

THE STATE OF THE ECONOMY

Agriculture and Water



**The Shahid Javed Burki
Institute of Public Policy at NetSol**

9th Annual Report
2016

**BIPP's 9th Annual Report
2016**

**The State of the Economy
Agriculture and Water**

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Foreword

As we have done in the past eight years, the ninth report also comes in two parts. In the first, we review the state of the Pakistani economy; in the second, we take a careful look at the contribution the agriculture sector can make in reviving the economy and putting it on a high growth trajectory. We are of the view that the Pakistani economy may be turning the corner and approaching a sustainable rate of growth that has been attained by high-performing economies of the Asian continent. To get to that point, policymakers in the country need to focus on two things: They need to recognize the assets the country has that can speed up the pace of growth and social transformation. Also, they need to put in place policies that will help to deploy the resources the country has in considerable abundance. The agriculture sector is one such resource. Unfortunately, the policymaking regimes in Pakistan have not given the needed attention to this resource. The only exception was the administration headed by President Muhammad Ayub Khan, which governed the country for eleven years from 1958 to 1969. During his time, agriculture output increased at a rate not achieved before and after his stewardship of the economy.

As I discussed in a book published almost four decades ago, General Ayub Khan succeeded in reversing a number of trends the country had followed in the first decade after independence. As a consequence of the arrival of eight million Muslim refugees from independent India, who were absorbed in Pakistan then with a population of only 24 million people, there was a major shift in the political power structure in the new country. The refugees were better skilled and educated than the native population of what was then West Pakistan. They dominated policymaking and focused on developing the modern sectors of the economy. The development of manufacturing was given special attention, especially after 1949 when India imposed a trade ban on Pakistan. The new country needed to produce more of the manufactures it consumed. Pakistan's industrialization proceeded at a brisk pace, and within half a decade it was able to produce most items of consumption. However, the sector of agriculture was ignored.

The arrival of the military on the political stage corrected some of these biases. The army recruited most of its personnel from what was now West Pakistan and within West Pakistan from the rural areas. General Ayub Khan himself was from rural Pakistan. As opposed to the refugees, the military had a distinct rural bias in its thinking. This included its interest in developing the rural economy. As we will note in one of the chapters in this report, the 1960s was one period in Pakistan's history when agriculture performed well. It was during this period that the country launched the "green revolution." It was the adoption of new high-yielding wheat and rice varieties that took Pakistan from having become a net importer of food to becoming self-sufficient. The main conclusion of the 2016 report is that Pakistan once again stands at the cusp of change. Supportive public policies are needed to take the country in the new direction.



I will refer to another work by me to make one more important point. In an article published in, The Express Tribune on March 7, 2017, I argued that Pakistan is richer than what official statistics tell us. “Upward adjustment will result in one other somewhat subtle change in perception,” I wrote. “Economists correctly believe that confidence in the future is a good determinant of the amount of investment that is made in the economy. Just presenting a picture of the economy that is closer to reality would result in improving the confidence of both domestic and foreign investors. Rather than viewing it as a fragile and failing state, the community of investors will begin to see it as a rapidly urbanizing and modernizing economy”.

Policymakers need to pay attention to two areas of the economy. One of these – agriculture – is old; the other – information and communication technologies – is new. Both have the potential to move Pakistan forward faster than it has gone for decades. In discussing the potential of agriculture, we have stressed the importance of judicious and economic use of water in advancing the sector. Water is a critical input not only for agriculture but for all sectors of the economy and for society as a whole. While it is perceived to be available in abundance - may be because of that - we have not given it the attention it deserves. The report argues with considerable force and conviction that this policy has to change in favor of a more intelligent use of this precious resource.

A number of people have contributed to the preparation of this report. I would like to mention in particular the contribution of Farrukh Iqbal, who was my colleague at the World Bank for a number of years. He is now the director of the Karachi-based Institute of Business Administration. Farrukh, to use a World Bank phrase, was the report’s “task manager.” He not only wrote the chapter of the recent economic developments and unresolved structural challenges but made sure that other chapter authors developed in a consistent way the main theme of the document: the role agriculture can play in reviving the Pakistani economy. This is the main message of this annual report on the state of the Pakistani economy, the ninth in our series. We covered the sector of modern technologies in our 2015 report.

Shahid Javed Burki
March 8, 2017
Lahore

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CONTENTS

FOREWORD	v
THE TEAM	vii
ACRONYMS	xiii
EXECUTIVE SUMMARY	1
CHAPTER 1	
Recent Economic Developments and Unresolved Structural Challenges	14
Recent Economic Developments	15
Unresolved Structural Challenges	23
CHAPTER 2	
Path Dependence and the Making of Agricultural Public Policy	28
Irrigation	31
The Pattern of Cropping	33
Marketing of Agricultural Surpluses	33
Land Ownership and Land Records	34
Technology and Agricultural Productivity	35
Conclusion: The Role of the State	36
CHAPTER 3	
Historical Overview of Agricultural Development in Pakistan: Successes, Weaknesses and Growing Challenges	40
Introduction	41
Agricultural Growth and Policy in the 1950s	42
Strong Agricultural Growth During 1960-2000	44
Land Use and Cropping Intensity	44
Canal and Ground Water Developments	45
Food Sufficiency and the Support Prices	46
Productivity and Yields	47
Fertilizer Use	48
Terms of Trade	49
Growth in Livestock Subsector	49
Recent Trends	50
Recent Relief Measures for Agriculture	52
CHAPTER 4	
Key Areas of Concern for Agricultural Sector Policy	56
Selected Areas of Concern	57
Key Reform Areas	61

CHAPTER 5

Agriculture Related Water Management: Issues and Options	68
The Supply Side: Water Availability	69
Water Sector Overview	70
Irrigation Arrangements	72
Water Demand Management Issues	76
Agriculture, Water and Energy Nexus	79
Reform Efforts and Conclusions	81

CHAPTER 6

Stagnation in Agricultural Exports	84
Recent Developments	85
Declining Competitiveness	86
Export Policy	87
Export Performance of Key Commodities	88
Common Issues for Agricultural Exports	93
Promoting Agricultural Exports	94

CHAPTER 7

Moving Beyond Traditional Solutions: Innovative Model for Increasing Agriculture Productivity	98
Value Chain in Agriculture	100

Annexure - Priority Policy Action Matrix	67
Statistical Appendix - Key Indicators	113
References	131
Notes	132

Tables

Table 1.1 Selected Macroeconomic Indicators	16
Table 1.2 Selected Public Finance Indicators	18
Table 1.3 Selected External Accounts Indicators	19
Table 3.1 Production of Major Agricultural Crops	42
Table 3.2 Wheat Imports	42
Table 3.3 Agriculture Growth Rates	44
Table 3.4 Area Under Important Crops	45
Table 3.5 Irrigation Water Supply	46
Table 3.6 Yield Per Hectare of Major Agricultural Crops	48
Table 3.7 Trends in Annual Fertilizer Offtake	48
Table 3.8 Trends in Annual Production of Milk and Meat	50

Table 3.9 Agriculture Sub-Sector Growth	51
Table 3.10 Wheat Procurement/Support Prices	51
Table 4.1 Agriculture Commodities Vs Input Costs 2010-2015	62
Table 5.1 Comparative Indicators of Water Availability and Use	74
Table 5.2 Water Charges (Abiana Rates) in Rs/Acre	77
Table 6.1 Recent Export Profile	86
Table 6.2 Trade Competitiveness Matrix for Top Ten Agricultural Exports	87
Table 6.3 Export Policy for Agriculture Inputs and Outputs	88
Table 6.4 Market Share and Other Competitive Indicators for Selected Commodities in Pakistan	92
Table 6.5 Pakistan and World Trade in Medicinal Plants in 2008	93

Figures

Figure 4.1 Wheat Yields Compared, 2014	58
Figure 4.2 Cotton Lint Production	59
Figure 4.3 Fruits Production Compared	60
Figure 4.4 Vegetables Production Compared	60
Figure 4.5 Benchmarking Pakistan's Expenditure on Research	64
Figure 5.1 Land Use in Pakistan	70
Figure 5.2 Issues: Water Happened Over Time	71
Figure 5.3 Pakistan Water Budget - Indus Basin Irrigation System Annually	73
Figure 5.4 Indus Basin: The Good News	75
Figure 5.5 Indus Basin: The Bad News	75
Figure 5.6 Abiyana Assessment and recovery	78
Figure 5.7 Virtual Water Content of Selected Crops	80
Figure 6.1 Exports, Imports and Balance of Trade	85
Figure 6.2 Exports and Imports of Agricultural Products	86
Figure 6.3 Competitiveness of top ten agricultural exports	87
Figure 6.4 Rice Production and Export	89
Figure 6.5 Rice: Revealed Comparative Advantage	89
Figure 6.6 Cotton (Lint) Production and Export	90
Figure 6.7 Cotton Lint: Revealed Comparative Advantage	91
Figure 6.8 Export of Fruits and Vegetables	91
Figure 6.9 Exports Unit Value, \$/Kg	94
Figure 6.10 Share of High Value Farm Products in Agriculture Exports	96
Figure 7.1 Interconnected and Synergy Pre-Prod-Post Stages	100
Figure 7.2 Agricultural Value Chains and Value Drivers	101
Figure 7.3 A Conceptual Framework for a Value-Chain Based Agricultural Development Strategy	102
Figure 7.4 Innovative Solutions in Finance	103
Figure 7.5 Salient Elements of the Agri-Mall Concept	105

