 73 percent on un-irrigated farms and 72 percent on all farms are explained by the explanatory variables “ X_i ”. The calculated F-ratios are also very high which suggest that estimated production functions are overall significant.

The student's "t" test is conducted for testing the significance of individual parameter estimates "bi". All of them are statistically significant.

5.6.3.iv. INTERPRETATION OF THE MODEL/ANALYSIS OF RESULTS

Complete results of the estimated production functions for the wet, dry areas and all sample farms are presented in the table 5.6.

Table 5.6
Results of the Estimated Production Functions by Irrigation status

A. Irrigated Farms: (Wet Areas)

$$\begin{aligned} \text{Ln}\hat{Y} &= \text{Ln } 2.5217 + 0.2613 \text{ Ln}X_1 + 0.4153 \text{ Ln}X_2 + 0.3010 \text{ Ln}X_3 + 0.3215 \text{ Ln}X_4 \\ &\quad (1.05) \quad (1.03) \quad (0.13) \quad (0.10) \quad (0.17) \\ \text{or } &= \hat{Y} = 12.45 X_1^{0.26} X_2^{0.42} X_3^{0.30} X_4^{0.32} \\ &\quad R^2 = 0.71 \quad F^* 305.73, \quad \Sigma e_i^2 = 4185.85 \end{aligned}$$

B. Un-irrigated farms (Dry Areas)

$$\begin{aligned} \text{Ln}\hat{Y} &= \text{Ln } 2.1485 + 0.1903 \text{ Ln}X_1 + 0.3205 \text{ Ln}X_2 + 0.1835 \text{ Ln}X_3 + 0.0843 \text{ Ln}X_4 \\ &\quad (0.11) \quad (0.05) \quad (0.32) \quad (0.21) \quad (0.07) \\ \text{or } &= \hat{Y} = 10.68 X_1^{0.19} X_2^{0.32} X_3^{0.18} X_4^{0.08} \\ &\quad R^2 = 0.73 \quad F^* 348.56, \quad \Sigma e_i^2 = 3976.58 \end{aligned}$$

C. All Farms (A + B)

$$\begin{aligned} \text{Ln}\hat{Y} &= \text{Ln } 2.4379 + 0.2213 \text{ Ln}X_1 + 0.3636 \text{ Ln}X_2 + 0.4919 \text{ Ln}X_3 + 0.2105 \text{ Ln}X_4 \\ &\quad (0.18) \quad (0.11) \quad (0.08) \quad (0.14) \quad (0.09) \\ \text{or } &= \hat{Y} = 11.45 X_1^{0.22} X_2^{0.36} X_3^{0.49} X_4^{0.21} \\ &\quad R^2 = 0.72 \quad F^* 3254.23, \quad \Sigma e_i^2 = 4018.63 \end{aligned}$$

The results reveal that the output elasticity of land "Xi" is significantly higher on the irrigated farms as compared to the un-irrigated farms. The

corresponding figures are 0.26 and 0.19 respectively. The output elasticity of labour is 0.42 on irrigated farms and 0.32 on un-irrigated farms. The responsiveness of wheat production to the cost of capital assets "X4" is notably lower on dry farms. This implies that the use of farm machinery and other implements is relatively higher on the irrigated farms. From the output elasticities point of view on all-farms, the input factors may be ranked as, labour "X2", consumable inputs "X3", land "X1" and cost of capital assets "X4".

The sum of output elasticities of all inputs is greater than unity on irrigated farms. The same situation was recorded on the "all sample farms". This implies that on average the sample farms are being operated in the stage of increasing returns to sale.

So far as the lines of production of both the types of farms are concerned, the impact of technology denoted by " b_0 " on irrigated farms stands higher (12.45) to the corresponding figure of 10.68 on un-irrigated farms.

To determine the role of tenurial status on the production (supply) of wheat, three different production functions for farms managed by owners, owner-cum-tenants and tenants are estimated. The results are reproduced in Table 5.7 below.

Table 5.7

Results of the Estimated Production Function by Tenurial Status

A. Tenants

$$\begin{aligned} \hat{\text{LnY}} &= \text{Ln } 2.3005 + 0.2435 \text{ LnX}_1 + 0.3678 \text{ LnX}_2 + 0.1901 \text{ LnX}_3 + 0.1236 \text{ LnX}_4 \\ &\quad (0.06) \quad (0.12) \quad (0.41) \quad (0.03) \\ \text{or } \hat{\text{Y}} &= 9.98 X_1^{0.24} X_2^{0.37} X_3^{0.19} X_4^{0.12} \\ R^2 &= 0.76 \quad F^* 315.63, \quad \Sigma e_i^2 = 4076.93 \end{aligned}$$

B. Owner-Cum-Tenants

$$\begin{aligned} \hat{\text{LnY}} &= \text{Ln } 2.4647 + 0.2603 \text{ LnX}_1 + 0.3711 \text{ LnX}_2 + 0.2171 \text{ LnX}_3 + 0.1703 \text{ LnX}_4 \\ &\quad (0.15) \quad (0.11) \quad (0.05) \quad (0.13) \quad (0.19) \\ \text{or } \hat{\text{Y}} &= 11.76 X_1^{0.26} X_2^{0.37} X_3^{0.22} X_4^{0.17} \\ R^2 &= 0.74 \quad F^* 299.77, \quad \Sigma e_i^2 = 3870.55 \end{aligned}$$

C. Owners

$$\begin{aligned} \hat{\text{LnY}} &= \text{Ln } 2.5479 + 0.2803 \text{ LnX}_1 + 0.3905 \text{ LnX}_2 + 0.2301 \text{ LnX}_3 + 0.2100 \text{ LnX}_4 \\ &\quad (0.16) \quad (0.14) \\ \text{or } \hat{\text{Y}} &= 12.78 X_1^{0.28} X_2^{0.39} X_3^{0.23} X_4^{0.21} \\ R^2 &= 0.71 \quad F^* 270.14, \quad \Sigma e_i^2 = 3481.18 \end{aligned}$$

It is observed that the output elasticities of all inputs are higher on the farms operated by owner farmers, followed by the owner-cum-tenants and tenant farmers. The efficiency of labour is the highest on owners farms, followed by owners land. This may be attributed to the use of farm machinery due to the availability of owned resources and access to credit facilities. The efficiencies of all inputs are relatively lower on the farms managed by tenant

farmers. This may be due to lack of financial resources. The lines of productions are also significant on different types of farms. The impact of technology on the production of wheat is the lowest on the tenants farms, while it is the highest on the farms managed by owners. The respective data are 9.98 and 12.78.

The data indicated that sums of the output elasticities of all inputs are greater than unity on the farms held by owners and owner-cum-tenants.

This infers that they are operating their farms in the increasing returns to scale. The results confirm that farm efficiency and ownership of land operation are positively related.

Farm size also has a significant influence on the production of wheat that is why production functions are estimated both for large and small farms. The relevant results have been shown in the following table 5.8.

Table 5.8
Results of the Estimated Production Function by Farm Size

A. Large Farms:

$$\begin{aligned} \hat{\text{LnY}} &= \text{Ln } 2.8309 + 0.2935 \text{ LnX}_1 + 0.1804 \text{ LnX}_2 + 0.03503 \text{ LnX}_3 + 0.3841 \text{ LnX}_4 \\ &\quad (0.11) \quad (0.07) \quad (0.45) \quad (0.13) \quad (0.10) \\ \text{or } &= \hat{\text{Y}} = 16.96 X_1^{0.29} X_2^{0.28} X_3^{0.35} X_4^{0.38} \\ &\quad R^2 = 0.69 \quad F^* 3019.11, \quad \Sigma e_i^2 = 3511.86 \end{aligned}$$

B. Small Farms:

$$\begin{aligned} \hat{\text{LnY}} &= \text{Ln } 2.2116 + 0.2133 \text{ LnX}_1 + 0.2311 \text{ LnX}_2 + 0.2730 \text{ LnX}_3 + 0.2411 \text{ LnX}_4 \\ &\quad (0.28) \quad (0.53) \quad (0.19) \quad (0.08) \quad (0.11) \\ \text{or } &= \hat{\text{Y}} = 9.13 X_1^{0.21} X_2^{0.23} X_3^{0.27} X_4^{0.24} \\ &\quad R^2 = 0.75 \quad F^* 3126.76, \quad \Sigma e_i^2 = 3897.15 \end{aligned}$$

The data reveal that the responsiveness of wheat output to the use of capital assets X4 is the highest one (0.38) on large farms. It is 0.24 on the small farms. The output elasticity of consumable inputs X3 is 0.35 on large farms and 0.27 on small farms. Similarly the output elasticities of inputs land and labour are higher (0.29, 0.28) on large farms as compared to the correspondign figures on the small farms (0.21 and 0.23).

So far as the impact of tenology is concerned, it is apprximately twice on large farms as compared to the small farms. The relevant figures are 16.96 and 9.13 respectively.

The results indicated that farms efficiency and farms size are positively related and both the farms sizes are operating their farms on different production lines.

5.6.4 MARGINAL PHYSICAL PRODUCTS (MPP)

The marginal physical products of different inputs are obtained from the estimated production functions, applying the following expressions:

$$MPP_{xi} = \frac{\partial \hat{Y}}{\partial X_i} = \frac{\partial}{\partial X_i} (b_0 X_i^{b_i})$$

The mean values of each inputs "X_i" are substituted in the partial derivatives of the estimated functions and the numerical values of marginal physical products for different inputs are calculated and presented in the table 5.9.

Table 5.9
Values of Marginal Physical products
of Various Inputs by Farm Category

Farm Category	Land X1	Labour = X2	Consumable inputs - X3	Capital Assets - X4
1. Irrigation Status				
i. Irrigated farms	2.16	2.83	0.91	1.87
ii. Un irrigated farms	1.98	1.99	0.57	0.95
2. Tenurial Status				
i. Tenants	1.98	2.00	0.47	0.82
ii. Owner-cum-tenants	2.08	2.48	0.84	1.65
iii. Owners	2.15	2.75	0.91	1.76
3. Farm Size				
i. Small Farms	1.99	2.04	0.54	1.09
ii. Large Farms	2.13	2.78	0.93	1.73
4. All Farms	2.07	2.41	0.74	1.41

Source: Primary data collected.

As to be seen from the table the value of the marginal physical product of labour is the highest on the irrigated farms, farms operated by owners and on large farms. The situation is reversed on the un-irrigated farms, farms operated by tenants and on small farms. The respective figures in the farmers case are 2.83, 2.75 and 2.78 respectively, while in the later case these are 1.99, 2.00 and 2.04 respectively. The Values of Marginal Physical Product (VMPPs) of consumable inputs are significantly lower on all types of farms. The figures corresponding to land and capital assets are not unusual in all cases. The results reveal that the MPPs of all inputs are relatively

encouraging on the irrigated farms, farms operated by owners and on the large farms.

5.7 EFFECTS OF LAND REFORMS ON WHEAT PRODUCTION

Pakistan inherited the feudalistic land tenure system. At the time of partition, 7 percent of the landowners owned 53 percent of the total land. These big landlords had little incentives to cultivate their land or to raise the productivity of their land, so the need felt was to break-up the landed assets and to provide security to the landless farmers. As it is the farmer, not the landlord who can play a vital role in increasing the production of wheat and other cereals/^{therefore} If his fortune and welfare is improved, ~~upon~~ this would mean improvement in the agricultural output and self-sufficiency in food grain, especially wheat.

In order to achieve these objectives three agrarian reforms have so far been introduced which are discussed as under, along with their effects on wheat production.

1. The Land Reforms introduced in 1948
2. The Land Reforms introduced in 1959.
3. The Land Reforms of 1972, with further reformative changes in 1977.

1. Land Reforms of 1948

A committee was formed in 1948 to make proposals for land reforms. The committee submitted its recommendations to the government in August, 1948, which were as included:

1. All the Jagirs as well as the proprietary rights of such land as awarded *inams* by the British regime to be taken over by the government without any compensation.
2. A landlord cannot have more than 150 acres of irrigated land and 450 acres of Barani land. The area in excess of the above limit, after being paid suitable compensation in lieu thereof to be distributed among the cultivators.
3. A legal recognition of the fact that the occupancy tenants is the virtual owners of their holdings.
4. Guarantee of adequate security of tenure to the tenants-at-will, which should not be less than 16 years in any.
5. A landlord cannot have more than 25 acres of land for self-cultivation.
6. The share of tenants, out of total produce, to be raised from 50 percent to 66 percent.
7. To check sub-division and fragmentation of holdings, cooperative farming should be promoted. The above recommendations of the agrarian committee were appreciated. The interested parties, however, stood in the way of their final approval. The recommendations were, therefore, shelved.

As the land reforms of 1948 remained merely a theoretical exercise and the recommendations of the reforms committee were not implemented, so the production of wheat get worsened for the coming years. The production of wheat resultantly dropped from 4.038 million tonnes in 1948-49 to 2.405 million tonnes in 1952-53.

If the recommendations of the committee would have been implemented, it would have increased the agricultural productivity to a significant extent and similarly would have increased wheat production also (*Zahid, 1982*).

2. Land Reforms of 1959.

Late Field Marshal Mohammad Ayub Khan constituted a commission of nine members to consider the problems relating to the ownership and tenancy of agricultural land in Pakistan. The commission presented its report on January 24, 1959, with the following salient features:

1. ***Limit on land Holding:*** A person could not own more than either 500 acres of irrigated or 1000 acres of un-irrigated land or 36000 produce index unites whichever is more. In addition, an owner was allowed to have 150 acres of land for gardens and pastures. Over and above the limit, the land has to be taken by the government after the payment of suitable compensation to the owners.
2. ***Utilization of resumed area:*** The excess land acquired by the government to be sold on reasonable conditions to the tenants. Afterwards, the remaining land to be sold to the deserving persons.
3. ***Creation of pool:*** The sale-proceeds of the acquired land were pooled in a separate fund. This fund was utilized for payment of compensation to the landlords to meet the administrative expenses in implementing the developmental projects in the acquired land and clearing of the bad debts.

4. *Jagirs*: Every kind of jagir, religious, charitable or educational institutions was abolished, however, the institutions were given grants-in-aid.
5. *Protection to tenants*: Illegal ejection of the tenants was prohibited. In case a tenant was legally ejected, he was to be provided alternative land. He was also to be properly compensated for the improvements made in the land.
6. *Proprietary rights for the occupancy tenants*: The existing law with regard to giving proprietary rights to the occupancy tenants was made operative as usual.
7. *Prohibition of illegal ejection*. Illegal ejection by the landlords were prohibited.

The ownership ceiling under 1959 reforms has been quite high because:

- i. It applied to individuals instead of families.
- ii. The owners were allowed to alienate land upto a specified limit before calculation of their entitlements.
- iii. Special exemptions were also granted for land under orchards and livestock farms.

These reforms, however, set the ball rolling for successive agrarian reforms and started a movement for voluntary reductions in individual ownership, encouraging creation of a strong middle-class of owner-operated farms of economic size.

The measure recommended by the land Reforms Commission had far reaching effects on wheat production.

As a result of these land reformative measures the evils of concentration of land in few hands have vanished. The tenant cultivators enjoy the rights of ownership so they take all possible measures to improve the fertility of the soil which ensure rise in agricultural production in general and wheat in particular.

Since ceiling on the ownership of land has been imposed and the size of economic and subsistence holding has been fixed, so the chances of further fragmentation of land have been eliminated. This leads towards mechanization, increase in wheat output and standard of living of the farmers. Eventually the agricultural production has also increased but this increase is not according to the expectation of the experts, because the government machinery badly failed to pursue the landlord to declare their holdings. For resumption of surplus land, the government followed discriminatory policy on political grounds. According to the estimates, about 24 Lacs acres of land were resumed and distributed among cultivators and about 2 lacs cultivators were benefited by the land reform of 1959. The data show a positive improvement in wheat production after land reforms of 1959, which increased wheat production from 3.909 million tonnes in 1959-60 to 4.027 million tonnes in 1961-62, and further to 4.591 million tonnes in 1964-65, respectively

3. LAND REFORMS OF 1972.

The late Mr. Zulfikar Ali Bhutto, after assuming power in December 1971, introduced land reforms on March 1, 1972. These were not confined merely

to reduction of size of ownership holdings but had many other reformative features.