Figure 7.6 Schematic of Market Intelligence and Information System	106
Figure 7.7 Short and Long Term Aspects of MIIS	108
Figure 7.8 Key Targets of Capacity Development	109

Boxes

Box 3.1 Prime Minister’s Agriculture Relief Pakage	54
Box 4.1 BT Cotton Seed	63
Box 4.2 Promoting Commodity Exchanges	66
Box 5.1 Mini and Micro Hydropower Projects (MHPs) in KPK, a Success Story of Developing Water/Energy Nexus in a Cost Effective Way	80

Acronyms

ADB	African Development Bank
BT	Bacillus Thuringiensis
CPEC	China Pakistan Economic Corridor
DHA	Dehydrogenase
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GSP	Generalized System of Preferences
GST	General Sales Tax
HEIS	High Efficiency Irrigation System
IBRS	Indus Basin River System
ICS	Indian Civil Service
ICT	Information and Communications Technology
IMF	International Monetary Fund
IRSA	Indus River System Authority
IT	Information Technology
IPPs	Independent Power Producers
IPO	Initial Public Offering
KAPCO	KotAddu Power Company
KPK	Khyber Pakhtunkhwa
LNG	Liquefied Natural Gas
LUMS	Lahore University of Management Sciences
MAF	Million Acre-Feet
MIIS	Medimaging Integrated Solution
MQM	Mutahida Qaumi Mahaz
NEPRA	National Electric Power Regulatory Authority
NFDC	National Fertilizer Development Center
NWFP	North-West Frontier Province
OECD	Organization for Economic Co-operation and Development
PEPCO	Pakistan Electric Power Company
PHDEC	Pakistan Horticulture Development and Export Company
PIA	Pakistan International Airlines
PICSS	Pakistan Institute for Conflict and Security Studies
PILADAT	Pakistan Institute of Legislative Development & Transparency
PL-480	Public Law-480
PLM-N	Pakistan Muslim League Nawaz

PMEX	Pakistan Mercantile Exchange
POS	Point of Sale
PSE	Pakistan Stock Exchange
PSM	Pakistan Steel Mills
PSO	Pakistan State Oil
RCA	Revealed Comparative Advantage
SACAN	South Asian Conservation Agriculture Network
SAFAL	South African First Aid League
SBP	State Bank of Pakistan
SCARPS	Salinity Control and Reclamation Projects
SMART	Strengthening Markets for Agriculture and Rural Transformation
STPF	Strategic Trade Policy Framework
UAE	United Arab Emirates
UHT	Ultra-high Temperature
UK	United Kingdom
US	United States
USA	United States of America
USAID	United States Agency for International Development
VAT	Value Added Tax
VCF	Value Chain Finance
WAPDA	Water and Power Development Authority

Executive Summary

Executive Summary

RECENT ECONOMIC DEVELOPMENTS

The Pakistani economy entered a lean patch after the onset of the global financial crisis of 2007-08. Over the next five years, growth faltered, the fiscal deficit rose and international reserves declined to perilous levels. During the last three years, however, the economy has stabilized. The average economic growth rate rose, inflationary pressures declined, the primary fiscal balance improved and international reserves strengthened. The proximate causes of improving macroeconomic performance would appear to be a substantial decline of oil prices, the financial cushion and credibility provided by adherence to an IMF program, and the improvement in the domestic security situation.

Oil prices began to fall in the middle of 2014 and declined by more than 50 percent by the end of the year. They have mostly stayed within the range of \$40-50 per barrel since then. This has had a substantial moderating effect on Pakistan's import bill as oil imports shrank from \$14.7 billion in FY14 to \$12.1 billion in FY15 and further to \$7.7 billion in FY16. In addition, this has had moderating effects on inflation and the fiscal deficit.

The new government (PMLN), elected in 2013, launched a new IMF financial support program in September 2013. The IMF had canceled the previous program, covering the period 2008-13, as the then government failed to meet certain performance targets and conditions. The new program involved the disbursement of a sum of SDR 4.393 billion in 12 quarterly instalments over 2013-2016. Performance criteria for all 12 disbursements were satisfied (and some were waived) every three months, and the program concluded in September 2016. The successful implementation of the IMF program over a three-year period bolstered the credibility of the government's macroeconomic strategy and allowed it to access international loans on commercial terms once again.

Sharp improvements have also occurred in recent years in the overall security situation. Security agencies carried out two major campaigns, one a military operation against Taliban and other extremist militant elements in the North Waziristan area and the other an operation against certain political elements in the city of Karachi seen as responsible for a spate of kidnappings

and extortion rackets. The latest annual security assessment of the Pakistan Institute for Conflict and Security Studies reports a significant decline in the number of militant attacks and resultant deaths and injuries since 2014.

Within this overall story of improvement, the agricultural sector stands out as a disappointment. It grew at a lower average rate during FY14-16 than in the three years prior and suffered a serious setback in FY16 when its growth rate was negative 0.2 percent. Since the agricultural sector is the focus of our present report, it is worth asking if the decline was the result of a random shock or of structural weakness throughout the sector. The available data suggests that both factors have been at play. There was clearly a big random shock in the cotton subsector where output fell from 14 million bales in FY15 to 10 million bales in FY16. Other major crops did not experience such dramatic changes in output; in fact, wheat and sugarcane output grew while rice output fell modestly. At the same time, longer-term data suggests that the agricultural sector has been growing at an anemic pace (less than 3 percent) for many years. Thus, there clearly is a structural issue as well.

PATH DEPENDENCE IN THE MAKING OF AGRICULTURAL POLICY

Lying behind the structural problems of the agricultural sector is a pattern of path dependence in the making and implementation of agricultural policy. Path dependence refers to the fact that decisions made by policymakers at any given time are affected by decisions made in the past, even though past circumstances may no longer be relevant. This is the case for the handling of agriculture by various administrations in Pakistan's history as far back as colonial times. In Pakistan, path dependence has led to a pattern of heavy state involvement in agriculture and the inability to change policy to meet new needs and circumstances.

An example of how the state intruded into agriculture in the first place is provided by the development of the vast irrigation network in the country in colonial times. The repeated occurrence of famines in Eastern India during the nineteenth century led the British colonial government to establish a series of Royal Famine Commissions to come up with ways to expand food supplies. In 1898, one such commission suggested building canals in the Western Punjab and upper Sindh regions to allow for greater food output there – the same to be transferred to other locations when needed. This essentially meant increasing the role of the state in land settlement, water provision and grain transportation.

Another example is provided by the pattern of cropping that prevails. Since the ultimate objective was to grow more food, over time the colonial state developed a complex set of arrangements to promote food grains such as wheat and rice. Cotton had entered the cropping pattern earlier to meet the demand of English cotton mills in the nineteenth century. This three-crop pattern (with the minor addition of sugarcane) has persisted in Pakistan in spite of the enormous changes that

have occurred in the structure of demand and prices. This pattern has implications for water availability, since both rice and cotton are water-intensive crops. As the country's population increases and the proportion living in urban areas grows, non-agricultural use of water will increase. Other sectors of the economy, such as manufacturing, will also need more water. Pakistan cannot remain a prisoner of history; it must make important structural changes to reduce the use of water in the agricultural sector.

The intrusive state pattern established in colonial times has survived even after seven decades of independence. In the early days of the Pakistani state, civilian bureaucrats and urban politicians had substantial power but little interest in developing the agricultural sector as they hailed from urban areas. They promoted industrialization by providing incentives to the private sector to make investments in the consumer goods industry. This neglect was to result in severe food grain shortages and considerable unrest in the mid-1950s. In the late 1950s, a military coup brought to power General Mohammed Ayub Khan, who had strong links with the country's rural elite. He "indigenized" Pakistan's political system by bringing in large landlords as his political partners. To maintain his base of support, he provided an array of incentives for agricultural activities that established a set of strong vested interests behind such policies as grain support prices, expansion of water use in agriculture, input subsidies and low taxation of agriculture.

This led to a vibrant agricultural sector for almost four decades. However, the policies and interests that served the country well in the past are standing in the way of further progress. What is now required is a state that is not intrusive but supportive.

HISTORICAL DEVELOPMENT OF AGRICULTURE IN PAKISTAN

Agricultural growth averaged well over 4 percent per annum during 1960-2000, a record matched by few countries over such a long duration. The remarkable growth was the result of a combination of factors. The most important of these were a three-fold increase in supply of irrigation water over 1960-1990, a speedy and effective response to the adoption of the Green Revolution in wheat and rice in the second half of the 1960s, rapid increase in fertilizer use and a major breakthrough in cotton productivity in the second half of the 1980s.

There are few parallels in the world history to Pakistan's achievement of increasing the overall availability of irrigation water from around 50 million acre feet in 1960 to well over 125 million acre feet by 1980. This expansion was due to two major developments: public investments in dams and barrages under the Indus Basin Treaty and a spontaneous private sector revolution in tube well development starting in the early 1960s.

The increase in irrigation water led to a sharp increase in area under major crops from 10.5 million hectares in 1970 to 15.4 million hectares in 2000; area under minor crops, oilseeds, pulses, fod-

der and fruits and vegetables remained almost unchanged at nearly 5.06 million hectares over the period. The increase in cropped area reflected mainly increased cropping intensity made possible by greater water supply.

Rapid growth in fertilizer use began in the late 1960s and continued over the next three decades. Fertilizer consumption increased ten-fold between 1970-1971 and 1999-2000 to reach three million tons of total nutrients, at an average annual growth rate of nine percent. However, consumption of fertilizer grew by only around 3.3 percent per annum over 2000-2010 and actually declined by 15 percent over 2010-2015.

Agricultural growth has clearly slowed down in the last decade. Output growth averaged only two percent per annum during 2006-16 and was negative in 2015-16. Excluding the last bad year, the overall rate of growth of value added in major crops over 2006-2015 was only 1.5 per cent per annum. While major crops have limped along at a slow rate, the value added in the other crops, which include fruit and vegetables and oilseeds, actually dropped slightly from 14.5 percent in 2005-2006 to 11.3 percent in 2015-2016.

Looking back, despite quick diffusion of the Green Revolution technology package over the 1970s and a significant burst in cotton productivity in the late 1980s, estimates of total factor productivity suggest limited growth in agricultural productivity over the long run. Apparently, low returns to irrigation water use as well as less effective use of seeds and fertilizer after the 1960s constrained productivity growth. Lack of significant diversification to higher value added crops has also hampered overall growth in agricultural productivity. With productivity growing slowly, and the availability of irrigation water leveling off after 2000, the overall rate of agricultural growth has decelerated.

Against this background, it will be difficult to re-attain the growth rates of 4-5 percent sustained in the past. Pakistan cannot count on any significant increase in irrigation water in the near future. The use of nitrogenous fertilizer is at near optimum level. Meanwhile, government policies have been preoccupied with major crops, especially wheat, and have not given sufficient support to higher value crops and the livestock sector.

KEY AREAS OF CONCERN FOR AGRICULTURAL SECTOR POLICY

International and domestic agencies have reviewed and analyzed Pakistan's agricultural performance numerous times. They have typically identified the following key areas of concern: procurement pricing, seed policy, water use and management, research and extension services, standards and marketing and financial services.

Pricing and Procurement Policies

Pakistan has generally followed a practice of keeping procurement prices for many food grains

above and consumer prices below free market prices. The motives for this include protecting grower incomes but also keeping urban consumer prices moderate. The government also intervenes through sales from stocks or via quotas and tariffs on trade in agricultural commodities. Such interventions have a number of side effects: they usually incur a high fiscal cost, distort intra-crop incentives and result in excess production of some crops and under-production of others.

Changes in the mix of cotton and sugarcane output illustrate the impact of pricing policies on intra-crop incentives. In recent years, the support price of sugarcane has been set higher than the import parity price. This has induced a switch to greater acreage under sugar, including some at the cost of cotton. This is problematic because sugarcane is more water-intensive than cotton, and because cotton is an important input for the textile export industry. In addition, the country now has surplus sugar that can only be exported at a social loss.

When domestic prices are below import parity prices, smuggling ensues. Experience shows this to be a major problem with respect to such commodities as wheat that are easily smuggled to neighboring countries. Thus, the original intention of the policy to keep domestic prices low is defeated.

Seed Policy

Government seed farms have failed to introduce improved varieties at a pace comparable to that seen in India and Bangladesh. Meanwhile, the majority of Pakistan's farmers rely on seed saved from their last crop or purchased from neighbors or dealers. The seed that is generally available through private sector sources is often of poor quality.

Seed agencies need to undertake genetic research, varietal development, bulking up, certification, registration, production and marketing. Many of these topics are highly technical and require well-trained seed scientists and technologists. Such capacity is lacking in the country, especially at the provincial level. Public sector plant breeders in Pakistan only use conventional breeding methods; most do not use biotechnology, traits or IT solutions. Most experts are of the view that a more dynamic seed industry could be established if the public sector monopoly is modified and a bigger role for the private sector is allowed.

Water Pricing

During the 1960s and 1970s, improvements in water supply together with new seeds and fertilizer enabled a quantum leap in farm output. Irrigation continues to underpin agriculture in Pakistan. However, water use (or misuse) is now starting to have consequences in terms of low water productivity, ground water depletion and poor governance. In addition, there is increasing competition for water from urban and industrial users whose willingness to pay is much higher. In the future, the agricultural sector will have to produce more with less, meaning more crop and more value from the application of each drop of water.

A key issue is the low price set for irrigation water. This has encouraged the prevalence of a “flooding” system of water application that is very wasteful. Water charges have not increased over time while output values and other input costs have risen. By now, the share of water in the cost structure of a typical farm is less than 3%. At current prices, farmers have limited incentives to save on water application, to choose crops that are less water intensive or to invest in water saving technology. Over the medium term, Pakistan has no choice but to raise agricultural water charges or impose use-quotas.

Research and Extension

Since the 1970s, value addition in Pakistan’s agriculture has been limited by low investment in research and development, inability to maintain an effective agricultural extension system and failure to invest appropriately in post-harvest handling and cold chain infrastructure. A more decentralized and demand-driven research system is urgently needed to provide solutions to the problems confronting farmers and promote high value commercial agriculture.

At the same time, agricultural extension services lack capacity to support farmers in coping with the changing climate; managing natural resources; addressing issues related to water shortages, declining productivity, new market demands and natural disasters. The system is supply-driven, top-down, technology-based and male-focused. It suffers because each field extension agent is expected to support too many farmers and cover too large a geographical area. Salaries are low, and monitoring of service quality is non-existent.

Marketing

Agricultural markets (*mandis*) still operate under the spirit of legislation put in place as far back as 1939 whereby farmers are required to sell to licensed traders (*arthis*) only. These traders effectively have an oligopsony at the *mandi* level within their districts, especially at harvest time. Over the years, such traders have consolidated their hold over small farmers in particular by enmeshing them in a complex relationship where they are also the principal suppliers of agricultural credit and inputs to them. As a result, it is felt that middlemen (including *arthis* and other distributors up the chain) pocket a substantial part of the consumer’s price. Reforms that increase the bargaining power of farmers through collectives, increase the number of trading licenses available and introduce a system of transparent auctions at the *mandi* level would be highly desirable.

Financial Services

Existing agricultural financial services favor large-scale farmers with political connections. Small farmers tend to rely mostly on informal sources, including local moneylenders. Recently, a number of new financing models aimed at small farmers have been introduced. These include the Choupal Model (successfully used in India), the Tameer Bank Model (successfully piloted in Pakistan) Value Chain Financing (initiated last year in Pakistan; no evaluation available) and the

Warehouse Receipt Program (successfully used in Africa and India).

There is enormous potential for expanding the coverage of these services especially through mobile telephony. The use of mobile phones is growing in rural areas and opens up the possibility of disseminating information on prices of crops and inputs. The Punjab government has recently undertaken an initiative to provide smartphones to 500,000 farmers. These phones will have apps to help farmers apply for agricultural loans as well as receive information about weather conditions, crop diseases and timely use of fertilizer and pesticides.

AGRICULTURE RELATED WATER MANAGEMENT

We can divide water management concerns into supply and demand issues. Supply side issues relate mostly to the availability of water resources while demand side issues relate to pricing and regulatory policies that affect the use of water. Pakistan faces a serious water scarcity problem due to growing demand and limited supply. The main challenge is to maximize the use of available water in an efficient and effective manner.

Water Supply Issues

Pakistan has a large stock of major irrigation infrastructure that is old and operates at low efficiency. Neither the central or provincial governments have adequate asset management plans nor are there reliable estimates of the annualized costs of replacing and maintaining this infrastructure. The funds available for maintenance and rehabilitation of this infrastructure system are grossly inadequate.