1. The ceiling on land ownership was reduced to 150 acres in the case of irrigated land, 300 acres in the case of un-irrigated land or 12,000 produce index units whichever was larger. Owners with tractors or tubewells were allowed to keep additional 2,000 produce index units (PIU's).
2. The area under "Stud and Livestock" farms was resumed free from any charge whatsoever.
3. The area *shikargahs* except historical *shikargahs* were resumed by the state for distribution among the peasants.
4. The land acquired by the state was distributed to the landless tenants free of charge.
5. In case of economic or above holdings, further sub-division by alienation or partition was prohibited, particularly if the resultant holding would be less than economic land.
6. Similarly, in case of subsistence or above holdings, further sub-division was not allowed if it resulted in less than subsistence holding.
7. Restrictions were placed on the ejections of tenants by the landlord. A tenant could only be ejected if he failed to pay rent or used the land in a manner which made it unfit for the purpose he got the land or sublet his tenancy.
8. In 1975, the government gave revenue concessions to small landowners holding up to 12 acres of irrigated land or 25 acres of non-irrigated land. These cultivators were exempted from payment of land revenue, land rates, development cess with effect from Rabi crop of 1975-76.

9. On December 18, 1976, the government declared that the tenants and the tillers of soil having less than subsistence holdings to be given cultivable and cultivable waste state land. It was also announced that all occupancy tenants of state land were declared the owners of the land.
10. On January 5, 1977, the government announced a further reduction in the ceiling of land ownership. The individual land holding was reduced to 100 acres of irrigated or 200 acres of non-irrigated land equivalent to 8,000 PIUs whichever was more. These reforms also had some agrarian features such as abolition of land revenue on holdings of 25 acres or less and imposition of agricultural income tax on large land-owners.

Land reforms of 1977

- i. Land in excess of prescribed ceilings, was resumed without compensation.
- ii. Payment of land revenue, cesses, water rate, taxes, surcharges, levies on land and provision of seed were made the responsibility of the owners.
- iii. Cost of pesticides and fertilizers was to be shared equally between the tenants and the owners.
- iv. Owners were forbidden to levy cesses on tenants or to take free labour from them.
- v. Contravention of these regulations was made punishable by rigorous imprisonment extending up to 7 years and confiscation of immovable property in case false declarations were made.

The changes in land-ownership under various land reforms are given below:-

Table 5.10
Comparison of Various Lands Reforms

	1959	1972	1977
Area Resumed 1,000 hectare	1035	497	76
Area Distributed 1,000 hectare	970	350	45
Resumed as % of cultivated	6.2	2.6	0.4
Persons benefited (Nos)	183,371	77,243	17,659

Source: Agricultural Statistics of Pakistan (various edition) P 110-113

Impacts of land Reforms;

The most important effect of these land reforms have been that due to the drastic cut in the ceiling on land holdings, the economic power vested in landed property aristocracy is substantially curtailed. More land has been resumed and distributed among the small cultivators and this eventually has increased both agriculture and wheat production. In 1971-72, wheat production estimated at 6.890 million tonnes which rose to 7.629 millions tonnes in 1973-74 and further to 9.144 million tonnes in 1976-77 after the land reforms of 1977, the production mounted from 8.367 million tonnes in 1977-78 to 10.587 million tonnes in 1979-80. This sharp rise in wheat production is mainly because of these land reforms.

The distribution of land to landless tenants free of cost gives birth to a strong and new middle class, who being owners, improve the land, and work hard to enhance the wheat productions, agricultural output and national income

together. The fortune of the poor farmer by land reform has been changed. The cultivators, with the help of the assistance provided by the government dramatically have changed their incomes, raised standard of living and enhanced wheat production in the country.

5.8 EFFECTS OF AGRICULTURAL TAX ON WHEAT PRODUCTION

The government of Pakistan is facing large budget deficits since last two decades. On one hand, there is weak government revenue performance and on the other, the expenditure of the government is increasing day-by-day.

For resource mobilization, tax on agricultural income is described as an important and potential area. The matter is quite controversial and sensitive. A number of commissions were set up for giving findings on agricultural taxation such as fact finding committee on Agricultural taxation 1963, the National Taxation Reforms Commission (NTRC) 1972, and the Report of the prime minister committee on tax reforms 1990.

The former caretaker prime Minister announced new economic package in 1993. He proposed a tax on agricultural income at the rate of Rs. 2 per produce index Unit (PIU), with the exemption limit of 4000 PIUs. The tax will be collected through the tax revenue system and its receipt will go to the provinces. The present government has got the issue of imposition of tax on agricultural income settled. All the four Assemblies, with weak voices have favoured the imposition of tax on agricultural income. In Punjab farmers holding more than 12.5 acres of irrigated land or 25 acres of un-irrigated land are exempted of paying tax. In Sindh and N.W.F.P. the tax has been

levied on cropped acreage basis of individual holdings (*Ghaffar, et al. 1991*).

The tax on agricultural income will of course bring some revenue to the government treasury but will have adverse effects on agricultural output especially wheat because taxes on agriculture will be shifted to the tenants by the landlords due to its inelastic demand. The burden of tax will be on tenants who are already living below subsistence level (*Khan, 1988*).

Moreover, the farmers are not getting adequate return for their produce. The income generated from this sector is not uniform. It varies from year to year depending upon the vagaries of weather. As regards much publicized availability of subsidies, the subsidized fertilizers are mostly not available in time. The agency holders sell these in black market and the sacks are mostly underweight and adulterated. Recently the government has stopped subsidy on fertilizer. Same is the case with the supply of wheat; where a lot of subsidy is shown in budget but is not benefiting the farmers (*Gary Ender, et al., 1992*).

The difference between the sale prices of agricultural products and their costs of production is negligible. Most of the farmers are carrying on the agricultural operations with the help of bank loans. The saving, if any, is very low and so there is no justification to tax the agricultural sector, but still the government has imposed a tax on agricultural income. This will obviously affect the wheat productivity adversely. As the tax will be ultimately shifted to the farmers who are already living from hand to mouth. This tax will affect their productivity. There are, of course, other ways of taxing agriculture besides an income tax (*Malik, et al, 1989*).

CHAPTER VI

BALANCING DEMAND AND SUPPLY

6.1 IMBALANCE BETWEEN CONSUMPTION AND PRODUCTION.

It is clear from chapter IV that population has been constantly increasing and with this, there has been a steady increase in national wheat requirements also. It is also worth mentioning that real income per head have also shown a tendency to rise, which means, that, on the whole, the population has been able to maintain an increasing effective demand for wheat. As is observed from chapter on consumption the nature of wheat requirements is such that with an increase in income, there is still a considerable scope for further increase in the individual's demand for wheat and in the major sectors of the economy.

On the other hand, production has been following a different pattern of behavior as witnessed in the preceding chapter. It is constantly fluctuating and is very sensitive to government policies. In case of concrete measures from the government, they have positive effects and the production has increased. In case of a little ignorance on part of the government, it generally have a downward swing, which has not only been sharp but also prolonged over a few years at a stretch.

One thing is obvious, that Pakistan, the major wheat consuming and producing area, has been self-sufficient only 7 time (1949-50, 1969-70, 1979-80, 1982-84 and 1986-88) in 51 years period, stretching from 1947-48

to 1997-98. In rest of the years, it has been running in deficits of varying magnitudes.

Production of wheat, of course, is increasing each year but in the mean time, requirements are also mounting up constantly. Except these 7 years the production has never matched with the requirements. The ratio between domestic output and requirements is getting even more wider. The imbalance between national requirements which is constantly rising upward and domestic supply which is swinging downward or in some years rises very slowly, is too obvious. As a result, there has been acute shortages of wheat in Pakistan, which is generally met through importation. The scanty and precious foreign exchange is mostly spent on wheat importation (*Qureshi, 1993*).

It is these lapses in production, which have been responsible for the cyclical crises. The main causes of these lapses are meager land availability, less rainfall (water availability) in the month of November, primitive farming techniques, non-use of improved seeds, fertilizers, lack of agronomic practices, crop management techniques, traditional wheat varieties in barani area, improper support price policy, anti-social activities like smuggling, hoarding and black marketing, etc. Though there is no gainsaying the fact that the explosive increase in population has helped and reinforced the wheat shortages. In other words, in the absence of a higher population, these lapses would not have caused the sufferings and miseries which they have. The government is doing its utmost to reduce the population growth rate (which has dropped from 3.6 to 2.7 percent) but with traditional society and low

literacy level, it is very difficult to achieve the optimum population growth rate.

Thus, what is extraordinary is not the population growth rate only but the severity with which wheat fluctuations have occurred and made themselves severely felt. Pakistan as is pointed out, has normally been a wheat deficit region. Though agriculture is the backbone of the economy and a major activity of the people, it should have not happened like this, rather Pakistan should have been a wheat surplus country. While wheat crisis may be regarded to have been increasing due to the ever-widening gap between population and wheat production, increase in wheat production of Pakistan has not been keeping a proportionate pace. (*Azhar, 1973*).

The problem of wheat shortages is thus existing and assuming a definite shape, which is further, intensified by crop fluctuations. It is this intensification, which has fabricated the wheat problem of Pakistan.

6.2 SHORT TERM MEASURES TO SECURE A BALANCE

6.2.1 EFFICIENCY IN WHEAT PRODUCTION:-

To meet the situation created by recurring shortages, corresponding steps have been taken by the government to increase domestic production. These steps mostly include short-term remedial measures to strengthen the incentive to cultivate food crops, and to resume the area of cereal crops (wheat) diverted to commercial crops. The procurement price of wheat is raised so that the farmers may wish to produce great quantities of wheat. The "grow more food campaign", covering a great number of short-term

measures has been intensified. Other measures including support prices of wheat, disbursement of more agricultural credit to the growers for wheat sowing, availability of more water at sowing time, provision of good quality seeds to the farmers have been stressed upon. Moreover, attempts have been made by the state to transfer gradually more and more land from commercial crops to food crops (wheat). Seeds and fertilizers are distributed to the farmers and no feasible facility ever denied to improve upon wheat production. The critical food crisis in 1996-97 served as an eye opener and thus 1997-98 is declared as wheat year by the government. As a result, the subsequent year witness a good wheat crop indicating an increase of 12 percent. During 1997-98, government imported wheat of 1.9 million metric tonnes (valuing \$ 361 million) as comparing^{ed} with the imports of 4.1 million metric tonnes of wheat last year (*Economic Survey, 1997-98*).

To improve upon the efficiency of wheat production, the government has under taken the following measures.

- i. **Irrigation:** The agricultural package announced by the government provides the following relief to boost up irrigation network by increasing:
 - The lining of water courses, from 4000 to 8000 per year.
 - Launching crash program for desalting of minors and ensuring of water reach the tail sections.
 - Raising section of canals which are contributing to water-logging and salinity under the national drainage programme.
 - Utilizing the water of hill torrents for Rabi crops (wheat) on a sizable area in all Provinces of Pakistan.

- Initiating for barani areas schemes of small dams, sprinkler and drip irrigation projects.

It is expected that the water availability during 1997-98, would reach 133.28 MAF, as compared to 134.0 MAF last year.

2. **Fertilizer.** The off take of fertilizer during 1997-98 stood at 2032 thousand nutrient tones as compared with 1899 thousand nutrient tonnes the last year, showing an increase of 7 percent. Open market sale price of fertilizer are prevailing in Lahore, Faisalabad, Hayderabad, Peshawar and Quetta.
3. **Quality Seeds.** Seed procurement and distribution is done by 4 public sector seed organizations and 159 seed companies in the private sector. Federal Seed Certification and Registration Department (FSC and RD) perform seed regulatory functions under seed Act, 1976 through its 18 seed testing laboratories, located in various ecological zones of the country (*Qureshi, 1971*).

In order to detect different diseases, seed health tests on various seed lots are carried out. The seed procurement agencies are advised to take remedial measures to avert the spread of diseases. The department under Truth-in-labeling (seeds) Rules, 1991, also monitored the quality of imported seed of various crops at Karachi seaport, Lahore railway station, airports and dry ports. To curb the sale of underscript and poor quality seed being sold in the market, monitoring continued and legal action against unscrupulous seed dealers taken. To establish distinctness, uniformity and stability criteria, a number of wheat and other crops varieties are yearly tested.

4. **Mechanization:** The process of mechanization is improving day by day in Pakistan which has helped in increasing income of farmers by minimizing pre and post harvest losses. It has also generated off-farm employment. A scheme of green tractors and tubwell has been started by the present government at concessional rates and in installments. An increase of 55.4 percent in the sale of tractors has been recorded which is attributed to the availability of credit from the ADBP. To reduce crop losses during harvesting and to ensure availability of qualitative seed of various crops, the government has arranged to import 125 combine harvesters and 11 units of mobile seed processing under Japanese KR-II grant. They have been delivered to the ADBP for supply to farmers on credit/cash basis.

Sales tax on tractors has been reduced which has decreased the prices of tractors manufactured locally.

5. **Price Support Policy:** Government fixes the support prices for major crops which includes wheat and other important crops. In order to improve upon production efficiency, the Agriculture's Price Commission (APC) makes important recommendations for support prices and suggest measures for improving the marketing condition and efficiency, and curtailed marketing margins so that the commodities become more competitive in the international market and less costly for the domestic consumers (*Ahmad, et al, 1987*).

Various criteria, including cost of production, local and international demand and supply situations, domestic market and international prices, etc. are taken into account while recommending the support prices to the government. The Agriculture Price Commission organizes mini as well as Omni level surveys regularly (*Afzal, 1992*).

The implementing agencies enter the market during the harvest period, and procure amount of the produce at the support prices fixed by the government. The support price implementing and procuring agency of wheat is -- Pakistan the Agriculture Storage and Services Corporation LTD (PASSCO) and the Provincial Food Department (PFD).

6. *Agriculture Research*: Pakistan Agricultural Research Council (PARC) is responsible for agriculture research in the country. The main objectives of PARC are self-sufficiency in food, grains, sugar and edible oil, poverty alleviation, equitable distribution of production resources, proper use of natural resources and environmental protection. PARC has introduced the new varieties of wheat including Shahkar 95, Wadnak-95, SR-95, Bakhtawar-92, Drawar-96 and Kohsar-95 (Brennan, 1984).
7. *Agricultural Credit*. Agriculture about 50 years back was deemed purely as a subsistence for life, yielding no commercial profit, now-a-days, it is regarded a primary large industry. As the propensity to save of the majority of the farmers is low, they need credit for investment in agriculture. It provides financial resources to the farmers for purchase of inputs like seed, fertilizer, pesticides, machinery, and protection against natural calamities, etc (Shultz, 1978).

It is used as an important instrument for achieving production targets of major crops like wheat. Recently the government has decided to issue pass books to all the farmers in order to facilitate them in obtaining agricultural credit. Agricultural loan amounting to Rs. 23,328 million have been disbursed during 1997-98 as compared to Rs. 19,548 million during last year. In order to ensure prudent lending and to bring a enduring improvement with wide coverage of small

farmers operating land upto 25 acres, a share of 75 percent loans of national target of general banking has been allocated to them during 1997-98.

These loans provided to the small farmers help them in purchasing good quality seed, fertilizers, pesticides etc. and have very healthy effects on wheat production. Assessment of state revenue has increased on commercial crops. As against the commercial crops, supply of water to food crops has enhanced. Because of more incentives virgin lands are brought under wheat crop. As a result of all these measures good crop have been received in 1997-98 but still the target of self-sufficiency has yet to be achieved.