The Indus Basin has a large groundwater aquifer that has become a significant supplemental irrigation source. This has a potential capacity of 50 million acre feet and is recharged by rainfall and surface flows, including seepage from canals and watercourses and field application losses. Currently, about 562,000 private and 10,000 public tube wells extract about 44 million acre feet annually. The potential for more extraction is limited, as suggested by the increasing salinity of ground water in many areas and falling water levels in others.

Water quality, of both surface water and groundwater, is a major issue. Access to clean domestic water is limited. Access to proper sanitation facilities is low, and only about 1% of the total wastewater generated in municipal areas is treated before being discharged into rivers. Improper disposal of solid waste pollutes surface waters.

Demand Management Issues

There are two main issues in the use of irrigation water. The first is wastage in the process of conveyance to farms. Only 40% of the water made available to agriculture actually reaches the farm-gate. The second is wasteful use within farms.

Flooding, the most common irrigation method is very inefficient. In addition, more than 40 percent of canal water is lost between *mogha* outlet and farmers' fields due to the poor condition of water-courses. Improvements in the water conveyance and application process could save this scarce resource.

Higher water charges to farmers could induce better water-use practices. Most farmers can pay a lot more for water than they are charged. Currently, the average selling price of privately supplied tube well water is about Rs.300 per hour, for an installed capacity of one cubic foot per second. This charge is four times more than what a farmer, relying entirely on government supplied canal water, pays for the same volume.

In addition to rationalizing water pricing, enhancing water storage capacity and improving governance and management of water institutions are the most critical areas for action. Pakistan has not created any additional water storage capacity in the last 40 years. Adding to storage offers possibly the highest return on investment today. At the same time, too many institutions (estimated at 18) have been created to manage and develop water. For this reason, recent efforts to formulate water policy have largely failed, as different institutions look at policy issues from their own vantage point. For example, there is hardly any connect between two critical institutions, the ministries in charge of agriculture and water/irrigation.

STAGNATION IN AGRICULTURAL EXPORTS

Production data reported earlier shows that the agricultural sector has been growing at a slow pace in recent years, especially in comparison to earlier decades. The structural malaise of the sector is reflected in exports as well. Agricultural exports have been declining since 2013 in nominal dollar terms.

Analysis using the Revealed Comparative Advantage (RCA) methodology shows that our major agricultural export commodities are declining in competitiveness. The RCA ratio is the share of a given product in a country's exports divided by its share in the world exports. A rising ratio over time suggests improving competitiveness while a falling ratio suggests declining competitiveness.

For example, after rising in the early 2000s, the RCA for rice has broadly declined since 2006-2010. Analysts note that our producers have failed to keep up with changes in consumer preference in international markets. Because of weak research and development efforts, Pakistan also failed to keep up with competitors, such as India, who have developed varieties that have cut into Pakistan's traditional markets. Furthermore, rice export markets are now focused on quality whereas Pakistan lacks adequate mechanisms for ensuring that rice exports meet global quality standards.

Cotton has faced somewhat different problems though with similar results. In recent years, the

production of cotton from Pakistan has declined due mostly to a disease called the leaf curl virus and other pest attacks and to the slow and unregulated adoption of a hardier seed variety called BT cotton. Exports have also declined though that has been due to a diversion of output to the domestic textile sector. A comparison with India illustrates our competitive decline. In 1990, the gap between India and Pakistan in textile export earnings was only one billion dollars but now Indian exports have reached \$30 billion while Pakistan's are stagnant at \$13 billion. In addition, Bangladesh converts one million bales of cotton to value added items and fetches about \$6 billion through exports, against Pakistan's one million bales to bring in only \$1.16 billion by marketing value-added textiles.

Pakistan's horticulture sector is growing slower (3 to 6% per year) than the world's (12% per year) as the country cannot yet fulfill the requirements of this market. Specific challenges include the lack of good post-harvest management (e.g., rapid cooling after harvest, packaging) as well as the lack of mechanisms to adhere to export standards and competition from other countries in Asia and the Middle East.

While each commodity faces specific export challenges and opportunities, the sector faces some common challenges as well. Some products (such as wheat and sugarcane) cannot be exported without a subsidy because domestic prices have been kept above international prices in an effort to protect the incomes of domestic growers and millers. The quality challenge applies across the sector. Pakistan does not have a credible system to monitor and control product quality in agriculture and to assign quality grades. It also does not have good post-harvest storage infrastructure to maintain quality prior to export. In recent years, the appreciation of the real exchange rate has also put our exporters at a disadvantage. Finally, many products also face market access problems as many developed countries continue to protect their agricultural sectors through tariffs, quotas, standards and anti-dumping practices as well as high levels of domestic price supports.

MOVING BEYOND TRADITIONAL SOLUTIONS

Each of the structural challenges discussed above has specific remedies. Some involve pricing reform, such as in the case of over-generous support prices for wheat and sugarcane which prevent a further diversification of the cropping pattern into higher value-added items like horticulture. Pricing reform is also important in the case of water, which is presently priced so low that it leads to wasteful use. Some remedies involve more investment in operations and maintenance of irrigation infrastructure. In particular, there is a need for enhanced water storage facilities, such as dams and barrages. Resources must also be applied to create a functional post-harvest commodity storage and quality grading system. Finally, research and development expenditures should be increased though with due attention to capacity building of the government bodies that conduct this.

In addition to the above remedies that mostly involve government spending and departments, we should consider a range of more innovative solutions that rely on private initiative and private markets. We discuss a few of these below.

Finance

The traditional solution to the finance constraint faced by farmers has been to develop public sector credit facilities, such as Agricultural Development Banks. These facilities have encountered several problems which have limited their usefulness. First, they typically cater to larger and politically connected farmers. Second, they are run on traditional lines with a heavy reliance on physical collateral that small farmers cannot provide. Third, they suffer from weak governance that usually results in high levels of non-performing loans and politically inspired write-offs of debt.

The efforts of non-governmental organizations and recent advances in ICT allow for more private-sector oriented solutions to the finance constraint of the agricultural economy, including small farmers and traders and input-suppliers. For example, microcredit schemes have been successful in providing access to small amounts of credit for the rural poor mostly in Asia. While started by non-governmental organizations, these schemes now involve many private banks as well.

Mobile phones are among the most widely used technological devices and have enormous potential in the rural areas for branchless banking. They have already successfully functioned in Kenya, South Africa, Philippines and Indonesia. The advantages of mobile phones include wide coverage, possible 24-hour service a day, very small fee for the agents, no need for a bank account as only a mobile phone number suffices, almost no paperwork (administration), very small bank overhead, suitable for many people with low income and low literacy and reduced transportation costs.

Value chain finance e.g, trade credit, input supplier finance, contract farming, inventory credit/warehouse receipt finance, collateralized lending and import/export finance etc, is yet another very important tool to help commercialize agriculture. It is important, however, to identify relationships along the value chain, mitigate constraints, exploit opportunities for value chain finance and explore how formal financial institutions can enter the equation.

Physical Infrastructure

The traditional approach to rural infrastructure in Pakistan has prioritized roads, electricity and irrigation networks. This is useful and necessary. Such investment in agricultural infrastructure is fundamental to increasing agricultural productivity as it ensures farmers' access to input and output markets, access to finance and credit, access to telecommunication and transportation and, if prudently developed, access to technology and advisory services besides facilitating the integration of less-favored rural areas into national and international economies.

However, we need to go beyond traditional solutions to re-galvanize agriculture in Pakistan. Farm Service Centers (FSC) or agri-malls may be a way to do this. Agri-malls are one-stop shops that provide small farmers with agricultural and veterinary inputs, services, finances and technologies that help them procure better agricultural technology, advice and inputs on the one hand and link them to markets on the other. Agri-malls exist in one fashion or another in such countries as Afghanistan, Bangladesh, Georgia, India, Moldova and Romania as well as in many African countries. In many of these cases, public-private partnerships have been used to render the concept operational.

The input infrastructure caters for fertilizers, seeds, pesticides, diesel and lubricants, farm services, rental of farm machinery, extension, training and advisory services. The agri-malls and FSC also provide a range of agri-finance support services, inventory credit, agriculture financing (production and capital loans), commodity financing and value chain financing. The output infrastructure in the agri-malls and FSC include temporary grain storage (silos), bulk handling logistics, electronic marketing and certification. For perishables, these could provide cold storages, sorting platform and grading/packaging facilities.

Marketing Intelligence and Information Systems

Reliable and up to date information on markets enable farmers to make better production decisions and governments to formulate coordinated policy responses in situations of market volatility. Given recent ITC advances, a good market information and intelligence system can be established to facilitate the above. This could make use of the rich information base on prices and costs that is already available from some government agencies, such as the Agriculture Marketing Information Service of Punjab.