6.2.2 IMPORTS ARRANGEMENTS OF WHEAT

Imports of wheat has been necessary from time to time to meet the normal wheat deficit of Pakistan, as well as to tide over emergencies. The import situation of wheat in the country is shown in Table 6.1

Table 6.1
Imports of wheat into Pakistan (000 tonnes)

Years	Imports	Years	Imports	Years	Imports
1970-71	219	1979-80	554	1988-89	1802
1971-72	705	1980-81	20	1989-90	1603
1972-73	1369	1981-82	136	1990-91	627
1973-74	1052	1982-83	-	1991-92	1640
1974-75	1617	1983-84	-	1992-93	2357
1975-76	1044	1984-85	545	1993-94	1408
1976-77	346	1985-86	1562	1994-95	2273
1977-78	1052	1986-87	-	1995-96	1931
1978-79	1957	1987-88	-	1996-97	2383
				1997-98	1900

Source: Agricultural Statistics of Pakistan (1996-97, P. 218).

Pakistan at the time of independence was basically a wheat surplus country and food deficits were unheard in Pakistan until 1952, despite the falling of wheat output and growing population growth. In the period that followed, however, Pakistan faced persistent wheat shortages, rising wheat imports and mounting financial burdens. It is because of the growing acuteness of these problems that self-sufficiency in wheat remained a necessary goal of development planning after 1960, where Pakistan has been a continuous importer of wheat. The heavy imports of wheat are due to crop failures and rising wheat requirement. Imports are also needed to build-up reserves (Ryan, et al., 1993).

Pakistan ^{also} enjoyed ~~varying degrees~~ of self-sufficiency in wheat in various years. From 1949-50 to 1954-55, Pakistan remained ^a wheat surplus ^{country} because ^{and} during this period it imported very little wheat, perhaps mainly for reserves making. Pakistan position in wheat has considerably been weakened during 1954-55 and 1964-65; because domestic wheat output accounted for only 83 percent and 73 percent respectively of the total wheat consumption requirement. The bumper wheat harvest of 1967-68 led to a drastic reduction in wheat imports (from 1.44 million tones in 1967-68 to only 16000 tones in 1968-69). Although this new development could promote official and unofficial optimism for Pakistan's entry into wheat exports ^{in countries}, the self-sufficiency status achieved in 1968-69 had been short-living, as dependence on exports began to grow again in 1974-75, with more than 14 percent of Pakistan's wheat requirements met by imports. Although dependence on imports from 1975-76 to 1977-78 has been some what lower, wheat imports reached a record figure of 2.24 million tonnes with worth Rs. 3.4 billion in 1978-79. In the subsequent years, Pakistan's wheat production exceeded

wheat consumption and resulted in wheat exports and accumulation of wheat stocks (*Haque, 1993*).

Although it is not possible to identify all the factors that helped Pakistan to achieve self-sufficiency in wheat in 1950, it is interesting to compare the mechanics of the self-sufficiency in wheat in the late sixties with that in the early eighties. The self-sufficiency in the eighties was accompanied by critical shortage of edible oils and pulses, which were not present in 1968-69. This situation was caused by the then exclusive emphasis of the government policy on wheat. Beside this the self-sufficiency in 1968-69 was achieved by the sharp increase in wheat output and accompanied by rapid increase in wheat consumption. By contrast, the early eighties were characterized by modest output increases and stagnating wheat consumption. This implies at the prevailing population growth rate of 3 percent per annum, self-sufficiency in wheat, wheat exports and build-up of buffer stocks in the eighties were largely the result of falling per capita wheat consumption. In his article, *Autarky in Food: Evidence and prospects*, and *Ghaffer (1983)* presented that the per capita wheat consumption in the sixties increased at the rate of 3.5-10.7 percent per annum, while in the eighties it actually fell at the rate of 1.2-4.3 percent per annum.

In view of the continuous rise in per capita income and the insignificant substitution of other food grains and animal products for wheat, the fall in the per capita wheat consumption appears to be paradoxical, but strict government control of the wheat market, through its monopoly of procurement, and a tight wheat stock release policy may well be responsible for this fall. Pakistan attained self-sufficiency several times but severe shortages were felt in 1992-93, 1994-95 and 1996-97. The shortages were

due to an increase in consumption, persistent drought, less availability of good quality seed and lack of irrigation water. Weather is also attributed as the major factor in shortage of wheat. Another important factor is over optimism on part of the concerned agencies which led to the feeling that imports would probably not be necessary. Consequently in 1996-97, when the shortage arose, it became necessary to make hasty arrangements for imports. Culminating into large unavoidable expenditure resulting from unplanned and precipitate purchases in a rising market of wheat.

To avoid such situation in future, the central government should enter into long-term agreements with wheat exporting countries for the purchase of wheat. These arrangements may have many advantages. In the first place, the prices would be substantially lower than what would have been if purchases were not made at short notice. Further, it may also make possible to phase shipments so that stocks could move as and when required, thus reducing the pressure on coastal shipping as well as on internal storage capacity.

6.2.3 WHEAT SUBSIDY AND PRICE POLICY

Pakistan has a history of agricultural input subsidies beginning with the 1950's. Despite the commitment of the government for relinquishing subsidies on agricultural inputs. They tend to continue persistently which have become increasingly implicit in the recent years. In the 1980's Pakistan's wheat policies taxed its producers and subsidized its consumers (*Niaz, 1984*).

The government now faces severe shortages of resources at a time when human capital and physical infrastructure have to be developed and maintained. Thus, a question arises about the role of the government in wheat prices and subsidies. Since the landed cost of the imported wheat is higher than that of the locally procured one, so both the Federal and the Provincial governments have to subsidize its sale in order to maintain wheat price at a reasonable level. Moreover, the government wants to give an attractive price to the producers also so that they are attracted to wheat production (*Marggraf, et al, 1987*).

When the wheat is harvested, farmers sell it either to the government (PASSCO or the Provincial Food Department) at the procurement price or to the private traders at the market price. Thus, two prices prevail in the market at any given time. Wheat moves through both channels primarily because of differences in quality. Clearly, this contributes to farmers receiving lower prices in many areas (*Ghaffar, et al 1995*).

Wheat is Pakistan's staple food but majority of the consumers do not purchase it as wheat. They buy flour or in many cases freshly baked *roti*. Wheat moves from traders to millers and the ground wheat eventually moves to the consumers. Wheat shortages are felt (especially in N.W.F.P.) then wheat also moves through the government channel to reach the consumers in the form of flour. For this, the old technique was rationing system at subsidized prices at ration-shops. The government abolished this system because it was not fulfilling its objective of helping low-income consumers. While there are no longer ration-shops but still the government maintains a substantial presence in wheat marketing. The role of ration shops is now played by utility stores. There have been some informal restrictions on the

amount of wheat released, tied to number of hours of milling operation per day. The current system does not attempt to target any recipient group. Rather its role is holding down and stabilizing the price of wheat (*Urff, 1992*).

A major role of the government in wheat marketing has been storage, because of the mutual interaction between procurement and release prices. The release prices are sometimes below the procurement prices. Thus, generally the private sector has not the incentive to store wheat for the whole year since it could not earn a sufficient profit on its investment in storage facilities. Millers mainly depend on government to supply a substantial part of their requirement of wheat during the last part of the year. In crisis, both the wheat traders and millers earn extra-ordinary profit, by involving themselves into hoarding, black-marketing and smuggling of wheat (flour) to the scarce area. The inadequate gap between release and procurement prices has resulted in a subsidy. The burden to the government of this subsidy on domestic wheat has been reduced, however, by the depressed producer price. If the government had to procure domestic wheat at a price comparable to world wheat prices, the subsidy would have been more. While the producers have borne part of the subsidy burden on domestic wheat, the burden of importing wheat and releasing it at subsidized price falls entirely on the government budget (*Ahmad, 1981*).

When world prices rise quickly and domestic prices rise slowly, the subsidy on imports is quite large.

The amounts of some wheat subsidies are shown in Table 6.2 and 6.3.

Table 6.2
Pakistan's Wheat Subsidies -- I

(Rs. Million)

Year	Federal	Provincial	Total
1986-87	150	2,625	2,775
1987-88	368	3,549	3,917
1988-89	4,947	2,956	7,903
1989-90	4,492	2,667	7,159

Source:- Agricultural Statistic of Pakistan (1996-97, P. 269)

Table 6.3
Pakistan's Wheat and Sugar Subsidies -- II

(Rs. Million)

Year	Federal	Provincial	Total
1994-95	1,890	1,010	2,900
1995-96	7,588	3,169	10,757
1996-97	6,353	5,173	11,526
1997-98	5,514	5,848	11,362

Source:- Agricultural Statistic of Pakistan (1996-97, P. 269).

The subsidies arising out of imports are borne by the Federal government while the subsidies paid on domestic operations are carried out by Provincial governments.

These amounts are quite substantial in comparisons to Pakistan's economy and government's expenditures. The subsidy of 1988-89 was about 1 percent of GDP and 6 Percent of the total government revenue. The largest subsidy was paid in 1996-97, which was Rs. 11,526 million, out of this Rs. 6353

millions were paid by the Federal and Rs. 5,173 millions by the Provincial governments.

In the last half of 1998, the government has significantly raise the procurement price of wheat. However, it remained below the adjusted world price. The increase in procurement price (Rs. 300) have made it harder for the government to increase the gap between the release and procurement prices. Nevertheless, the basic price structure has not changed with the abolition of rationing.

The government of Pakistan has been providing a subsidy on the sale of wheat. Through this subsidy, the government gives all consumers who purchase wheat, an income transfer in the form of cheaper wheat. Consumers benefit from the low release price through its dampening effect on the level of wholesale prices (*Ali, 1992*).

Millers may also benefit from subsidized prices. During a year, the retail price of wheat flour moves with the whole sale wheat price, while the release price remains constant throughout the year. Miller's margin of profit at the end of the year are higher than at the beginning, at that time they are buying mostly from the government at the release price, where they capture some of the subsidy. The miller's ability to jointly set flour prices helps them capture some of the subsidy at this time. As the commercial poultry industry and the volume of wheat handled by the government grew steadily subsidized, cheap wheat became an economical source of calories for the poultry industry. Along with the government's large-scale wheat, marketing operations came the likely-hood of increased losses to insects and shrinkage during storage as well as spillage and spoilage. Moreover wheat in Pakistan

has been cheaper than in the neighboring countries, unrecorded exports are also stimulated especially movement of wheat to Afghanistan (*Bale, et al 1981*).

Thus besides the direct financial cost of wheat subsidy, there is considerable waste, use of wheat for feed and smuggling to other countries. Expenditure on health, education and other social programmes are also lower than they might have been which is mainly ~~due to~~ ^{because of} higher expenditures on subsidies. More foreign exchange spending has also ^{been} increased on wheat imports. The subsidized price stimulates demand for other uses namely feed, smuggling and additional losses. Thus, total per capita use of wheat continues to increase. The government has recently made further progress in enlarging the gap between the release and procurement prices. In the last half of 1998, the government announced an increase from Rs. 240 to ~~Rs.~~ 300 in the procurement price. This has further raised the gap between two prices.

The government is not yet fully committed for withdrawing the wheat subsidy. Moreover, as long as the domestic price remains below the world price, imports would remain subsidized. Government should spend scarce resources on health, nutrition, education and roads, etc. The *United Nations Development Report* States that Pakistan has among the lowest expenditures on health and education as a percent of GNP in the world.

These facts lead to paint a new picture of the existing situation, where poverty has reduced, although it is concentrated in some areas, there is still mal-nutrition. Thus a general wheat subsidy does not belong in this scheme, but targeted programmes do. The government should eliminate the wheat subsidy. The domestic subsidy can be eliminated by raising the release price.

The subsidy on imported wheat should be eliminating too. When the subsidy has been removed, the government may then consider its massive involvement in wheat marketing. Here the government should bring procurement price up to the world level, in the long run period. It would then be possible to eliminate most of the government's role in storage. The government should target food-for-work or other programmes to specific groups. This might be done through the zakat system (*Gary Linder, et al., 1992*).

Nutrition education would also help with preventable problems of food choices and infra-family distribution. This may have positive effects on Pakistan's flour millers. The government would no longer be storing wheat for them at a lower cost. The government should also remove all bottlenecks to the provision of credit to the flour-millers, farmers and other economic agents involved in this process.

6.2.4 CHECKING ANTI-SOCIAL ACTIVITIES:-

It would be useful to make a passing reference to the movement against certain anti-social elements, which has augmented the scarcity and has further aggravated the problem of wheat.

Smuggling of wheat on a large scale across the border into Afghanistan, Iran and Indian territories, has been a well known phenomena where the free market as well as the government procurement prices of wheat have been higher than those prevailing in Pakistan.

Black-marketing and hoarding of wheat stocks have been some of the other evils, which are responsible for the man-made elements in scarcity. This part of smuggling, black-marketing and hoarding is greatly responsible for the acute shortages of wheat in the country and are most commonly felt in the wheat crisis environment. Historically it has been observed that during Martial law administration, efforts were made in real earnest to punish defaulters. Large hoarded stocks were discovered, black-marketeering sustained heavy blows and smuggling came almost to a stop. As a result, scarcity was reduced to some extent and free market prices eased down considerably. While in democratic regime, these three elements activated to the full extent during wheat crises. Of course, serious efforts were made by the government but they were sabotaged by their own members and supporters.

The present government is doing its level best to weed out such elements, which are increasingly undermining the socio-economic fabrics of the nation. The steps taken by the government in this regard are to seal the borders for wheat movement, sudden inspections of flour mills and main depots, sever punishment for those involved in these mal-practices, free distribution of hoarded stocks, etc. These measures have improved the situation to some extent but permanent solution of the problem requires more drastic action. Legislation, laws and rules should be passed where by such people involved in practices of smuggling, black-marketing and hoarding should be punished, exemplarily.

6.2.5 NECESSITY OF RESERVES AND STORAGES:-

For excessive instability of food supplies, there are no remedies except general economic development and all round increase in production. However, this is a long and gradual process. While emergencies call for immediate relief, high scarcity prices have to be avoided in the interest of consumers and the general economic development of the country, which assumes that all possible financial means and precious foreign exchange must be at its disposal. A smooth flow of supplies over time is, therefore, necessary. This is a pre condition for a programme of sustained economic and social development (*Pinckney, 1988*).

In Pakistan where people heavily rely on wheat as food, grain reserves are imperative. Maintenance of adequate rations is essential, at least to serve as minimum food supplies for each citizen of the country so as to bolster public confidence in time of crop failures and help to avoid high prices.

As Pakistan's position in wheat was considerably weakened in 1954, so it was rightly decided to build a reserve of 500,000 tons of wheat in the then West Pakistan. Due to shortfall in wheat harvest in 1955, internal procurement in Pakistan was lower than was expected and stock had to be released to prevent prices from rising. The diversion of resources towards imports of wheat gave a great setback to schemes of economic development in hand in the country.

It is against this setting of increasing inflation, and crop failures which is necessitating heavy imports and dependence on foreign aid for balancing

external accounts that Pakistan's national reserve policy has been formulating.

A greater portion of marketed wheat is procured by the government institutions and stored until it is released to flour mills. Apart from the amount of wheat retained by producers and stored by them for own consumption, the government bears the main responsibility for wheat storage. The stocks are held by the government to meet two objectives.

1. To bridge the gap between production and consumption, which are not held for more than one year.
2. To supplement the supply of wheat in years of bad harvests for longer term stocks and reserves. Table 6.4 provides wheat storage position in Pakistan.

Table 6.4
Grain Storage Facility

(000 tonnes)

Year	Procurement	Releases	Stocks	Storage capacity
1989-90	4135	4951	615	4041
1990-91	4412	5608	1508	5126
1991-92	3159	5431	1000	5126
1992-93	3249	5143	505	5042
1993-94	4120	5982	1007	5042
1994-95	3644	5999	776	4857
1995-96	3740	5139	385	4596
1996-97	3448	5987	453	4777

Source:- Economic Survey of Pakistan (1997-98, P. 65)
Agricultural Statistics of Pakistan (1996-97)

The amount of wheat held by the government to bridge the period between two harvests is indicated by the size of the releases from the stocks. The table shows that this volume has remained relatively constant in recent years. The table further indicates a consistent government policy to build up buffer stocks to meet shortages due to bad harvests. It also shows that in 1996-97, the wheat storage requirements by the government reached approximately 6,440 thousand tonnes. On the other hand covered godowns owned by the government had a capacity of 4777 thousands tonnes. Thus to meet the requirements the government hired the storage capacity of the private sector and used the raised platforms, railway platforms and tarpaulin coverings. Thus, there is enough room for the construction of additional storage capacity to cut down the wheat losses drastically. The recent steps taken by the government to increase storage capacity are in the right direction. However, it is important that the government policy regarding storage facilities is consistent with its buffer stock and procurement policies.

6.3 LONG TERM MEASURES TO SECURE BALANCE

6.3.1 INCREASING WHEAT PRODUCTION:-

Agriculture sector is highly exposed to natural calamities where shortages do occur. This creates a problem for the government which can be solved by increasing wheat production within the framework of the limitations examined above. Increase in wheat production can be achieved in two ways, firstly, by extending the area under wheat and secondly by increasing per acre yield (*Byerlee, 1993*).

Extension of area under wheat can be affected in two ways, firstly by reclaiming the cultivable waste land and applying it to wheat cultivation. This is not so easy and has its own physical and economic limitations. Any way it is a remedy which can help the situation but is not very feasible and possible because it cannot be carried out in a short time, secondly by diverting part of the cultivated area from other crops to wheat. Effort have been made by the government several times to bring about this diversion but they are successful only for the said year. Next year again the farmers start their old routine so it has its own limitations, thus it cannot be relied upon for longer period.

The second method of increasing per acre yields has many important points in its favour which are discussed here.

1. As the 1st method has a lot of limitation and is not very feasible in the long run, this remains to be the only way to increase production.
2. A considerable increase in yield will also make it theoretically possible to release some land for other important crops for example in U.S.A and Canada where they have tremendously increased yield per acre because of mechanization. Thus, it is said that U.S.A alone can provide wheat to the whole world, which is true also because each year USA destroy a bigger portion of its wheat stock. She do not provide it free to the world because of economic factors so it is destroyed. If some other country can improve their production so greatly why cannot Pakistan do it. The billion of rupees which we spent on importation of wheat, if is spent on mechanization of agriculture sector, can give very fruitful results.

3. Increased productivity per acre can mean reduction of cost per unit of production. This is possible because some of the costs like those of seeds, fertilizers, taxes and water charges do not increase in the same proportion as yields. Greater availability in this way will itself reduce scarcity.
4. Increase in yield per acre will increase the income levels of agricultural class and bring efficiency in agriculture sector by breaking through the vicious circle of agricultural poverty. Moreover, it will regularize the marketable surplus, the necessity for which is growing increasingly with urbanization. Ultimately it will increase the national income as a whole (*Iqbal, 1975-90*).
5. It may also raise output per head and thus add to effectiveness of labour.

An analysis of yield per acre shows that the post-partition acre-yields have been fluctuating from year to year. Since yield per acre for individual years are affected by climatic conditions, these fluctuations are quite understandable. In 1959-60, the yield per hectare in Pakistan was 801 kg/hectare which rose to 1171 kg/hectare in 1969-70 and 1568 kg/hectare in 1979-80. It is observed that yield per hectare has double itself in 25 year i.e. from 1959-60 to 1984-85 where it increased to 1612 kg/hectare. In 1989-90, it further rose to 1825 kg/hectare. The yield per hectare has increased to 2224 kg/hectare in 1997-98.

The following conclusions are drawn from the preceding paragraph;

1. Wheat yields per acre are woefully low—low even by Asian standards and

2. Though they have shown an upward trend (slight increase in yield per acre) but this increase is at a very slower rate. It has doubled in 25 years and expected to be tripled in 40 years.

Thus, a question arises that what are the causes responsible for this low yield per acre. The obstacles which stands in the way of achieving this result in practice, are complex and not easily to be removed.

Theoretically, low yields per acre might be due to the lack of intensification, or to the improper combination of the factors of production. The former means that due to the abundance of one of the factors, land, it is not being utilized properly, because it is more economic to combine additional dose of the same factor with the scarce factors of production, labour or capital, rather than to apply more of the scarce factors to the same dose of the abundant factor, land, even though it means greater yields per acre. It is simply a question of what is the more economic alternative to maximize the total produce and profit. This system is followed in the developed countries of the world like U.S.A., Canada, Australia and New Zealand, where land is abundant and labor scarce (*Lybecker et al., 1988*).

The latter means that the combination of the variable factors of production, labour and capital, with the fixed and scarce factor of production, land, is either insufficient or defective. In both cases, low yields are an expression of a poor response of land to the present combination.

In the case of insufficient combination of the factors, land will respond directly to greater and greater application of the requisite factors of production, other things being equal. But when it is a case of the defective or

wrong combination of the variable factors, low yields are the result of an inherent dynamic process in which land ceases, or, is reluctant, to respond proportionately to the present combination, even if there were to be additional doses of it. In this case, yields can only be increased if there is a reorganization and reallocation of the variable factors, say, more of one and less of the other.

This reorganization may to some extent also be brought about by changes in attitudes and improvements in the methods of application, which will increase the effectiveness of the same doses of the variable factors. These may be collectively termed as "innovations". To elucidate this concept a little further. "Innovations" include two-pronged measures, which are aimed at improvements in the socio-psychological behavior on the one side, and on the other, at a "rationalized" conduct of the farm business. This latter means that owing to greater scientific insight into the several processes taking place in soil and climate, and in the consecutive periods of growth of plants and animals, the farmer succeeds in adapting human intervention in such a way that either the same amount of inputs of capital and labor will yield higher results, or, the same results will be achieved by economizing on cost (*Islam, 1978*).

Combined with such a better organization of the farm business, net returns will increase substantially without in any substantial measure changing the present quantitative combination. The adoption of improved varieties and seeds, deeper ploughing and better cultural practices are known to have increased yield considerably without involving any proportionate expense.

6.4 CAUSES OF LOW YIELD IN PAKISTAN

In order to bring out the causes of low wheat yields in Pakistan, it is necessary to analyze the various factors of production, their utilization and their combination. This is done below. The discussion, which follows, should also serve to highlight the general agricultural background of the country against which the production of wheat as well as of other competitive food and non-food crops is to be seen.

6.4.1 WATER AVAILABILITY

Water is the first and most important condition of soil fertility. Its application in the requisite amount, has a very great influence on crop yields.

The water requirements of the different crops to attain proper growth and give good yield vary a great deal, not only from locality to locality and for the different species of the vegetable kingdom, but also throughout the season of growth. In case of deficiencies in natural rainfall, plants would have to be fed artificially with water if these requirements have to be met fully. Here then arises the basic problem of irrigation: How to provide just the right amount of water at the right time (*Belbase et al., 1985*).

Rainfall and the Artificial Irrigation:

Pakistan is dry, some of it arid and desert. Average rainfall is low and the climate is one of extremes of temperatures.

But whatever be the yearly averages, from the cultivator's point of view, "water that does not fall when his crops need it, may not count as water at

all". There is an acute water shortage in winter, which hits winter crops hard (*Government of Pakistan, 1990*).

In Pakistan, winter rains are both inadequate and erratic. In the event of a drought, wheat, the major food staple of the people, suffers particularly. The food situation in Pakistan thus hinges on the timely arrival of rainfall. Artificial irrigation is, therefore, necessary to correct the seasonal fluctuations and to make up the deficiencies of rainfall and reduce the risks of betting on the caprices of nature. Provision of irrigation facilities during the winter months would also increase the prospects of double cropping by means of raising winter crops. It may be mentioned here that the means of artificial irrigation will have to be varied according to conditions, costs and necessity.

Table 6.5
Area Irrigated by different Sources
(Million Hectares)

Years	Canals	Wells	Canal wells	Tubewells	Canal tubewells	Others	Total
1990-91	7.89	0.13	0.08	2.56	5.87	0.22	16.75
1991-92	7.85	0.16	0.11	2.59	5.93	0.21	16.85
1992-93	7.91	0.18	0.10	2.67	6.23	0.24	17.33
1993-94	7.73	0.14	0.09	2.78	6.22	0.17	17.13
1994-95	7.51	0.17	0.10	2.83	6.41	0.18	17.20
1995-96	7.60	0.18	0.11	2.89	6.58	0.22	17.58
1996-97	7.81	0.18	0.11	2.88	6.61	0.26	17.85

Source: Economic Survey of Pakistan (1997-98, P. 121).

In 1950-51, irrigation facilities had been extended to 9.22 million hectares which were further extended to 10.41 million hectares in 1960-61. The area under irrigation increased to 10.59 million hectares in 1970-71, 14.90 million hectares in 1980-81 and 16.70 million hectares in 1990-91. This has

further increased to 17.85 million hectares in 1996-97. Thus, in 48 years time, the irrigation facilities have approximately been doubled which is a very slow progress as compared to the changes in population, food requirements etc.

Scarcity of irrigation water causes a serious limitation in extension of wheat and other crop area in Pakistan. The lower water supplies, losses from watercourses in their fields are the serious problem of wheat growers, which causes deficiency of wheat. In production chapter, while discussing the year wise production of wheat, it was observed that if for a particular year, wheat crop is good, it is because of proper rain, in proper time and if wheat crop is bad for a particular year, the major reason for it is non-availability or less availability of water. Thus, proper irrigation facilities will minimize the intensity of the problems.

As we have two sources of water-Rain and Artificial Irrigation. We do not have control on rain, it is beyond our limits but artificial irrigation is fully under control. Through proper planning we can increase it to the required level, through the availability of small dams, installation of tubewell, etc. for raising wheat production and agricultural output. Thus, there will be less dependence on nature for the supply of timely water, if the command water is improved through water management.

6.4.2 MANURE

Next in importance only to water is manure, and from this side, the soil of Pakistan is as poorly fed as does the soil feed its people. The proportion of

the current fallow lands bears testimony to the fact that manuring is being replaced by a process of natural rest.

Organic Manures:-

No data are available to show the trends in the use of manures like farmyard manure, compost, urban waste, bonemeal, oil cakes and fishmeal. But, on one hand, the greater proportion of the farmyard manure continues to be used as fuel, on the other hand, much of the oil cakes, bonemeal and fishmeal in the country are exported and not used within the country.

Green Manuring:-

In spite of the fact that the practice of green manuring has been advocated for a long time, its use has not made much headway. In regions where much land happens to lie fallow, one might wonder if it is not due to a failure in finding the right approach (assuming that sincere efforts have been made) to pursue the farmer into applying a method which, being economical, makes the practice possible without entailing much extra cost.

In those regions where pressure on land is very heavy, so that fallow lying is exceptional, a green manure crop may only be more readily acceptable if it fits into the normal rotation of crops. But there are exceptions to it, for instance, in rainfed areas, if a farmer grows green manure with the summer rains, he loses the chance of growing the winter cereals. This he can ill-afford. Green manuring can, therefore, be successful only where there is an abundant supply of water and the pressure on land is not very heavy (*The Estimates of Fertilizers, 1991*).

Artificial Fertilizers:-

The use of artificial fertilizers has been introduced and their consumption is gradually increasing but it is still low when compared to agriculturally advanced countries of the world, as shown in Table 6.6

Table 6.6
Fertilizers Consumption in Selected Countries

(Kgs per hectare)

Years	Nether Lands	Germany	Japan	France	Egypt	Italy	USA	India	Pakistan
1990-91	610	394	451	316	401	200	96	72	92
1991-92	599	-	431	309	405	220	71	77	91
1992-93	599	239	395	253	339	156	101	72	101
1993-94	560	221	407	237	-	148	108	73	97
1994-95	554	240	400	242	304	159	103	80	103

Source:- Economic survey of Pakistan (1997-98, P. 138).

Pakistan consumes 103 kgs per hectare of fertilizer while this figure is about 400 in Japan, 554 in Netherlands and 304 in Egypt. The difference speaks for itself. The need and necessity of fertilizers in raising the yield per acre is only too obvious. Various experiments carried out in Pakistan show that fertilizers prove very effective. The off take of fertilizer during 1997-98 stood at 2032.27 thousand nutrient tonnes as compared with 1899.24 thousand nutrient tones during last year (*Statistical Supplement, 1993-94*).

The government provided subsidy on fertilizer up to 1995-96 (Rs. 46.7 million). As the government has realized that fertilizer is now popular among the farmer, so they have stopped fertilizer subsidy since 1996-97.

6.4.3 CROP ROTATION

A judicially planned, scientific rotation of crops can serve as an important factor in soil fertility. It not only maintains but also greatly adds to the fertility of the soil.

Experiments carried out in Pakistan show that the inclusion of leguminous and green manuring crops in rotation prove highly beneficial. With this end in view, the Government have tried hard to encourage the practice by granting subsidies and distributing seeds at reduced costs. But as yet, the idea of a proper rotation of crops has not taken root in the country. A planned rotation of crops is bound to improve the fertility of the soil by way of making provision for green manuring. The government should educate the cultivators to resort to judicious rotation of crop. Sometimes injudicious rotation of crop becomes harmful (*Hussain, 1970*).

6.4.4 IMPROVED SEEDS AND VARIETIES

Seed plays a very important part in plant husbandry and crop improvement. It is the rock on which the house of agriculture must be built. The application of improved seed is known to have increased out turns considerably in countries which have attained high agricultural yields per acre.

A considerable importance has been attached in the past by the Provincial and Central Governments to the provision of good seeds of improved varieties to the farmers. But supplies have been limited and covering only a few crops. The requirement of improved varieties of seeds in our agriculture

has never been met adequately. For increasing the output per acre and improving the quality of agricultural products, the use of better quality seeds is absolutely necessary. It has been estimated that the yield per acre is increased by 10 to 25 percent, if better quality seed are used by the cultivators (*Cornellise, et al., 1985*).

The First five-year Plan, while recognizing that yields can be increased by as much as 10 to 25 per cent if improved varieties are grown by the cultivators. The plan has attached a great importance to the development of new varieties and the improvement of the existing ones. The Plan provided a sum of Rs. 21 million for plant breeding programme whereby improved varieties of food grains, etc., were to be tried. To make full use of the improved varieties evolved, seed will have to be multiplied on the necessary scale, and distributed to, and sown by, the cultivators. For this purpose, the plan provided a sum of Rs. 64.5 million.

During the Third plan period, the outstanding, feature of the seed programme was the introduction of HYV of wheat. The acreage under the Mexican wheat varieties increased from 60,000 acres in 1966-67 to 60,00,000 acres in 1969-70 (*Johnstan, et al 1969*).

In the recent years, 4 public sector seed organizations and 159 seed companies in the private sectors are involved in the distribution of seed. Beside this, there are 18 seed testing laboratories located in various part of the country. These laboratories tested and distributed a total quantity of 58.77 thousand tones of wheat in 1996-97, Shown in Table 6.7

Table 6.7
Distribution of wheat improved seed

(000 tonnes)

Crop	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97
Wheat	43.44	45.70	49.40	50.11	63.29	65.44	58.77

Source: Agricultural Statistics of Pakistan (1996-97, P. 9).

To encourage private sector to take up seed business, 19 more seed companies were allowed seed production and distribution, raising the total number of seed companies to 159. To curb the sale of poor quality seed being sold in the market monitoring continued and legal action against unscrupulous seed dealers were taken (*Economic Survey, 1997-98 P. 9*).

6.4.5 PLANT PROTECTION

Pests and plant diseases cause a great amount of damage by reducing yields, affecting the quality of grains, and sometimes leading to great and unexpected crop fluctuation. Losses caused by crop pests and diseases were estimated by the agricultural Inquiry Committee to be at least 15 percent every year, and up to 50 percent or even higher in certain years (*Hamid, et al, 1987*).

In view of the already low yields, further reduction of yields by these diseases, combined with locust attacks from time to time, cause serious havoc. Plant protection must therefore receive due consideration in the national plans for agricultural development.

6.4.6 METHODS OF FARMING AND MECHANIZATION

The tools and implements with which the Pakistan farmer works on his land are not only a part of, but also stand in a causal relationship to, his primitive methods and agricultural practices. There is the old plough, described by one Western observer as an implement of which the operative part is no more than a wooden point tipped with iron, with the help of which land is scratched rather than ploughed. Then there are certain other simple tools like the wooden drills, the Sohaga, etc., to the use of which the farmers have clung fast throughout the past centuries, and apparently "seem to have been more keen on conserving their ancient methods and tools than conserving the soil (*Mahmood, 1991*).