The long-term solution envisages development and deployment of an integrated information system that allows monitoring of the crop cycle from sowing through harvesting to marketing. The MIIS electronically connects commodity markets and through the provincial Agriculture Department links up with international markets. A computerized database provides a repository of information on sources of supply, wholesale prices and supply volumes. It disseminates the vital information to the target groups e.g. producers, market intermediaries, consumers and government functionaries on a real time basis through websites, display boards, print and electronic media.

Capacity Development

Capacity development is a fundamental component to increasing agricultural productivity. A massive effort is required to address this widespread capacity deficit. This effort must cover the strengthening of policy analysis, data and statistical systems, educational research and development entities and extension and advisory services. It would require institutional changes in key public sector organizations that deal with the agriculture sector. The objective would be to

generate a critical mass of trained human capital (policy makers, extension agents as well as farmers) to catalyze and mobilize farming communities and producers' organizations to upgrade their skills, knowledge and competencies and be ready to assimilate new technologies. The strategy should aim at three key target groups: (a) government agencies related with the agriculture sector and responsible for policy, planning and regulatory frameworks; (b) extension and advisory services; (c) farmers and producer organizations engaged in agri-business and agro-industry.

Chapter 1

Recent Economic Developments and Unresolved Structural Challenges

Chapter 1

Recent Economic Developments and Unresolved Structural Challenges*

The first section of this chapter focuses on recent economic developments in Pakistan. It documents the extent to which the economy has stabilized after a period of widening macro-economic imbalances following the global crisis of 2007-08. It also contains a discussion of the China Pakistan Economic Corridor (CPEC) initiative, a multi-billion dollar energy and transport investment program launched in 2013. The second section considers selected structural challenges faced by the Pakistani economy. It focuses on the narrow tax base, the poor performance of key public sector enterprises, financing and supply problems in the energy sector and issues in the overall business environment. The emphasis of the discussion is on recent developments in these areas of structural concern.

RECENT ECONOMIC DEVELOPMENTS

The Pakistani economy entered a lean patch after the onset of the global financial crisis of 2007-08. Over the next five years, growth faltered, the fiscal deficit rose and international reserves declined to perilous levels. During the last three years, however, the economy has stabilized. This section documents the rise in economic growth (modest), decline in inflationary pressures (considerable), improvement in primary fiscal balance (substantial) and strengthening of international reserves (encouraging) that has taken place in FY14-FY16. The proximate causes of improving macroeconomic performance would appear to be the substantial decline of oil prices, the financial cushion and credibility provided by adherence to an IMF program and the improvement in the domestic security situation. Notably, the recovery has occurred against the backdrop of a generally weak global economic environment.

Oil prices began to fall in the middle of calendar 2014 and had declined by more than 50% by the end of the year. They have mostly stayed within the range of \$40-50 per barrel since then. This has had a substantial moderating effect on Pakistan's import bill as oil imports shrank from \$14.7 billion in FY14 to \$12.1 billion in FY15 and further to \$7.7 billion in FY16.¹ In addition to providing relief on the external side, this has had moderating effects on inflation and the fiscal deficit.

*This chapter was prepared by Farrukh Iqbal

A new IMF financial support program was launched in September 2013 by the PMLN government, which was elected in the middle of the year. The IMF had canceled the previous program, covering the period 2008-13, as the then government failed to meet certain performance targets and conditions. The new program was scheduled to run for 36 months over 2013-2016 and involved the disbursement of a sum of SDR 4.393 billion in 12 quarterly instalments. Performance criteria for all 12 disbursements were satisfied every three months and the program concluded in September 2016. The successful implementation of the IMF program over a three-year period has supported the credibility of government's macroeconomic strategy and allowed it to access international loans on commercial terms once again.

Sharp improvements have also occurred in recent years in the overall security situation. Two major operations were carried out, one a military operation against Taliban and other extremist militant elements in the North Waziristan area and the other an operation against certain political elements in the city of Karachi considered responsible for a spate of kidnappings and extortion rackets. The latest annual security assessment of the Pakistan Institute for Conflict and Security Studies reports a significant decline in the number of militant attacks and resultant deaths and injuries since 2014.²

Rise in Economic Growth

As Table 1.1 shows the economy has grown at or above four percent per annum in each of the past three years, rising to 4.7 percent rate in FY16. The FY16 rate is the highest growth rate Pakistan has achieved in the last eight years.

Table 1.1 Selected Macroeconomic Indicators (FY11-16)						
	FY11	FY12	FY13	FY14	FY15	FY16
Output and Prices (annual percent change)						
Real GDP at Factor Cost	3.6	3.8	3.7	4.1	4	4.7
Agriculture	2	3.6	2.7	2.5	2.5	-0.2
Manufacturing	2.5	2.1	4.9	5.7	3.9	5
Services	3.9	4.4	5.1	4.5	4.3	5.7
Consumer Price Index (period avg.)	13.7	11	7.4	8.6	4.5	2.9
Savings and Investment (in percent of GDP)						
Gross Savings	14.2	13	13.9	13.7	14.1	14.2
Government	-4.2	-5.3	-5.2	-1.4	-1.5	-0.2
Nongovernment	18.4	18.3	19	15.1	15.7	14.4
Fixed Investment	12.5	13.5	13.4	13	13.9	13.6
Public	3.2	3.7	3.5	3.2	3.7	3.8
Private	9.3	9.7	9.8	9.9	10.2	9.8
Source: Pakistan Economic Survey, 2015-16 and IMF (2016)						

Last year's performance would have been even better had the agricultural sector not suffered a setback and declined by 0.2 percent. Since the agricultural sector is the focus of our present report, it is worth asking if the decline was the result of a random shock or of structural weakness throughout the sector. The available data suggest that both factors have been at play. There was clearly a big random shock in the cotton subsector where output fell from 14 million bales in FY15 to 10 million bales in FY16. Other major crops did not experience such dramatic changes in output; in fact, wheat and sugarcane output grew while rice output fell modestly. At the same time, longer-term data suggest that the agricultural sector has been growing at an anemic pace (less than three percent) for many years. Therefore, there clearly is a structural issue as well.

With agriculture in decline, growth came entirely from the industrial and services sectors. Among industries, the manufacturing sector grew by 5 percent in FY15, following earlier growth rates of 3.9 percent and 5.7 percent in the previous two years. This generally buoyant performance has led some to talk about an industrial revival in the country. However, that may be a premature call since there is not enough supportive evidence from other areas, such as the exports of manufactured goods.

No signs of an industrial resurgence are evident in the investment data either. The overall fixed investment ratio has fluctuated between 13 and 14 percent of GDP during the last six years, and the private investment rate has fluctuated around ten percent of GDP. While this is slightly higher than in the last three years of the previous government, the change is too modest to signal a resurgence.

Decline in Inflationary Pressure

Table 1.1 also shows that inflation has declined substantially in the last three years, from 7.4 percent in FY13 to 2.9 percent in FY16. This decline has much to do with the price of oil, which dropped sharply in FY15 and has stayed soft ever since. Monetary policy helped keep inflation under control. Under the terms of the IMF program, the government was constrained from borrowing from the State Bank of Pakistan (SBP) and had to meet other monetary growth restrictions as well. Such restraint was made easier by the oil price decline that reduced the financing needs of both the public and private sectors.

Fiscal Balances

Table 1.2 shows that the budget deficit has decreased substantially in recent years, from 8.4 percent of GDP in FY13 to 4.3 percent in FY16. The primary balance has improved substantially as well, from a deficit of 3.9 percent of GDP in FY13 to only 0.1 percent in FY16.³

This process of fiscal consolidation has occurred in a balanced fashion across expenditures and revenues with the former declining from 21.8 percent to 19.6 percent of GDP during FY13-16 and the latter rising from 13.3 percent to 15.0 percent of GDP. Among expenditures, the bur-

den of adjustment has fallen mostly on development spending which declined from 5.0 percent of GDP in FY13 to 3.7 percent in FY16. Within revenues, the overall tax to GDP ratio rose from 10.0 percent to 12.4 percent of GDP over FY14-FY16. The improvement in tax revenues, especially in FY16, is attributed to new measures applied in November 2015, including regulatory duties on some items, as well as to the yield from changes in the duty structure of petroleum products (State Bank of Pakistan, 2016, p. 4).

	FY11	FY12	FY13	FY14	FY15	FY16
Total Revenue	12.4	12.8	13.3	14.4	14.3	15
Tax Revenue	9.5	10.4	10.0	10.5	11.0	12.4
Nontax Revenue	2.9	2.4	3.3	3.9	3.3	2.7
Total Expenditure	19.3	21.7	21.8	20.1	19.7	19.6
Current	16.5	17.9	16.8	16.4	16.6	16.6
Interest Payments	3.8	4.4	4.4	4.6	4.7	4.3
Development	2.6	3.5	5.0	4.0	3.8	3.7
Budget Balance	-6.7	-8.6	-8.4	-4.9	-5.2	-4.3
Primary Balance	-2.9	-4.2	-3.9	-0.3	-0.5	-0.1

Source: Pakistan Economic Survey, 2015-16 and IMF (2016)

There is some concern that the improvement of the revenue position over the past three years looks better than it has actually been because of some unusual accounting. For example, the receipt of \$1.2 billion from the sale of government-owned shares in Habib Bank was apparently booked as profits for the State Bank of Pakistan and thus as non-tax revenue (Ahmad, 2016). A more conventional approach would have been to book the receipts as a (non-recurring) source of financing rather than as a revenue item.

There is also concern that the fiscal consolidation over time looks better because some expense items have been moved off the budget. For example, the arrears related to the energy sector were moved off the budget in March 2015. These arrears have grown over time, but this deterioration does not show up in the reported budget balance. The fiscal balance may also look better because of delayed payments to suppliers, another form of arrears. These will eventually have to be paid and recognized in the fiscal accounts but in later years.

Finally, one aspect of the current fiscal consolidation program may have adverse implications for the delivery of public services in the provinces. Under the program, provinces are required to post fiscal surpluses. This requirement comes on top of the change in expenditure responsibilities brought about by the 18th Amendment in 2010, under which health and education spending (among other basic services) were assigned to the provinces. There is concern that provinces may cut back on health and education spending and/or go into arrears on wages and salaries for relevant personnel (such as teachers and doctors). Provinces may also be less motivated to pay their energy bills on time, thereby aggravating another problem with adverse long-term consequences.

External Balances

The current account deficit has fluctuated around 1 percent of GDP for the past three years (see Table 1.3). Imports declined from 17.3 percent of GDP in FY13 to 15.3 percent in FY15, due mostly to the drop in the price of oil. While some of the import bill adjustment occurred in FY15,

much occurred in FY16 as well. Meanwhile, exports have struggled for at least five years. The ratio of exports to GDP fell from 11.9 percent in FY11 to 8.9 percent in FY15. Nominal export receipts declined by 8.8% in FY16 further reducing the ratio to GDP.

Why have exports been declining as a share of GDP? Most analytic studies for Pakistan point to the exchange rate as an important determinant in addition to global demand (as measured by OECD growth rates) and the country's level of competitiveness. All three factors have been at play in Pakistan. The exchange rate has appreciated, especially in the last two years (by about 19 percent according to the latest IMF review). Global demand has been relatively weak as OECD countries have failed to grow strongly out of the recession brought about by the financial crisis of 2007-08. In addition, Pakistan's position vis-a-vis competitors has not improved, at least as captured by such measures as the World Bank's Ease of Doing Business index.

At the same time, the decline in the nominal value of exports in 2016 was not confined to Pakistan; many emerging economies also had a similar experience due in part to a commodity price downturn in global markets (State Bank of Pakistan, Figure 6.5).

The news on the foreign investment front is mixed despite the improvement in the macroeconomic situation. The inflow of foreign investment fell from \$1.7 billion in FY14 to only \$0.85 billion in FY15 before rising to \$1.9 billion in FY16, in part due to higher investment from China. To put this in perspective, note that the inflow of foreign investment has been much less than the \$3.5 billion per year projected for 2013-18 at the onset of the IMF program.

Remittances have begun to show some impact from the decline of oil prices. After rising from \$15.8 billion in FY14 to \$18.5 billion in FY15, they registered a level of \$19.9 billion in FY16, which reflects a deceleration in the rate of increase though not an absolute decline. Given the impor-

Table 1.3
Selected External Accounts Indicators

	FY11	FY12	FY13	FY14	FY15	FY16
Trade						
Export/GDP	11.9	11	10.5	10.3	8.9	
Import/GDP	16.8	18	17.3	17	15.3	
Current Account Balance/GDP	0	-2.1	-1.1	-1.3	-1	-0.9
Foreign Investment (\$ billion)				1.7	0.9	1.9
Remittances (\$ billion)				15.8	18.7	19.9
Remittances (% Change)				13.7	18.2	6.6
Gross Reserves (\$ billion)	14.8	10.8	6	9.1	13.5	18.1
Real Effective Exchange Rate (percent change)	6.1	3	-1.3	0.9	10.9	

Source: State Bank of Pakistan (2016) and IMF (2016).

tance of remittances to Pakistan's reserves position and to the welfare of a sizable lower middle class population in the country, the deceleration is not welcome news.

International Reserves and Public Debt

International reserves have strengthened from only \$6 billion in FY13 to around \$18 billion at the end of FY16 and from 1.5 months of import cover to 4.2 months. Meanwhile, external debt declined modestly from 26.3% of GDP in FY13 to 25.7% in FY16 while overall public debt, including obligations to the IMF, rose from 64.2% of GDP in FY13 to 66.9% of GDP in FY16.

Pakistan has been able to access international capital markets several times in recent years. In 2014-15, government raised \$1 billion from five-year bonds at a fixed rate of 7.25% and another \$1 billion from ten-year bonds at 8.25%. Most recently, in 2016, the government raised \$1 billion from five-year *sukuks* (Islamic bonds) at 5.5%. The terms of the new *sukuk* issue compare favorably with the previous one, also of five-year tenor, that had been placed at 6.75% in 2014, suggesting an improvement in market sentiment for Pakistani sovereign paper.⁴

The sustainability of the public debt has attracted much debate in recent months. Official sources insist that movements in the profile of public debt over the past three years were within the parameters agreed to with the IMF, and developments in FY16 continue to remain within limits set by the Medium Term Debt Management Strategy for 2016-19.⁵ Others see some worrying signals in that our exports are not rising, even in nominal terms, and remittances are decelerating. Therefore, debt service could become a problem in the future. At the same time, there may be a big increase in public debt or contingent liabilities associated with the investments of the China-Pakistan Economic Corridor project over the next ten years. Some are also concerned that the run-up to the national elections due in 2018 may see a substantial boost in public spending that is now no longer constrained by IMF performance criteria.

The China Pakistan Economic Corridor

Launched in 2013, the China Pakistan Economic Corridor (CPEC) refers to a \$50 billion plus package of mostly energy and transport projects to be carried out in Pakistan with the technical and financial help of China. In terms of composition, the bulk of the projects by value (around 75%) are to be in the energy sector while the rest are primarily in transport-related infrastructure. In terms of location, the projects will stretch out mostly along a north-south axis connecting Kashgar, in western China, to the port of Gwadar in southern Pakistan. For China, the benefit to building such a corridor comes from linking their western provinces to the Arabian Sea, thereby facilitating the exports of Chinese goods to the Middle East and Europe while simultaneously allowing for faster delivery of oil from the Middle East to China. For Pakistan, the benefit is expected to come from the direct employment effects of a massive construction program (involving many roads, railroads, telecommunication cables and power plants) as well as the spillover effects of an

improved transportation network and greater trade with China. While the full project will run over the next 10 to 15 years, several “early harvest” investments are expected to become operational starting in 2017.

CPEC projects include the following: the upgrading of Gwadar Port through the construction of breakwaters, berthing areas, and new channels; the building of a water treatment plant, a hospital and vocational training institutes in Gwadar; the laying of a fiber optic cable from the Chinese border to Islamabad; the upgrading of the Karakoram Highway in northern Pakistan; the building of a new motorway between Lahore and Karachi; the building of a new rail link between Gwadar and Jacobabad and at least nine power projects, including the Diamer-Bhasha Dam and the Nandipur power plant and several coal based plants. This is just an illustrative list of the main energy and transport infrastructure projects. In addition, special projects like industrial parks and special economic zones are also envisaged under the CPEC umbrella.

The CPEC initiative has attracted comment and controversy in four main areas: (a) costs and returns relating to the independent power projects, (b) the lack of information on the fiscal and debt consequences for Pakistan, (c) the impact on local industries and (d) environmental impact.

Some CPEC power projects have reportedly encountered snags arising from cost and rate of return considerations. For example, a cluster of power plants planned for Gadani were scrapped because of the high cost of building a jetty at the location. A coal-fired power plant project in Kallar Kahar was also cancelled due to cost escalations during the period of negotiation. Other projects have been delayed because the power tariff rate being sought by Chinese investors is much higher than what is judged appropriate by the National Electric Power Regulatory Authority (NEPRA). For example, the Matiari-Lahore transmission line project has been delayed by a year or so because the investors have asked for a tariff rate that is 30% higher than the NEPRA-approved rate (95 paisa per unit versus 71 paisa per unit). Similar differences have characterized the negotiations relating to the Nandipur power plant. One unfortunate consequence of such differences between investors and the regulator is that government has announced plans to reduce the independence of the regulator by placing it under the authority of a government agency (the Water and Power Ministry).