As a source of energy for draft purposes, Pakistan's agriculture depends chiefly on bullock power. But the cattle population of the country, is underfed and of poor quality.

It is thus evident that the efficiency of agriculture is to be improved, changes, in farm implements and mechanization is necessary.

Farm mechanization is one of the packages of green revolution technology, which implies the use of mechanical technology in the various farming operations like sowing, harvesting, threshing, leveling, watering, spraying, weeding, etc. There is unanimity of opinion that mechanical technology along with other inputs increases agricultural productivity. The difference is, however, on the type of technology to be adopted. In advanced countries, the concentration of large scale mechanized farming has maximized output per hectare and per workers (*Kemal, et al, 1992*).

While the conditions in developing countries, like Pakistan, are different. They can neither adopt mechanized farming on large scale, nor can use the same mechanical technology applied in advanced countries. The most suitable strategy for them is to collect quantitative data on the effects of mechanization on crop yield in different areas and apply appropriate technology according to the local conditions. For example, the area where there is surplus labour, the use of new seeds, fertilizer and better water management can give increased yield per hectare even with the tradition methods of cultivation. The area where land is to be leveled, the use of bulldozers is a must. Similarly where canal waters is not available and the ground water is good, the installation of tubewells should be encouraged. The area where the cultivable land is in plenty and the population is small, the mechanized farming should be adopted on massive scale. Thus mechanization is good but planning and mechanization should go side by side. It should not be done in haphazard manner (*Mcinerney, et al, 1975*).

The government of Pakistan is guiding and encouraging selective farm mechanization in the country. Spray machines are applied to spray the standing crops. The manual harvesting of wheat is now virtually dispensed with. Tractors, bulldozers and attached implements are increasingly brought into the scene. In 1995-96, the number of tubewells increased to 483785 as compared to 1980-81, where it was 199673. Similarly in 1994, the number of tractors (by type of ownership) in Pakistan reached 252861.

Moreover a scheme of green tractors and tubewells has been initiated by ADBP and a lot of other concessions are given by the present government for increase yield per acre.

6.4.7 WATER LOGGING AND SALINITY

Due to the enormous pressure on land, there is a great land hunger in the country, while on the other side, there are vast areas suffering from, soil depletions and deteriorations like salinity, water-logging and erosion.

It is believed that land lost as such is greatly in excess of the rate of reclamation, and that there are indications that the tempo of retrogression of irrigated lands is increasing. Sir Roger Thomas is of the opinion that "if the canker of water-logging of its irrigated lands is not remedied, and if salt impregnated lands cannot be rendered fertile, then the substructure of the agricultural economy of Pakistan threatens to be undermined with disastrous consequences in the not very distant future.

Exact and up-to-date statistics of the damage done by soil erosion are not available, but it is estimated that in a few years, about millions of acres have been lost through this.

The above facts and figures of the extent and rate of soil deterioration call attention to the seriousness and the urgency of the problems. Greater and immediate efforts at soil conservation are necessary, in the words of Pigou, "to defend the exhaustible and natural resources of the country from rash and reckless spoliation". In the First Five-Year Plan, (1955-60) a sum of Rs. 7.4 million was provided for soil conservation. *1955/56 - 1959/60*

It may be noted that by 1955, 185,000 areas of saline and water-logged land had been reclaimed in Pakistan.

It is necessary to point out here that most of the soil depletions are closely bound up with, and are the result of, the exploitative and extractive methods of cultivation and careless, inadequate and inefficient irrigation and drainage practices — a problem which is not unknown in the several arid and semiarid regions in the other parts of the world. The pressure of population on land, and the intensity of present wants, are so great that future is heavily discounted. So long as these conditions are present, government efforts at soil reclamation in one direction will be nullified by the extension of soil-deterioration in others. The government of Pakistan is aware to the seriousness of the problem which is a great threat to the agrarian economy. Vigorous efforts are being made to protect and reclaim the areas affected by water logging, salinity and soil erosion (*Ilyas, 1994*).

6.4.8 POPULATION AND ITS PRESSURE ON LAND

Though rural population has been increasing relatively slower than that in the urban areas, its rate of increase has been much faster than the rate of progress of cultivation. It is unlikely that there has been a corresponding change in rural industries and services to offset this difference. Kingsley Davis concludes from his studies in the population of the country that with the growth of population, more and more people have sought a living in farming. Dependence for employment on agriculture, therefore, has increased.

This increase in the ratio of agricultural population to farm land could have been compensated for had there been a proportionate increase either in productivity per acre, or, in the total supply of cultivated land. But, as it is, there has not been any appreciable progress in either direction. The

implications of this state of affairs are far-reaching. But, it may be noted here that this has added further to the already too great pressure on land in the rural areas which have long since passed the point of diminishing returns so far as the application of labour to agriculture is concerned (*Ahmad, et al 1988*).

The number of cultivators should really be a matter of what the land can productively absorb, or, in other words, be effectively combined with. From this point of view, it is no longer a combination: It is heavy pressure.

6.4.9. ECONOMIC STRUCTURE OF AGRICULTURE

The socio-economic organization of agriculture bears greatly on the will to work and power to work of the farmer. The relationship in which the cultivation of land stands to the ownership thereof, and the rights and status of actual cultivators, greatly determine the conditions under which agricultural production is conducted. The size of his holding and his material resources determine the physical limits to the farmer's enterprise, or, to his power to work; whereas his share of the actual produce and the security of his tenure greatly determine the incentives, or, his will to work.

Land tenures in Pakistan can be grouped under two categories: First, there was the Zamindari system (Landlordism), in which large landed estates were owned by Zamindars (landlords), while actual cultivation was done by tenants. Since the imposition of Martial Law in October 1958, and onward in 1972 this system has been reformed. While the landlords were absentees, the actual cultivators had neither the security of tenure nor a guarantee to their due share of the produce. The cultivators therefore had neither the resources

nor the permanency of interest to make any substantial improvements. Again, though the holdings of the big landlords were very large, they were cultivated in fragments. As a consequence, while on the one side, the system had all the disadvantages of large-scale ownership, the country was deprived of the advantages of large-scale production, on the other.

The second category is that of Ryotwari system, which in principle is one of owner-cultivators. Holdings in this category are normally small and fragmented, and the laws of inheritance further subdivides them.

The land reforms of 1958, 1972 and 1977 were only cosmetic reforms. The actual position is that vast acres of land were exempted and left to the landlords for orchards, raising cattle and breeding race horses. Landlords illegally transferred their big holdings to their relatives. The various land reforms introduced were largely legal eyewash and they exist mostly on papers.

Due to law of Inheritance the gradual shrinkage of the size of holdings and their fragmentation has been in a large measure responsible for the decrease in agricultural production. Firstly, the surplus production of the ordinary cultivator is so small that he has no incentive either to increase it or market it properly and secondly, no large-scale measures can be adopted effectively to secure improvement in yields.

6.4.10 OBSERVATIONS

The above conditions of production are each in turn a cause of the low yields in the country. The soil suffers from deficiency of nitrogen, irregularity of irrigation and floods, where vegetation is sparse. While on the one side, little

is done to replenish or re-establish the fertility of the soil, on the other, extensive areas are severely affected by salinity, water-logging and erosion. There is no scientific rotation of crops. Improved varieties are not available in the requisite quantity. The tools and implements of the farmer are primitive and the sources of the traction power both insufficient and inefficient. Pests and plant diseases damage the crops heavily in fields. The socio-economic organization of agriculture in the country curbs both the power to work and the will to work of the farmers. Pressure on land is extremely heavy. With the growth of population and lack of alternative sources of employment, more and more people seek a living in farming where there is already underemployment and disgustingly unemployment thus further reducing the standard of efforts. Under the circumstances, this low standard of efforts is naturally balanced by a low standard of living.

The combination of the factors of production is thus exceedingly defective. More and more labor of the same quality is being applied to poor and depleting land resources with little or no change in capital. Land, therefore, does not respond. Unless aided by additional capital, additional doses of labor are not only ineffective but rather add further to underemployment in agriculture. In the absence of any increase in yields, the government relies more and more on extending the area under cultivation to meet the constantly rising requirements; but as noted above, there are serious limits to it (*Mahmood, 1981*).

A thorough reorganization of the factors of production is therefore needed. More capital is necessary to make the present labor supply effective. And greater scientific insight among the cultivators is needed to improve this effectiveness. Experiments carried out on water requirements of crops and

the application of fertilizers show that yields can be considerably increased. Increases of 10 to 20 per cent can be achieved with improved varieties. Better organization of agriculture and improved implements, etc. can still further improve yields. With this end in view, efforts have all along been made by the Provincial and Central Governments in these directions. Yet, yields are progressing very slowly.

6.5 POSSIBILITY OF SELF-SUFFICIENCY IN WHEAT

Pakistan is basically an agricultural country and agriculture is the major sector of the economy with majority of population directly or indirectly depends on this sector and about one fourth of GDP contributed by it. In spite of the fact that Pakistan's 50 percent of the population is engaged in farming, it has not been able to achieve self-sufficiency in wheat which is the basic food item of the people (*Nasim, et al, 1991*).

The gap in the requirements and production of wheat is highly fluctuating. Pakistan had to import 2.6 million tonnes of wheat during 1992-93 to supplement domestic reserves. During 1993-94, it has imported 1.4 million tonnes. During 1996-97 the imports of wheat was 2.4 million tonnes which later on increased to 4 million tonnes (unofficial figure) of wheat costing a very heavy amount of precious foreign exchange.

The deficit in wheat supply exists as the years pass. Pakistan during this decade has not attained self-sufficiency and export surplus in wheat which depends upon a variety of factors such as the price-structure, income, elasticity of demand, requirement for seeds and feeds etc.

Self-sufficiency in wheat is possible provided the following policy measures are adopted.

- **Vertical Expansion.** The area under wheat is likely to expand marginally (1.4 percent per year is the past trend) due to scarcity of additional water for irrigation purposes. The emphasis, therefore, should be laid on obtaining larger quantities of wheat from vertical expansion with greater use of physical inputs rather than from a larger area.
- **Increasing Wheat Yield:** Wheat yield to be increased beyond past trends. In the past, wheat yield has been increasing at 2.2 percent per year, whereas the population is increasing at the rate of about 2.7 percent per annum. Steps shall have to be taken to increase the wheat yield at least to the level of growth of population.
- **Varietal Break Through.** The wheat yield is 2224 kg/hectare. This is to be increased to at least 2600 kg/hectare by varietal break through and improved seed dissemination, adoption of agronomic practices by majority of the farmers, right and appropriate doses of fertilizers according to soil characteristics, paying greater attention to seed control, reducing post-harvest losses and exploiting Barani areas.
- **Growing High Yielding Varieties.** The acreage of HYV seeds is increasing each year but their prices are too high so they are not very common. More efforts in this regard are needed, with plenty of quantity and reasonable prices. So that people should substitute them with new varieties of seed which are pest resistant. The change will help in increasing yield per acre.

- ***Distribution of Seed at Subsidized Rates.*** At present, only a very low percentage of the area is being sown with improved wheat seed. The new seed varieties should be fairly distributed to the farmers at subsidized rates.
- ***Improved Agronomic Practices.*** The agronomic practices being used are now outdated. For increase in the wheat yields, it is necessary that the improved agronomic practices which exploit the genetic potential of the varieties should be introduced.
- ***Crop Management Techniques.*** In order to increase production of wheat, crop management techniques should be made well-known to the farmers. The relation of right type of crops, fertilizers recommended to the soil types, weed control, etc. should be based on integrated approach.
- ***Increase of Wheat Yield in Barani Areas.*** Barani area is about 20 percent of the total cultivated area. The area under Barani cultivation is still sown with traditional wheat varieties. Yield increase can be obtained by simply inducing the farmers to switch over to new varieties of seeds.
- ***Technology Package.*** The small farmers in Pakistan are still using old farming techniques. The present government has offered them technology package (access to inputs, advice and credit, green tractors, and tubewells schemes; etc.) This will greatly help in increasing the crop yield.
- ***Harvest and Post-harvest Losses.*** The substantial harvest and post-harvest losses greatly contribute to the low yield of wheat. These losses can be covered by the use of mechanical reapers, binder and

combines. On and off farm storage facilities can also help reducing cost and losses of food grains.

- **Smuggling.** A large quantity of wheat is smuggled to Afghanistan, Iran and India every year, which is due to the lower prices of wheat (subsidized) in Pakistan as compared to those countries. This needs a serious check because it is among the major causes of wheat shortage in Pakistan.
- **Subsidy on Wheat.** Both the Federal and provincial government give a lot of subsidy on wheat each year (sugar plus wheat) (Rs. 11362 million in 1997-98). This on one hand puts extra burden on government treasury, on the other hand, drastically reduces the foreign exchange reserves. So what is needed in the long run, to gradually reduce and ultimately finish the subsidy on wheat and leave it to the forces of demand and supply.

If these measures are carefully adopted, and implemented, there is no reason for Pakistan to become self-sufficient and export surplus in wheat.

CHAPTER VII

CONCLUSIONS AND POLICY IMPLICATIONS

7.1 SUMMARY:-

Wheat is an essential food ingredient in Pakistan, which is used several times a day. Its extensive and intensive use has made people habitual of it, and they cannot tolerate its shortages where such shortages do occur.

Pakistan is among the few countries in the world, where majority of the people suffers from lack of food security. Millions of people are pre-occupied solely with bear survival and hunger is a reality in their every day life. In Pakistan wheat is the staple diet, consumed in the morning, afternoon, evening, and like typical wheat diets everywhere. With the change in time, and an extension of transportation, wheat is entering more and more into the daily life of the people, wheat shortages necessitate the alter native consumption of inferior grains or other cereals.

In Pakistan, wheat forms 73 percent of the total food crops production (1997-98), which is proportionately a very high percentage. Both as the principal crop and as the principal food wheat is stemming from the scale of economic prosperity and social adversity of people at large. Data supports clearly that area and production of wheat is increasing constantly every year but still its supply is always short of effective demand. To bridge this gap between rising demand and static supply each year, a considerable amount of foreign exchange is spent on it imports. The deficit in wheat supply prevails almost every year and Pakistan (with few exceptions), has not achieved self-

sufficiency in wheat. According to economic theory, self-sufficiency is optimal only when a country has a comparative advantage in producing the commodity. There exists a good potential for increasing wheat production, but apparently, this is impeded by the slow rate of technology adoption, detrimental agrarian structure, weak infrastructure and an inadequate level of water supply for wheat.

The key to increase wheat production in Pakistan lies in rapid adoption of technology, vis-a-vis the larger population and the limited land base, the diffusion of biochemical technology (Improved Varieties, fertilizers, and pesticides, etc.) is apparently a more appropriate path towards technological progress than labor saving mechanization. The adoption of biochemical technology for wheat production critically depends upon the expansion of irrigated areas. Increased use of the leading inputs which play a role of shift variables of production function, and contributes most towards the increasing output.

Historical background reveals that prior to the British colonization of India in the Eight century, private ownership of agricultural land did not exist in the present Pakistan. Land was held communally by the entire village, so that each household attained subsistence production derived from the land allotted to them. Peasants possessed and used their land holdings, while the sovereign feudal authority collected land tax from them. In the present Pakistan under the permanent settlement Act of 1793, the property right of land was transferred to the Zamindars who were required to pay a yearly tax to the British government. Thus, land became a private property which could be bought and sold. This fundamental change in property rights was responsible to eventually create the landlords, tenants and landless classes.

As a result, the majority of farmers are either tenants, owner-cum-tenant households in Pakistan. The most common form of tenancy relationship in Pakistan is sharecropping. Sharecropping terms are generally 50 percent of the crop at harvest.

Data reveals an important fact that if there is a severe shortage of wheat for a year, and the government provides proper counter treatment to it; then the next year the problem is resolved. Thus, it infers that the problem can be eliminated on permanent basis if each year proper wheat policy is devised and implemented. The other side of the issue is that if for a particular year bumper wheat crop is harvested because of more efforts and proper government policy, then the next year no attention is paid in sustenance and after some time the problem is aggravated once again. Hence self-sufficiency in one year does not mean self-sufficiency forever. Next year more efforts should be concentrated, which should be a continuous process, regularly.

While import elimination involves restructuring of the whole marketing system, to meet the increasing demand of wheat, a considerable expansion and improvement of efficiency is needed. In addition, general improvement in market efficiency would also be essential for providing continuing incentives to the farmers without unduly rising prices for the consumers. Of course, there is inefficiency in the production of wheat but another important reason for wheat deficiency is the highly disorganized nature and performance of wheat market, which leads ultimately towards importation of wheat. Elimination of wheat imports can, therefore, greatly alleviate Pakistan's balance of payments problems. The constituents of wheat market are the farmers, the intermediaries including commission agents, whole

salers, beoparis, millers, retailers, stores and consumers. In 1960 the price of wheat had been fixed higher than world market prices because to increase wheat production. Since 1970 the rationing system had strengthened and expanded wheat supper and wheat could be procured at less then world market prices. ^{Since} In 1973, the Pakistan Agricultural Storage and Services Corporation (PASSCO) has been set up to share the working load of procurement process. Thus, wheat procured by the government mounted to from 3 percent in 1972 to 18 percent in 1973 and further 29 percent in 1980.

The wheat policy of Pakistan has been spelled out separately in detail as a part of the general agricultural policy. A number of policy changes, since 1980, have been operated upon motivated by a mixture of governments objectives for ameliorating problems. Maintenance of food self-sufficiency with a preference for the generation of exportable wheat surpluses has remained the government's core objective, ^{and} it's realization is becoming impossible because of the deteriorating situation of development resources. In order to improve the productivity of wheat, a number of steps have been devised, like growth in fertilizers, water course improvements, increasing institutional credit, supply of key agricultural inputs, expansion of network of agricultural cooperatives, administrative measures, wheat price policy, plant protection and agricultural research. Though the government is making a lot of efforts in this regard but for the achievement of self-sufficiency, government has to change its policy in the light of the new structural developments.

Regarding wheat price policy of the government, one observation is the difference between the prices of imported wheat to that of the domestically produced wheat, has put an unnecessary burden on foreign exchange.

Moreover, if wheat prices are announced in advance of wheat sowing, it may affect wheat acreage. In order to improve, production efficiency, the Agriculture Price Commission (APC) makes important recommendation, for support prices and increase yield per acre. The APC has set up standing committees, consisting of farmers, representative of the Provincial chambers, associations of Agriculture, trade and industry, researchers and subject specialists for various crops. The support prices of wheat crop for the year 1996-97 has been estimated at Rs 240 per 40 kg and Rs 300²⁴⁰ per 40 kg for 1997-98.

Wheat consumption in Pakistan in 1965-66 is estimated at 4.6 million tonnes, which increased to 8.5 million tonnes in 1969-70. Thus, in 5 years times, the consumption of wheat has nearly doubled itself. In 1979-80, wheat consumption increased to 11.4 million tonnes and 1984-85, to 12.2 million tonnes. In 1997-98, the consumption has been 19.03 million tonnes. Thus, consumption of wheat is increasing regularly and constantly which depends upon so many factors, among them the most important ones are the population growth and change in per capita income.

There is a close interaction between food and population. The number of people is the basic factor in determining food requirements. If population is increasing at a faster rate than food, then obviously there are shortages of food, which commonly persists in Pakistan. On the other hand, if population is increasing at a slower rate than food requirements, it brings prosperity. In Pakistan, what is essentially needed is that fertility in homes has to be balanced by fertility in fields.

The statistics reveal that population in Pakistan gets doubled between 1961 and 1981 (20 years), where it increased from 42 million to 84 million respectively. These figures infer that in 1961-81 population growth rate reached the alarming dangerous zone of 3.06 percent. In 1991, the population increased to 114 million, which further rose to 140 million in 1998. The current population growth rate^{of pop.} is estimated at 2.7 percent, which is the highest in the region. The growth rate^{of pop.} has remained the highest in 1972, which there after climbed to 3.69 percent. Followed by a declining trend, it is estimated to have decelerated to 2.77 percent in 1997. By the end of 9th five year Plan, the population growth is projected to slow down to 2.5 percent. (1998-99 / 2002-2003)

As wheat provides the bulk of the food, changes in the size and structure of population have a direct effect on wheat requirements. Every addition to number of mouths to feed leads eventually to a corresponding increase in requirements, for wheat. In Pakistan, the population has grown by 21.300 million during 1990-97, where the wheat consumption has increased by 2.086 million tonnes in the same period. Thus, every increase in population is also bound to aggravate pressure on wheat consumption, unless accompanied by a corresponding expansion in the supply of other cereals. Pakistan has now remained for a long time a deficit region in wheat and if the pressure of refugees (Biharies, Bengalis, Indians, Burmese, Thai's, Sri-lankan, Iranians and Afghanis)^{of pop.} still continue, it may add a great deal more to the difficulties of the nation to meet its wheat requirements. Wheat scarcity results in higher prices, hit hard the middle and poor classes, leading to strife and discontent. At a time when the nation has ambitions plans of economic development in hand, and development programmes are on their way,

discontent prevailing among the lower class can have drastic consequences. The pressure is further aggravated by nutritional density (the rate at which increase in the sources of food supply lags behind increase in population). In a country like Pakistan, where majority of the people live at subsistence level and where poverty has already broken their shoulders, rising food prices may further aggravate their miseries. Thus, the problem of demand of wheat due to an increase in population is further complicated by its attainment at lower cost. Every effort of the government to promote economic development, the pressure of population has tended to perpetuate the problem of mere subsistence at the forefront. The struggle to balance the increasing food requirements of an increasing population has so far not shown any positive sign on the economy of Pakistan. In Pakistan the lower and middle class is spending all its income on essentials of life, in which food constitute more than 50%.

Of all the factors, which exert influence on food consumption, income is the most important one, which effects the kind and variety of food consumed. An increase in per capita income has a dominant influence on habits of food consumption of the people. Among food, wheat is one such item, which is being used 3-4 times daily. Thus, an increase in per capita income is directly prone to wheat consumption. The initial effect of increase in income in the developing counties where the food and nutritional conditions are not very normal may be to add more wheat to the diet.

In Pakistan, demand for wheat is income elastic. A small increase in purchasing power leads towards greater demand for wheat and vice versa. An increase of 12 percent in per capita income in the near future promises a great increase in wheat consumption and requirements. An annual increase

of 2.7 percent in population is very likely to have an accelerating effect on wheat requirements too.

It is thus concluded that the population of Pakistan is still increasing at higher a speed (2.7 percent) which is creating pressure on the cultivated land and is adversely affecting the production of food, especially of wheat. Moreover, the per capita income is increasing at a rate of 11.9 percent which is increasing aggregate demand for better quality of wheat. Thus, a gap is created between demand and supply of wheat, which may further be widened in future. This problem can be solved through efficient government policies and its formulation.

Moreover a bigger portion of wheat harvested in Pakistan is lost and is not available for consumption. These losses are further aggravated in the process of supply to the final consumers. Thus, the total losses of wheat in Pakistan may be between 15-17 percent of the total wheat production, which indeed, is a very large quantity. This loss cannot be averted entirely though technically it is highly desirable. It has been practiced upon several times, but always the cost has been more than the benefit. Still the loss can be minimized by improved handling, storage and treatment of the crop.

The production of wheat increases each year but the production possibilities are severely limited because the average yield per acre is still very low, with large variation from the average. The variations are mainly explained by the condition of soils and the availability and use of key agricultural inputs particularly canal irrigation water.

It has been observed that the area under wheat cultivation is constantly increasing. It registered an increase of 4.5 million hectares from 1959-60 to 1997-98, the area under wheat is likely to expand further at a marginal rate (1.4 percent per year is the past trend) because of the scarcity of additional water for irrigation purposes, and lack of incentives for the farmers. The comparative emphasis, therefore, should be laid down on obtaining larger quantities of wheat from vertical expansion with greater use of physical inputs rather than from extension of larger area.

In 1947-48, production has been low due to unsettled conditions of partition and the dislocation of agriculture. Standing crops have been badly affected by the migration of population. Things started improving only after the agriculturist refugees settled down and got used to the new environment and conditions. Where finally most of them settled in urban areas and performed as public personnel, industrial labor, etc. The 1952-53 has been exceptionally a bad year where production of wheat dropped down from 3.3 million tonnes in 1947-48 to 2.4 million tonnes in 1952-53. The reasons included first drought and thereafter floods, causing failures in wheat and all other cereals, which thrust Pakistan into the grip of an unexpected food crisis. In 1955-60 the increase in food supply especially wheat, has been negligible because of the negligence of the agriculture sector as a whole.

In 1960-65 the government has determined to achieve self-sufficiency in wheat production by undertaking a few effective steps like the agrarian reforms, adoption of modern technology, provision of credit facilities to the wheat growers. Initially, the well phased policies of agriculture in general and wheat in particular, did bear fruit, but afterwards the wheat production indicated a fluctuating growth trend and overall a gloomy picture. Wheat for

1997-98 stands at 18.6 million tonnes as against 16.6 million tonnes of the last year, indicating an increase of 12 percent. The bumper wheat crop is attributed to the enhancement of support prices of wheat, disbursement of more agricultural credit to the growers availability of sufficient moisture at sowing time in Barani areas, provision of quality seeds to the farmers favourable weather conditions and availability and the time application of proper inputs.

It is thus concluded from the above discussion that the supply of wheat depends on the total land available for the crop, irrigation facilities, climatic conditions and market price of wheat. Wheat is sown in the month of November, where in rainy (Barani) areas receive very little water bring always a bad harvest.

An important question that needs to be addressed at this point is regarding the desirability of state intervention in wheat market. For this, the production efficiency of wheat in the private sector and its cost to the economy, may be seen in case of non-intervention, the problem of efficiency wheat production to be resolved in the long run in case of non-intervention, initially prices may shoot up temporarily because of the discrepancy in demand and supply but ultimately, both prices and production may settle down, in the long run. The cost to the society in this context is obvious. More burden may fall on the poor and their miseries may further be enhanced. Thus, what is needed, is a gradual withdrawal of the government from the wheat market, leaving the environment free to the forces of demand and supply to apply naturally. In the mean time, the government may both increase employment opportunities, and raise per capita income. This may enable the poor class

with more purchasing power and thus in the absence of government help, they may be in a position to cope with the situation effectively.

The process of price formation is dominated by the government, which provides an umbrella coverage to the consumers from traders exploitation. The government also assumes the responsibility of storage and transportation of wheat. The role and interference of government in the wheat market is apparent and has its own justification. But it has been witnessed in developed countries like U.S.A and Canada, and also some less developed countries, that if there is least interference from the government side in wheat procurement, (in the long run) it has every positive effect both on the economy and agricultural output both. In case of Pakistan, this withdrawal by the government may not be immediate but gradual, the government may withdraw by refining the system, and leaving it to the private sector ultimately.

ARIMA model used in this study is to forecast the future production of wheat from 1998-2010 (13 years ahead) with 95 percent confidence interval shows that the forecast and are reasonable as compared to the past and the predicted values overlap the actual values to a greater extent which indicate the analytical shows validity of the model. This may enable the concerned authorities to determine the future requirements of wheat by taking appropriate measures. Pakistan is basically an agricultural country but is importing wheat since a long time, this forecast may minimize the problems arising out of the sudden jumps in production.

The size of marketable surplus (surplus wheat sold in the market) is determined soon after harvest which is usually lower than the actual requirements. There are numerous reasons responsible for it like farmers own domestic consumption, payment of rent in kind, low quality of land,

dependency of rain, distance from the farm to markets, etc. It is noted in this regard, that wherever surplus is sold, its major portion comes to the government storages, from where it is supplied to the flour mills and converted into flour and is made available to the final consumers

It is the farmer, who plays a vital role in enhancing the production of wheat and other cereals. If his fortune and welfare is improved, this may ^{bring} impart improvement in the agricultural output and achieve self-sufficiency in wheat and food grain. For accomplishing this, three agrarian reforms have so far been enforced. The land reform of 1959 has remained merely a theoretical exercise with the recommendations of the relevant committee not implemented, so far, the production of wheat has worsened for the subsequent coming years. The production of wheat declined from 4.036 million tones in 1948-47 to 2.405 million tones in 1952-53. The second dose of reforms introduced in 1959 attempted to purge the evils of land concentration in few hands. The tenant cultivators enjoying the rights of ownership interest took and all possible measures to improve the fertility of the soil which increased agricultural production in general and wheat output in particular. The statistical data indicate^d a positive improvement in wheat production after land reform of 1959, increasing output from 3.909 million tonnes in 1959-60 to 4.591 million tones in 1964-65. The land reform of 1972, has increased wheat production from 6.89 million tonnes in 1971-72 to 9.14 million tonnes in 76-77 and to 10.58 million tonnes in 1979-80.

7.2 POLICY MEASURES FOR BALANCING THE SITUATION

It is on record that Pakistan, attained self- sufficiency in wheat production seven times i.e. in 1947-50 1969-70, 1979-80, 1982-83, 1983-84, 1986-87

and 1987-88) in 51 years period. In rest of the years, it has been running in deficit of varying magnitudes. The main causes for these lapses in production are less land availability, less rainfall, old farming techniques, improved seeds, fertilizers, and agronomic practices, lack of crop-management techniques, traditional wheat varieties in Barani areas, improper support price policy, anti-social activities like smuggling, hoarding, and black marketing, etc. Moreover, explosive increase in population has reinforced the wheat shortages. However, what extraordinary is not the population growth rate but the severity with which wheat fluctuation have occurred and made themselves felt. Pakistan has been identified as a wheat deficit region, though agriculture is the backbone of the economy and a major activity of the people. It should have not happened like this, rather, Pakistan should have been a wheat exporting country.

To improve upon the efficiency of wheat production, in Pakistan the following policy options are offered for consideration;

1. **Irrigation:** Water availability is the most important factor in increasing wheat productivity. In this regard the government has under taken improving steps as a result of which irrigation water has increased 133.28 MAF during 1997-98. What is further needed is the construction of small and medium size dams so that more and more water is foiled and made available for crops and dependency on nature (rain) is minimized. The present government has also initiated a scheme of Green tubwells.
2. **Fertilizers:** Fertilizer can effectively improve upon yield per acre, if right doses, at right time are used. To popularize the use of fertilizers the government has offered subsidy for a longer period which has

been stopped since a few years. Data reveals that farmers are using enough fertilizers but the problem again is its shortages, which, the government should solve through more production of fertilizers.

3. **Quality Seeds:** Seed procurement and distribution is done by 4 public sector seed organization and 159 seed companies in private sector. The seed testing laboratories has discovered and distributed new varieties of wheat (which give more production and are resistant to diseases). The problem here is that they carry high prices and are not available in the required quantity.
4. **Mechanization:** The process of mechanization has improved in Pakistan, which has boosted the income levels of the farmers and has generated off-farm employment. The government has started with green tractors and tubwell schemes, at subsidized rates which may further improve upon the process of mechanization. The crucial problem here is that the farmer of Pakistan is the poorest person, therefore, what is needed in this context is to improve his purchasing power (per capita income) so that he should have an effective access to the modern implements.
5. **Price Support Policy:** Agricultural Price Commission has made important recommendations for support prices and has suggested measures for improving upon the marketing efficiency so that the wheat commodity becomes more competitive in the international market and less costly for domestic consumers. The price of wheat is mostly kept lower than the world wheat price. As each year a significant portion of wheat is imported at higher world prices and is sold at lower local prices, so it put, an extra constraint on the foreign exchequer and government treasury. Moreover, because of higher

prices of wheat into the neighboring countries like Afghanistan, Iran and India wheat is smuggled out which deepens the shortage problem. This needs proper price policy on part of government and the concerned agencies.