At the same time, concerns have emerged regarding the high rates of return embedded in the IPP agreements. While financial details have not generally been made public, it is widely believed that rates of return of 20 percent and above characterize most such agreements.⁶ Ultimately, power consumers in Pakistan will bear the burden of these agreements.

A second category of concern relates to the fiscal and debt consequences of the CPEC initiative. The financing arrangements of the overall package will most likely emerge on a project-by-proj-

ect basis. From verbal statements made at different occasions by senior government officials, it appears that use will be made of both Chinese and Pakistani government funds, preferential facilities, private investments and capital from international donors. Additional sovereign debt, raised at the federal or provincial level, is also possible. Some of the financing deals may involve subsidies from the Chinese or Pakistani governments. These may involve such sources as export buyers' credits, loans from export-import banks and loans from development banks. Private firms will be encouraged to make direct investments. Finally, efforts will be made to tap loans from international development institutions such as the World Bank, the Asian Development Bank and the Asian Infrastructure Investment Bank.

Most energy projects under CPEC will take the form of foreign investment from Chinese sources (plus a small amount of investment from local Pakistani joint venture partners in a few cases). This means that they will not directly affect the budget or the public debt. In such cases, fiscal consequences will only arise if the investors activate the sovereign guarantees underpinning the IPP agreements for some reason. It is hard to assess in advance what these consequences will be. The experience of previous large IPP deals, such as those that took place in the early 1990s in Pakistan, could provide some guidance but the relevant analysis is not available in the literature.⁷ A fiscal impact also arises from the tax exemptions granted to some CPEC-related imports and investments (such as the income tax holiday granted to Gwadar Port) but the scale of this cannot be easily established from currently available information.⁸

One fiscal impact to be borne by provinces arises from security costs relating to CPEC projects. The federal government has apparently asked for the provinces to yield 3% of their share from the divisible pool for security purposes.

A third concern is that, once certain roads and railway lines are in place, the easier flow of goods into Pakistan from western China will have an adverse impact on local industries in Pakistan. To justify this concern, industry bodies point to the increased bilateral trade deficit with China following a bilateral trade liberalization agreement a few years ago.⁹ While government-run investment promotion boards talk up the possibilities of additional investment and exports from Pakistan, private sector bodies have so far been skeptical of such claims.

A fourth concern relates to the environmental impact of CPEC projects. The initiative features a large number of projects to be undertaken in a relatively short period. Some involve resource extraction, such as the mining of coal using open-pit methods. Others involve building new roads through fragile and sensitive ecological regions such as Gilgit-Baltistan. The use of coal as a source of energy has, in particular, raised questions since Pakistan already suffers from substantial air pollution. Many developing countries, including China, are trying to move away from coal-powered power plants as well as from the use of coal as a fuel in household cooking. While

government officials have assured the public that the relevant environmental impact studies have been done, and mitigation measures will be in place, concerns continue to be raised in the media about this.

UNRESOLVED STRUCTURAL CHALLENGES

Revenue Performance

Pakistan is a low-tax country in terms of collections. It suffers from both issues of tax policy design (relating to who and what is taxed) and administration (evasion and corruption). The failure to raise adequate revenues from domestic sources pushes governments into excessive reliance on foreign aid and underspending on public investment (in infrastructure and human capital), a feature that constrains the long run growth rate of the economy. The tax to GDP ratio in Pakistan has fluctuated around 10 percent since 2005. Governments have committed to raising the tax ratio several times under agreements with the IMF over the past fifteen years but have failed to meet this goal.¹⁰ Even at present, the authorities are aiming for a target tax ratio of 14.5 percent by FY2020. However, recognizing the difficulty of modifying tax policy in the current political-economic circumstances, most of the additional revenue is slated to come from improvements in tax administration.

Policies Relating to Tax Policy Design

The low tax ratio is partly due to a narrow base for the income tax. It has proved extremely difficult to expand the tax net to cover a greater number of income-earning persons and activities. Tax collections are also lower than necessary because the tax administration system is prone to evasion, corruption and political manipulation.¹¹ It has often been used, through the promulgation of special regulatory orders, to exempt certain individuals, companies and activities from the full impact of the relevant revenue laws.

The Pakistani tax system relies heavily on a sales tax known as the GST. The base for this is divided between the central and provincial governments in that the taxation of goods is assigned to the center and that of services is assigned to provincial administrations. Many services remain exempt from the GST as provincial administrations have proved unable or unwilling to apply it in their jurisdictions.

A more efficient tax system is available in the form of the VAT now in use in over 130 countries. However, Pakistan has not been able to implement a VAT despite committing to doing so under an IMF program that ran from 2008 until it was canceled (for lack of performance) in 2012.

For the moment, even the IMF has given up on the objective of introducing a VAT in Pakistan. In the latest program, started in 2013, the IMF retreated to a piecemeal program focusing largely on reforming tax administration. In terms of policy, among measures to expand tax bases and

encourage more people to file, the program has involved the introduction of a withholding tax on banking transactions that applies only to non-filers.

Policies Relating to Tax Administration

The most important decision announced by the government in recent years is that of eliminating Statutory Regulatory Orders (SROs) by the end of the IMF program in 2016. This measure alone should increase revenues by up to 1.5% of GDP. In addition, some other measures are being introduced to make tax administration more productive in terms of tax yield.

Measures to reduce tax evasion and enforce better tax compliance among large payers include the introduction of risk-based auditing of high net worth individuals and large companies and the identification of potential high net-worth taxpayers through field surveys. Information has been sought from third parties as well (such as utility companies) to detect cases of high expenditures among households who are not in the tax net. The coverage of tax audits in general was expanded in recent years and measures are being considered to improve data sharing between tax and customs authorities to detect cases of non-compliance or less than full compliance.

Legislation has been introduced to reduce *benami* transactions. A *benami* transaction is one where property is held by a person, other than in a legally-documented fiduciary capacity, on behalf of another person who has actually paid for it and is the real owner or held by an entirely fictitious person. Close family members are excepted in the legal definition of *benami* transactions. Such transactions are often used to evade taxes, especially on property. A new law defines such transactions, makes them illegal and specifies fines and penalties. The law applies only to transactions that take place after it comes into effect. So past *benami* transactions are effectively amnestied.

Better tax administration also involves improving the tax refund process. There is a large stock of refund claims relating to GST, income tax and customs duties. Businesses complain bitterly about the delays involved in getting refunds from government and the “fees” they sometimes have to pay to get their refunds. The Federal Board of Revenue has recently started publishing data on the stock of outstanding refund claims on a monthly basis so as to allow outsiders to judge progress on case resolutions more easily. The stock declined from 0.8 percent of GDP in March 2015 to 0.7 percent in March 2016. The plan is to bring outstanding claims down to a level of three months of flow amounts and to keep it there. This aspect is related both to tax administration and to the business environment since improving the refund resolution process and speeding up refunds make it easier for businesses to plan and manage their cash flow.

Public Sector Enterprises

Many public sector enterprises (PSEs), including Pakistan International Airlines (PIA), Pakistan Railways and Pakistan Steel Mills (PSM), continue to be a major drain on fiscal resources while

providing poor services to the public. Other public sector enterprises, such as electricity distribution companies are not necessarily loss-makers but need to be run more efficiently to save public resources. In recent years, Pakistani governments have attempted to deal with the PSE performance issue along two tracks. One track has involved privatization, and the other has involved cost-cutting and efficiency-enhancing measures. Neither track has been particularly successful.

There has been a lot of political opposition (mostly from employee groups) to privatization. This came to the fore particularly with the failed attempt to privatize PIA in 2015. The present government has accordingly scaled back its privatization plans and now hopes to address the issue in part through measures to contain the company's losses. The parliament passed legislative amendments in April 2016 relating to the corporatization of PIA. These amendments require the government to retain a majority share and management control of PIA. This effectively kills the PIA privatization initiative and hands a major victory to the PIA employees group that had opposed the move. This will also make it difficult to reduce the overstaffing of PIA that has been partly responsible for its poor financial condition. Now cost cutting is to be achieved mostly through the shedding of some routes, replacement of aging planes and measures to attain greater fuel efficiency.

There has not been much progress either with regards to the privatization of the Pakistan Steel Mills (PSM). Initial plans were set back by the refusal of the Government of Sind to take over the company from federal authorities. Now the federal government has begun a process to privatize the PSM directly. The bidding process is supposed to conclude in June 2017. Meanwhile, PSM is incurring losses since it continues to pay its staff even though the company is not operating and produces no steel.

Plans to fully privatize power distribution companies (DISCOs) have also been shelved due to political opposition. Instead, selected DISCOs will seek strategic private sector participation in management while offering less than majority shares to the public. Meanwhile, expressions of interest have been solicited for the divestment of one major power generation company, the Kot Addu Power Company or KAPCO.