6. **Agricultural credit:-** As the propensity to save of the majority of the formers is low so they essentially need credit for purchase of inputs like seed, fertilizer, pesticides, machinery, natural calamities, etc. Recently the government has decided to issue pass book to all the farmers in order to facilitate obtaining agricultural credit. The government has started with the process of *one window Operation* in agricultural credit also. Agricultural loan worth of Rs.23328 million have been disbursed during 1997-98, which have very healthy effects on wheat production. The government should also make it sure that the loans sanctioned should reach the small farmers and not the landlords at proper time, when needed.
7. **Self-sufficiency in wheat:** Pakistan at the time of independence was basically a wheat surplus area and food deficits were unheard in Pakistan until 1952, despite the small wheat output and growing population. In the period after the 1955, Pakistan faced persistent wheat shortages, surmounting imports and mounting financial restraints. It is this growing acuteness that self sufficiency in wheat remained a goal of development planning after 1960. Pakistan's position got considerably weakened between 1954-55 and 1964-65. However, the bumper wheat harvest of 1967-68, led to a drastic reduction in wheat imports in 1968-69, which promoted official optimism for Pakistan's entry into wheat export. The self-sufficiency status achieved in 1968-69 has been short living as dependence on

imports began to grow again in 1974-75. Wheat imports reached a record figure of 2.24 million tonnes in 1978-79. In the subsequent year (1979-80), Pakistan wheat production exceeded wheat consumption and thereby resulted into wheat exports and accumulation of wheat stocks.

It is not possible to identify all the factors that helped Pakistan to accomplish self-sufficiency in wheat during 1949-50. The self-sufficiency in 1968-69, is achieved by the sharp increase in wheat output which is caused exclusively by the emphasis of government policy on wheat. By contrast, the year 1979-80, has been characterized by a modest output increase and stagnation in wheat consumption. Again sever shortages have been felt in 1992-93 and 1996-97. The shortages are due to an increase in consumption, persistent draught, less availability of improved seeds and lack of irrigation water. Weather is equally recognized as a major deterrent of wheat output.

8. *Long term purchase agreement:* To do away with such situations in future, the central government should enter into long term agreements with wheat exporting countries. As pre-planned purchases, the prices of wheat may be lower and reasonable as compared to emergency purchases.
9. *Wheat future prediction:* The ARIMA Model used in this study has accurately (with 95 percent C.I.) determined wheat future predictions for 13 years (up to 2010). The government each year should maintain at least the level predicted for the said year. Thus, the government may have enough stock to coop with any emergency situations and may be on the safe side.
10. *Subsidy on wheat:* The role of the government in wheat prices and subsidies is seriously questioned by economists and world financial organizations. The role of government in the wheat prices has already

been fairly discussed. Both, the Federal and the Provincial governments subsidize their sale. The inadequate gap between release and procurement prices has resulted in a subsidy. The burden of importing wheat and releasing it at subsidized price rests entirely on the government's budget. The largest subsidy on wheat has been paid in 1996-97, with Rs. 11,526 million. The subsidy prices are lower in Pakistan as compared to neighboring countries. This leads considerably towards wheat smuggling to other countries where prices are comparatively high. The government is not yet fully committed for waving off the wheat subsidies. The government should eliminate wheat subsidy gradually.

11. **Gradual eliminating of government involvement:** After the subsidy is removed, the government may then consider ^{the volume of} its massive involvement in wheat marketing. Here the government should bring procurement price at par with the world price of wheat, in the long run period. It would then be possible to eliminate the government role in wheat storage. The government should target food-for-work or other programmes to specific group. This might be done through the zakat system.
12. **Anti-social activities:** Anti-social activities like smuggling, hoarding and Black marketing have ^{aggravated} augmented the scarcity of wheat and have ^{aggravated} ~~aggravated~~ the problem further. Smuggling of wheat on a large scale across the border into Afghanistan, Iran and India has been a well known phenomena. For this purpose legislation, laws and rules should be promulgated, and people involved in these activities should be punished.
13. **Wheat storage:** A smooth flow of wheat supply over time is necessary. It is also a precondition for a long-range programme of economic and social development. Maintenance of adequate wheat bolsters public confidence at times of crop failures and help to avoid

high prices. The government bears the main responsibility for wheat storage.

Data indicate a consistent programme of government policy to build up buffer stocks of wheat to meet shortages due to bad harvests. In 1996-97, the wheat storage requirement of the government reached to 6.4 million tonnes with covered godowns ^{with} having a capacity of 4.7 million tonnes only. Thus to meet ^{effectively} the requirement, the government hired storages capacity of the private sector. There is, therefore, enough room for the construction of additional storage capacity to do away with the wheat losses drastically.

14. Crop Insurance

The basic theme of crop insurance is that there is provision for any crop (or particular crops) to be insured. If the crop grows well and there are no problems, the crop is harvested and the insurance amount paid. On the other hand, if there are problems like natural calamities, etc, the sum insured is paid to the farmer and his loss is minimized.

Crop insurance which is extensively used ~~frequently~~ in developed countries and getting popularity in Less developed countries also. In Pakistan, the government has recently advised the major insurance companies to make an arrangement for crop insurance especially wheat. The idea so far does not have ^{got} momentum but once started under government supervision will give fruitful results.

7.3 FINDINGS AND CONCLUSION

The core essence of the findings of this study is that the irrigation-induced technological change (ITC) would accelerate the growth of wheat production, resulting of a gain in economic efficiency and self-sufficiency,

attempting further to create employment and raise income of the poor, thereby alleviating poverty. The production of wheat would be self-sustained because it would be supported by effective demand.

In Pakistan the growth performance of wheat is a primary determinant of the levels of nutrition and real income of the poor, leading towards the growth of the agricultural sector and the development of the economy. As a whole self-sufficiency in food grain production is the ultimate national goal. Pakistan enjoys a comparative advantage in wheat production; therefore, the self-sufficiency goal is not only theoretically but practically feasible and valid.

The country has a large potential for accelerating growth in wheat production. In this context, Irrigated HYV wheat would play the pioneering role in future growth.

However, the growth potential of wheat is, largely contingent upon irrigation. Expansion of irrigated area is the key to increased wheat production. Unless irrigated area expands rapidly, the gap between wheat production and its requirement may be widened. In the recent past, the growth in irrigated area has been low and insufficient for the required growth in food grain production for self-sufficiency. Without rapid expansion of irrigation, the adoption and productivity of HYV technology would be low.

The increase in per capita income leads to a rightward shift in the effective demand for wheat. Contrary to the conjecture of equity-efficiency conflict, this study demonstrates that an equitable distribution of income is complementary to efficiency. Landless laborers and marginal farmers are the

poorest in Pakistan. If a policy that increases their per capita income, then the inequality in income distribution in rural areas would decrease. This equitable policy would have a significant positive impact on wheat production, which would promote economic efficiency and would alleviate poverty substantially.

Wheat production with irrigation-induced HYV technology has a substantially higher impact on employment generation than production with HYV technology alone. The employment elasticity of production indicates that irrigated HYV wheat production would generate almost twice as much employment as switching from local to HYV of wheat.

On the basis of the findings of the analysis, this study recommends an irrigation-induced-technological changes as the core wheat production strategy for Pakistan. A successful implementation of this strategy would necessitate a large increase in investment and great efforts on part of the government, donor agencies, and the private sector altogether.

One of the major constraints to farmer's adoption of the ITC is their limited access to institutional credit. Credit is a significant determinant for adoption of the new technology in agriculture. Evidences from several sources show extreme inequality in the distribution of institutional credit in rural areas. Farmers who own relatively large amounts of land and physical assets have better access to credit than small crucial. The availability and the cost of credit are important factors affecting the use of irrigation, fertilizer, and other modern inputs. Various efficient and effective institutions should be developed to provide credit to the small farmers who confront serious

financial constraints, but do not have access to the formal institutional credit.

It is, however, impractical to depend exclusively on the private sector for the massive investment required to achieve the suggested rate of growth in irrigation expansion. In the recent past, the growth in irrigation has mainly contributed to the rapid growth and the use of shallow tubewells in the private sector. However, shallow tubewells are not technically suitable in many areas; therefore, the government has to assume the leading role in investing and providing deep tubewell irrigation in those areas.

A substantial increase in government investment is also going to strengthen the national agriculture research and extension system. A strong research system can increase the crop productivity enormously. Moreover, extending the existing technological know-how to more farmers is more effective way to increase average yield of wheat production.

Increased effectiveness in repair and maintenance is of crucial vitality for the mechanized irrigation methods. Equipment breakdown and wearing and tearing during the critical crop growing period can be disastrous unless service and spare parts are timely available. The government should assist the private sector in developing a service capability for maintaining and repairing irrigation equipments to ensure that the system operates at optimum capacity level.

The ability of the farmers to obtain inputs such as seed, fertilizer, pesticides, fuel oil for irrigation equipment, spare parts, etc. is contingent upon adequate infrastructure, particularly roads and bridges. Improved infrastructures including physical market facilities are also important to

market the product. Poor infrastructure in Pakistan is one of the major hurdles for slowing the rate of technology adoption in agriculture. An adequate and improved infrastructure reinforces the effectiveness of the process of technology diffusion. Thus, greater investment in development of infrastructure is indispensable for a rapid expansion of irrigation and diffusion of HYV technology.

An increase in the per capita income of the landless laborers and marginal farmers leads to a substantial increase in wheat production and economic efficiency. The program for the landless irrigation groups would improve upon the equity of rural income and undermine the negative influence of water utilization.

The implementation of the landless irrigation program would require strong institutional support and stimuli in the initial stage in order to organize the landless irrigation groups. Private voluntary agencies can play a far reaching role in this respect.

The landless group irrigation program provides a rare opportunity cost to address effectively the most severe economic and social problems in Pakistan. Therefore, the government should seriously consider a nation wide implementation of this programme.

Labour-saving farm mechanization is strategically not a decisive policy option in the situation of a rapid growth in labor force in a labor-surplus economy like Pakistan. However, anticipating an inadequate supply of draft animals, future accelerated growth in wheat production with the ITC may require the use of simple machinery for cultivation. If such a situation

occurs, the farmer's adoption of power tillers and simple machinery may be demand-driven. The government policy to be limited to facilitating the importation or domestic manufacturing of simple machinery.

Historically, the relatively well off section of urban population has been the principal beneficiaries of subsidized food grain distributed through the public Food grain distribution system. The benefits of subsidized food largely bypass the rural population and the urban poor, whose needs for subsidized food are greater. Improved food grain distribution through better targeting to achieve poverty alleviation objectives are receiving increasing attention of the government and the donor agencies.

The efforts in this study indicate that the answer to Pakistan wheat problem consists basically in a more equitable course of development. It is expected that the analysis would contribute to the understanding of the potential complementary interaction between economic efficiency and self-sufficiency of wheat, enabling Pakistan one day to emerge as a wheat export country in the region, Inshallah.

APPENDIX TABLE - I
LAND UTILIZATION

Year	Total Area	Rep. Area	Forest Area	Not available for cult.	Cultivable Waste	Current Fallow	Net Area sown	Total Area Cult.	Area sown more than once	Total cropped area
1959-60	79.61	48.46	1.34	20.59	10.02	3.44	13.97	16.51	1.60	14.67
1960-61	79.61	50.99	1.68	18.73	12.46	4.85	13.27	18.12	1.59	14.86
1961-62	79.61	50.92	1.66	18.57	12.79	4.26	13.64	17.90	1.61	15.25
1962-63	79.61	50.83	1.67	18.43	12.70	4.25	13.78	18.03	1.69	15.47
1963-64	79.61	51.38	1.80	18.38	12.87	4.92	13.41	18.33	1.92	15.13
1964-65	79.61	52.83	1.97	18.78	13.36	4.56	14.16	18.72	2.09	16.25
1965-66	79.61	53.04	2.08	18.70	13.02	5.31	13.93	19.24	1.61	15.54
1966-67	79.61	52.93	2.08	18.54	13.05	5.03	14.23	19.26	2.18	16.41
1967-68	79.61	53.16	2.28	18.87	12.58	4.55	14.88	19.43	2.06	16.94
1968-69	79.61	52.95	1.88	20.53	11.25	5.04	14.25	19.29	1.99	16.24
1969-70	79.61	52.93	1.84	20.40	11.46	4.70	14.54	19.23	2.24	16.78
1970-71	79.61	53.55	2.83	20.40	11.11	4.77	14.44	19.21	2.18	16.62
1971-72	79.61	53.49	7.72	20.43	11.25	4.75	14.34	19.09	2.26	16.60
1972-73	79.61	53.75	2.81	20.73	11.09	5.05	15.07	19.12	2.86	16.93
1973-74	79.61	53.91	2.85	20.53	11.15	4.19	15.19	19.38	3.19	18.28
1974-75	79.61	53.92	2.80	20.32	11.25	4.78	14.77	19.55	2.60	17.37
1975-76	79.61	53.92	2.84	20.63	10.63	4.77	15.00	19.82	2.96	18.02
1976-77	79.61	54.97	2.86	21.47	10.88	4.69	15.07	19.76	3.14	18.21
1977-78	79.61	54.96	2.89	20.92	11.05	4.88	15.22	20.10	3.89	19.11
1978-79	79.61	53.59	2.77	19.77	11.07	4.57	15.41	19.98	3.89	19.30
1979-80	79.61	53.71	2.76	18.84	11.88	4.62	15.61	20.23	3.61	19.22
1980-81	79.61	53.92	2.85	19.90	10.86	4.89	15.41	20.30	3.92	19.33
1981-82	79.61	57.91	2.81	21.96	12.72	4.89	15.53	20.42	4.25	19.78
1982-83	79.61	57.76	2.07	22.79	10.73	4.62	15.69	20.31	4.37	20.06
1983-84	79.61	58.14	2.09	22.94	11.78	4.67	15.66	20.33	4.33	19.99
1984-85	79.61	58.13	3.16	23.26	11.10	5.00	15.61	20.61	4.31	19.92
1985-86	79.61	57.78	3.12	24.52	9.47	4.90	15.77	20.67	4.51	20.28
1986-87	79.61	57.78	2.92	23.61	10.33	4.86	16.00	20.92	4.54	20.90
1987-88	79.61	57.78	3.46	24.40	9.26	5.94	14.72	20.66	4.84	19.52
1988-89	79.61	57.90	3.43	24.06	9.39	4.93	16.09	21.02	5.73	21.82
1989-90	79.61	57.97	3.38	24.84	8.81	5.12	15.82	20.94	5.64	21.46
1990-91	79.61	57.61	3.46	24.34	8.85	4.85	16.11	20.96	5.71	21.82
1991-92	79.61	57.87	3.47	24.48	8.86	4.87	16.16	21.06	5.53	21.72
1992-93	79.61	58.06	3.48	24.35	8.83	4.95	16.45	21.40	5.99	22.44
1993-94	79.61	58.13	3.45	24.43	8.74	5.29	16.22	21.51	5.65	21.87
1994-95	79.61	58.50	3.60	24.44	8.91	5.42	16.13	21.55	6.01	22.14
1995-96	79.61	58.51	3.61	24.35	8.87	5.19	16.49	21.68	6.10	22.59
1996-97	79.61	58.51	3.62	24.39	8.91	4.85	16.74	21.59	6.19	22.93
1997-98	79.61	58.51	3.62	24.39	8.91	4.85	16.74	21.59	6.19	22.93

Source: Ministry of Food, Agriculture & Livestocks (1997-98, P. 49)

APPENDIX TABLE - 2

AREA, PRODUCTION AND YIELD OF WHEAT

Year	Wheat	(000 tonnes)	Kg hectare
1959-60	4.878	3.909	4.878
1960-61	4.639	3.814	4.639
1961-62	4.923	4.027	4.923
1962-63	5.022	4.170	5.022
1963-64	5.019	4.162	5.019
1964-65	5.317	4.591	5.317
1965-66	5.155	3.916	5.155
1966-67	5.344	4.335	5.344
1967-68	5.983	6.418	5.983
1968-69	6.160	6.618	6.160
1969-70	6.229	7.294	6.229
1970-71	5.977	6.476	5.977
1971-72	5.797	6.890	5.797
1972-73	5.971	7.442	5.971
1973-74	6.113	7.629	6.413
1974-75	5.812	7.673	5.812
1975-76	6.111	8.691	6.111
1976-77	6.390	9.144	6.390
1977-78	6.360	8.367	6.360
1978-79	6.687	9.950	9.687
1979-80	6.924	10.857	6.924
1980-81	6.984	11.475	6.984
1981-82	7.223	11.304	7.223
1982-83	7.398	12.414	7.398
1983-84	7.343	10.882	7.343
1984-85	7.259	11.703	7.259
1985-86	7.403	13.923	7.403
1986-87	7.706	12.016	7.706
1987-88	7.308	12.675	7.308
1988-89	7.730	14.419	7.730
1989-90	7.845	14.316	7.845
1990-91	7.911	14.565	7.911
1991-92	7.878	15.684	7.878
1992-93	8.300	16.157	8.300
1993-94	8.034	15.213	8.034
1994-95	8.170	17.002	8.170
1995-96	8.376	16.907	8.376
1996-97	8.109	16.651	8.109
1997-98	8.378	18.634	8.378

Source: Economic Survey of Pakistan (1997-98, P. 50 to 51).

APPENDIX TABLE - 3
CREDIT DISBURSED BY AGENCIES

(Rs. Million)

Year	ADBP	Taccavi	Cooperatives	Commercials Banks	Total
1955-56	1.00	6.40	25.44		32.84
1956-57	1.70	7.10	27.75		36.55
1957-58	3.60	12.80	29.21		45.61
1958-59	5.70	17.20	32.55		55.15
1959-60	24.80	17.90	44.88		87.58
1960-61	30.90	14.80	58.08		103.78
1961-62	42.70	12.20	92.91		147.81
1962-63	40.70	9.80	82.83		133.33
1963-64	46.70	12.00	70.34		129.04
1964-65	40.50	30.50	56.54		127.54
1965-66	68.00	12.70	51.72		132.42
1966-67	100.50	11.20	83.45		195.15
1967-68	106.20	13.00	59.46		178.66
1968-69	82.10	12.20	47.38		141.68
1969-70	91.30	10.60	53.45		155.35
1970-71	92.70	10.20	55.48		158.38
1971-72	80.00	8.92	39.08		128.80
1972-73	168.80	10.23	42.02	85.70	306.75
1973-74	415.18	67.50	144.22	286.40	913.30
1974-75	395.50	12.13	81.54	520.90	1,010.07
1975-76	532.19	25.67	91.83	808.10	1,457.79
1976-77	636.77	13.14	45.74	959.40	1,657.05
1977-78	430.53	8.80	206.24	1,277.50	1,923.07
1978-79	416.94	12.65	263.71	1,381.10	2,074.40
1979-80	711.55	9.20	601.23	1,537.20	2,859.18
1980-81	1,066.62	8.59	1,128.25	1,816.13	4,019.59
1981-82	1,557.38	8.48	1,100.80	2,436.10	5,102.76
1982-83	2,310.43	11.42	1,414.93	2,338.36	6,075.14
1983-84	3,131.68	7.60	1,449.89	3,770.76	8,359.93
1984-85	4,167.91	6.28	1,567.60	4,544.42	10,286.21
1985-86	5,307.86	4.62	2,048.58	5,324.59	12,685.65
1986-87	6,031.15	13.30	2,494.75	7,313.10	15,852.30
1987-88	7,716.08	9.14	3,020.28	5,174.52	15,920.02
1988-89	8,667.52	24.93	2,730.71	3,054.10	14,477.26
1989-90	9,389.86	55.58	815.07	3,629.53	13,890.04
1990-91	8,323.95	56.30	3,017.45	3,517.59	14,915.29
1991-92	6,996.44	56.30	3,247.01	4,179.56	14,479.31
1992-93	6,643.40	50.80	2,978.00	4,063.30	16,198.11
1993-94	8,989.26	--	2,621.49	4,063.30	15,674.05
1994-95	14,575.74	--	3,756.74	4,040.79	22,373.27
1995-96	10,339.27	--	3,803.38	5,044.66	19,187.31
1996-97	11,687.11	--	3,431.13	4,429.43	19,547.67
1997-98	15,528.45	--	4,181.53	3,617.63	23,327.61

Source: State Bank of Pakistan, Ministry of Food Agricultural and Cooperative.
(1997-98, P. 58)

APPENDIX TABLE - 4

FERTILIZER OFF TAKE AND IMPORTS OF PESTICIDES

Year	Fertiliser off take (000 N Tonnes)				Import of fertiliser (000 N/T)	Import of Pesticides	
	N	P	K	Total		Quantity (Tonnes)	Value (Mln Rs)
1954-55	14.10			14.10	-	164.6	0.35
1955-56	6.60			6.60	-	157.5	0.38
1956-57	9.00			9.00	-	723.4	2.79
1957-58	16.40			16.40	-	727.4	2.93
1958-59	18.00			18.00	-	436.7	2.30
1959-60	19.30	0.10		19.40	-	1,349.02	7.17
1960-61	31.00	0.40		31.40	-	4,979.4	19.52
1961-62	37.00	0.50		37.50	-	1,980.3	8.39
1962-63	40.00	0.20		40.20	-	4,594.3	22.09
1963-64	68.00	0.70		68.70	-	1,670.3	6.64
1964-65	85.00	2.20		87.20	-	826.0	7.08
1965-66	69.24	1.25		70.49	-	882.9	11.26
1966-67	107.78	3.91	0.14	111.83	-	2,443.5	1.65
1967-68	177.44	12.78	0.21	190.43	-	5,153.1	18.44
1968-69	203.52	38.64	2.48	244.64	-	1,465.1	3.87
1969-70	272.56	33.80	1.34	307.70	-	1,998.0	10.49
1970-71	251.50	30.50	1.20	283.20	-	2,248.0	41.77
1971-72	341.20	37.30	0.70	379.20	-	2,438.0	39.65
1972-73	346.20	48.70	1.30	436.20	-	18,484.0	78.72
1973-74	341.90	57.80	3.20	402.90	335.5	6,473.6	171.36
1974-75	362.90	60.50	2.10	425.50	133.3	6,927.6	257.68
1975-76	445.30	102.50	2.80	550.60	182.7	13,758.3	310.42
1976-77	511.10	118.20	2.50	631.80	279.6	16,225.7	460.64
1977-78	550.90	156.80	5.90	713.60	548.7	12,754.4	254.46
1978-79	684.27	188.00	7.60	879.80	707.7	7,727.3	188.81
1979-80	806.20	228.50	9.60	1,044.30	776.0	4,419.1	167.66
1980-81	843.00	226.80	9.60	1,079.50	574.4	7,405.0	224.74
1981-82	832.60	225.60	21.80	1,080.00	202.0	5,481.00	230.62
1982-83	952.69	265.30	25.60	1,243.60	400.1	8,860.3	396.71
1983-84	914.32	259.81	28.50	1,202.63	286.8	10,662.5	685.84
1984-85	934.80	293.79	24.67	1,253.26	341.9	15,889.2	1,196.62
1985-86	1,128.39	350.07	33.33	1,511.79	331.0	17,498.9	1,416.81
1986-87	1,332.35	408.87	42.62	1,783.84	522.4	20,647.8	1,878.39
1987-88	1,282.08	392.89	45.03	1,720.00	521.6	15,765.4	1,769.27
1988-89	1,324.90	390.41	24.53	1,739.84	461.6	11,326.5	1,382.90
1989-90	1,467.60	382.43	40.07	1,890.10	637.9	10,543.5	1,249.27
1990-91	1,471.63	388.50	32.75	1,892.88	685.0	13,030.1	1,489.43
1991-92	1,462.60	398.02	23.30	1,883.92	632.0	15,258.3	1,945.98
1992-93	1,635.34	488.20	24.07	2,147.61	759.1	14,434.8	1,730.60
1993-94	1,659.36	464.24	23.17	2,146.77	903.0	12,100.4	1,706.30
1994-95	1,738.12	428.40	16.54	2,183.06	261.0	21,776.1	2,978.10
1995-96	1,983.55	494.46	29.70	2,507.70	581.0	3,047.9	5,080.70
1996-97	1,985.10	419.51	4.47	2,409.08	269.1	30,855.9	5,272.49
1997-98	1,602.80	414.86	15.10	2,032.27	446.4	18,195.2	3,010.10

Source: Economic Survey of Pakistan (1997-98, P. 59).

APPENDIX TABLE -5
FERTILIZER CONSUMPTION IN RELATION TO
CULTIVATED AREA IN SELECTED COUNTRIES

(Kgs. Per Hect.)

Year	Nether lands	Germany	Japan	France	Egypt	Italy	USA	USSR	Pakistan	India
1970-71	749	400	384	241	122	90	87	40	15	13
1971-72	740	408	390	260	-	117	82	45	20	16
1972-73	720	400	390	285	147	125	86	78	23	17
1973-74	759	393	407	312	44	115	86	54	21	17
1974-75	757	402	375	245	55	103	76	58	22	16
1975-76	751	386	319	247	69	121	90	69	28	17
1976-77	758	423	431	269	210	105	107	73	32	20
1977-78	737	422	428	278	188	141	100	53	36	25
1978-79	743	429	450	297	205	180	106	79	44	27
1979-80	805	479	478	312	212	189	111	75	51	30
1980-81	789	471	372	301	232	170	112	81	53	31
1981-82	767	418	387	298	248	163	102	83	53	89
1982-83	738	435	412	299	335	161	87	87	61	35
1983-84	789	431	437	312	361	169	105	99	59	39
1984-85	841	445	452	326	387	178	126	-	63	-
1985-86	770	428	427	309	319	169	92	114	86	57
1986-87	688	421	433	299	351	190	93	182	83	54
1987-88	702	433	491	328	388	254	95	120	83	53
1988-89	685	468	468	335	448	231	94	119	48	67
1989-90	663	467	467	341	452	201	100	109	91	70
1990-91	610	394	451	316	401	200	96	111	92	72
1991-92	599	-	431	309	405	220	71	85	91	77
1992-93	599	239	395	253	339	156	101	42	101	72
1993-94	560	221	407	227	-	148	108	-	97	73
1994-95	554	240	400	242	304	159	103	12	103	83

Source: Economic Survey of Pakistan (1997-98, P. 61).

APPENDIX TABLE 6
AREA IRRIGATED BY DIFFERENT SOURCES

(Million hectares)

Year	Canals	Tanks	Wells	Canal Wells	Tubewells	Canal Tubewells	Others	Total
1950-51	7.53	0.06	1.08	-	-	-	0.58	9.25
1951-52	7.5	0.06	0.99	-	-	-	0.53	9.09
1952-53	7.51	0.06	1.83	-	-	-	0.52	9.13
1953-54	8.00	0.05	0.99	-	0.02	-	0.59	9.65
1954-55	8.28	0.06	0.95	-	0.04	-	0.66	9.99
1955-56	8.47	0.06	0.88	-	0.05	-	0.63	10.09
1956-57	8.61	0.06	0.86	-	0.06	-	0.71	10.30
1957-58	8.71	0.06	0.79	-	0.07	-	0.64	10.27
1958-59	8.67	0.06	0.78	-	0.12	-	0.62	10.25
1959-60	8.73	0.03	0.76	-	0.16	-	0.67	10.35
1960-61	8.59	0.01	0.86	-	0.25	-	0.70	10.41
1961-62	9.64	0.01	0.93	-	0.26	-	0.51	11.35
1962-63	9.09	0.01	0.89	-	0.44	-	0.58	11.01
1963-64	8.85	0.01	1.00	-	0.45	-	0.73	11.04
1964-65	9.00	0.01	1.02	-	0.54	-	0.87	11.44
1965-66	8.70	0.01	0.96	-	0.80	-	1.01	11.48
1966-67	8.81	0.01	1.01	-	0.76	-	1.50	12.09
1967-68	8.95	0.01	0.85	-	1.29	-	1.52	12.62
1968-69	8.87	0.01	0.93	-	1.15	-	1.60	12.56
1969-70	9.26	0.01	0.84	-	1.11	-	1.27	12.49
1970-71	6.69	0.01	1.29	-	2.25	-	0.35	10.59
1971-72	9.57	0.01	0.67	-	2.10	-	0.64	12.99
1972-73	9.80	0.01	0.51	-	2.21	-	0.53	13.06
1973-74	10.06	0.01	0.52	-	2.41	-	0.65	13.64
1974-75	10.09	0.01	0.44	-	2.38	-	0.43	13.34
1975-76	10.19	0.01	0.43	-	2.39	-	0.62	13.63
1976-77	10.10	0.01	0.45	-	2.69	-	0.59	13.83
1977-78	10.43	0.01	0.35	-	2.79	-	0.65	14.22
1978-79	10.01	0.01	0.26	-	3.49	-	0.71	13.47
1979-80	10.74	0.05	0.34	-	2.74	-	0.87	14.74
1980-81	11.46	0.07	0.32	-	2.81	-	0.61	14.90
1981-82	11.44	0.06	0.30	-	2.99	-	0.60	15.39
1982-83	8.09	-	0.18	-	1.98	4.53	0.63	15.48
1983-84	7.95	-	0.18	0.07	1.95	4.58	0.72	15.46
1984-85	7.78	-	0.19	0.08	1.97	4.68	0.58	15.28
1985-86	7.84	-	0.19	0.08	2.05	4.95	0.68	15.79
1986-87	7.96	-	0.18	0.08	2.20	5.16	0.74	16.31
1987-88	7.73	-	0.16	0.07	2.30	5.23	0.19	15.68
1988-89	7.96	-	0.16	0.08	2.46	5.53	0.55	16.64
1989-90	7.73	-	0.16	0.08	2.57	5.72	0.62	16.89
1990-91	7.89	-	0.13	0.08	2.56	5.87	0.22	16.75
1991-92	7.85	-	0.16	0.11	2.59	5.93	0.21	16.85
1992-93	7.91	-	0.18	0.10	2.67	6.23	0.24	17.33
1993-94	7.73	-	0.14	0.09	2.78	6.27	0.17	17.13
1994-95	7.51	-	0.17	0.10	2.83	6.41	0.18	17.20
1995-96	7.60	-	0.18	0.11	2.89	6.58	0.22	17.58
1996-97	7.81	-	0.18	0.11	2.88	6.61	0.26	17.85

Source: Ministry of Food Agriculture and Livestock (1997-98, P. 62)

APPENDIX TABLE 7
IMPORT OF WHEAT
(MAY-APRIL)

(000 tonnes)

Year	Quantity
1970-71	218.5
1971-72	705.1
1972-73	1364.6
1973-74	1052.6
1974-75	1616.5
1975-76	1043.5
1976-77	346.0
1977-78	1052.0
1978-79	1957.7
1979-80	554.2
1980-81	20.0
1981-82	136.0
1982-83	-
1983-84	-
1984-85	544.6
1985-86	1562.0
1986-87	-
1987-88	-
1988-89	1802.0
1989-90	1603.0
1990-91	627.3
1991-92	1640.4
1992-93	2356.6
1993-94	1408.0
1994-95	2273.0
1995-96	1931.0
1996-97	1383.0

Source:- Agriculture Statistics of Pakistan (1996-97, P. 218)

INTERVIEW SCHEDULE FOR WHEAT PRODUCTION

1. Basic Information

- i) Investigator's Name
- ii) Farmer's Name
- iii) Village Name
- iv) Village Number
- v) Tehsil/District

2. Farm Area

Owned		Self-cultivated	
Rented in		Barani	
Rented out		Irrigated	

3. Labour Farm Labour Permanent Labour Causal Labour

4. Area, Output, Cost and Price

	Area 1997-98	Cost per Acre	Output (Mnds) 1997-98	Price (Rs Mnds) 1997-98
i. Wheat				
ii. Rice				
iii. Maiz				

5. Wheat Inputs

	Amount Per Acre	Price per unit
i. Seeds		
ii. Fertilizer		
iii. Pesticides		
iv. Ploughing		
- Bullock		
- Tractor		
v. Irrigation		
- Canal		
- Tubewell		

- 6. What in your opinion, could be the major impediment of wheat shortages in Pakistan.
- 7. What remedial measures do you suggest to combat them?

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