The restructuring plan for Pakistan Railways is an example of the second track to improve PSE performance. The plan focuses on three areas: improvements in business processes, financial stability and service delivery. Government also plans to introduce a new Railway Board to oversee the corporation. Unfortunately, past experience with efficiency and cost-cutting measures in such public sector organizations does not lead to much optimism that the measures being considered now will remain in place through more than one political election cycle.

Energy Sector Issues

Much progress has been made in recent years in this sector. Through most of the past decade, the sector had been characterized by supply shortages and financial losses among public sector power generation and distribution companies. The sector also featured a large amount of circular debt owed by different parts of the power supply chain to each other. The current situation is much better.

Since 2013, several power projects have been launched and some will come on stream in 2017 and 2018. Service has improved in that total hours of power outage have declined. DISCOs have cut distribution losses and raised collection rates, thereby improving their financial performance. Subsidies to the sector have been cut while tariffs and surcharges increased.

Despite a significant adjustment undertaken in 2013, the sector continues to be plagued by large arrears on both receivables and payables. Receivables are arrears owed by consumers to power distribution companies. Payables are mostly arrears owed by distribution companies to independent power producers (IPPs) or to fuel suppliers (such as PSO) or to WAPDA. A review issued by the Pakistan Electric Power Company (PEPCO) for 2015-16 showed receivables to have risen to Rs. 684 billion and payables to Rs. 300 billion by June 30, 2016 even after the payment of Rs. 480 billion to power producers and fuel suppliers in 2013.

At the same time, most DISCOs have improved their recovery rates from consumers. The average recovery rate stood at 94.4 percent of billed amounts during FY15-16 compared to 89.2 percent the previous year. Most DISCOs have also improved their financial reporting process: quarterly performance reports are now made public after being reviewed by the relevant government bodies.

Reforms to the tariff setting process have proved difficult to achieve in the face of political and social opposition. The process of setting up multi-year tariff frameworks for DISCOs has not yet advanced significantly. It will be difficult to attract investors to the modest IPOs planned by the DISCOs if these frameworks are not in place.

Private Investment and Business Climate Issues

The rate of private investment in Pakistan has fluctuated around 10% of GDP over the last quarter century, while that in India has climbed above 20% of GDP. Why are private investors wary of committing long-term capital to the country? Different factors, including security concerns, energy supply concerns and the overall nature of the business climate, have played roles of varying importance at different times. In this section, we focus on business climate issues.

Several internationally comparative measures of the environment for conducting business are now available. Of these, the best known is the World Bank's Doing Business database. This

includes such measures (among others) as the time needed to start or wind up a business, the ease with which contracts can be enforced or credit obtained and issues relating to importing and exporting. According to the 2017 version of this, Pakistan ranks 144th out of 190 countries in the composite Ease of Doing Business index. Three additional points will help to put this rank in perspective. First, the current rank represents an improvement relative to the 2016 rank.¹² Second, between 2008 and 2016, Pakistan had fallen 72 ranks. Third, among the major South Asian countries, Pakistan ranks worse than India and Sri Lanka though better than Bangladesh.

The current government has attempted to improve the business climate through an Action Plan launched in 2014. One area where progress has been made is in the setting up of one-stop shops. A Virtual One Stop Shop for new business registration is now operational. Using an online portal, this has integrated registration procedures for a range of company types and documents. It is expected to eliminate two procedures and reduce the average time for registering a business by three days. Physical one-stop shops are also operational now in Lahore and Islamabad, and one is in the process of being set up in Karachi as well.

Other improvement measures include: simplifying tax filing procedures for traders; introducing alternative dispute resolution measures for commercial disputes so as to avoid lengthy court procedures; strengthening the credit information system; adopting a financial inclusion strategy that gives priority to the credit needs of small and medium enterprises; and using a web-based portal to speed up the processing of documents relating to importing and exporting. The Action Plan was reviewed in 2016, and new time-bound measures and targets were adopted. The slight improvement in Doing Business ranks between 2016 and 2017 noted above may reflect the initial effects of such reform efforts.

Chapter 2

Path Dependence and the Making of Agricultural Public Policy

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In many cases, what governments do today is learnt from what they know about the past. This is the case for all governments around the world including those that have held the reins of power in Pakistan in its near-seventy year history. Social scientists have a phrase for the role of history in the making of public policy – they call it “path dependence.” The *Financial Times* defined it as follows: “Path dependence is the idea that decisions we are faced with depend on past knowledge trajectory and decisions made, and are thus limited by the current competence base. In other words, history matters for current decision-making and has a strong influence on strategic planning. Competences, built in the past, define the options and range for today’s moves. New business opportunities, in particular those based on technological progress, emerge gradually because of competencies acquired prior to new discoveries and over time. A well-known example is the QWERTY layout of typewriters. Despite the fact that different keyboard layouts in modern computer keyboards would allow faster typing, the QWERTY layout prevails. Due to the network effect (network externalities) the layout seems immutable.”

Using the concept of “path dependence” for understanding policymaking is different from the traditions of neo-classical economics, which typically assume that only a single outcome can be reached regardless of initial conditions or transitory events. This outcome is the result of rational thought on the part of “economic man.” With path dependence, both the starting point and accidental events called “noise” can have significant effects on the ultimate outcome.

Path dependence explains how decisions faced by policymakers at any given time are affected by decisions made in the past even though past circumstances may no longer be relevant. This is certainly the case for the handling of agriculture by various administrations in Pakistan’s history. In this chapter, we use this notion to discuss some of what happened in the past – the past taking us back to the two-century rule of the Indian sub-continent by the British.

One important conclusion from our reading of history is that the state became increasingly intrusive in managing agriculture in areas that now comprise Pakistan. Once the state becomes

*This chapter was prepared by Shahid Javed Burki

heavily involved, it becomes difficult for it to let go and stand aside – a theme elaborated at some length in the rest of this chapter. This has not only been Pakistan’s experience but also that of many other countries around the world. The optimal role of the state remains an unresolved issue. Unhappiness with the role the government was playing in managing Britain’s participation in the European Union led to the surprising decision by a slim majority of voters to quit the EU in a referendum held in June 2016. It was also dissatisfaction with the United States’ governments handling of the economy that led to the political rise of Donald Trump.

The theme of this report is that Pakistan has not used the enormous potential of the well-endowed sector of agriculture for sustained economic progress. For the sector to move forward and realize its full potential, the state will have to redefine its role and shed some of the functions it has acquired over time. Pakistan could have obtained a much higher rate of economic growth and lowered the incidence of poverty to a larger extent, had agriculture been the focus of public policy attention from the beginning. In the final chapter of the report we will present a policy framework within which the decision makers working at various levels of government – in the federal, provincial and local governments – could adopt the policies needed to make agriculture one of the important determinants of economic progress and social change. For policymakers to move in the proposed direction, they will have to beat back many vested interests that would be hurt by the change in the development paradigm we propose in this work. History is important for understanding why some vested interests have developed the power they currently possess, and why they have been able to forestall the adoption of rational state policy under different political systems. Agriculture’s full potential was not realized during most of the time the military governed – the military ruled the country for 33 out of the 69 years Pakistan has been independent – as well as during the time democratically elected governments held the reins of power. One notable exception was the first part of General Ayub Khan’s rule when the government was actively involved in bringing the green revolution to Pakistan.

In this chapter, we will look at how history has shaped agriculture policy-making in six different areas. We will examine path dependence in the areas of irrigation, covering both surface and groundwater management; the choice of the pattern of cropping; the way surpluses produced by agriculture were marketed in both local and foreign markets; development of physical infrastructure to move agricultural surpluses over long distances; ownership of agricultural land and maintenance of land records, including changes in ownership; and the use of technology to improve agricultural productivity. All these areas need new approaches if agriculture is to become a more important determinant of economic progress in the country.

Before discussing these areas, one important fact needs to be noted about the legacy of British rule. The British governed with the help of a set of laws embedded in various acts put on the books

by the central authority operating out of New Delhi but also in the provinces. In the Punjab, three acts were to profoundly influence the structure of the sector of agriculture. They were the Land Alienation Act of 1901, the Land Settlement Act of 1912 and the Agricultural Marketing Act of 1932.

IRRIGATION

When the British arrived in the mid-nineteenth century in the area that makes up the current state of Pakistan, they saw a lot of vacant land and also a lot of water flowing down the rivers that originated in the wall of mountains on the north and went into the sea in the south. The province of Punjab in fact had two agricultural systems, one in the east and the other in the west. The eastern part is now the Indian state of Punjab; the western is the Pakistani province of Punjab. Both parts did not receive enough rain to sustain agriculture. The amount of water available had to be augmented. The more densely populated eastern part tapped the abundant amount of ground water fed by the rivers that flowed through the area. The sparsely populated western districts mostly depended on rain that came mostly in late summer in heavy downpours. Agriculture was much more advanced in the east than in the west. Marketable surpluses were produced in the east; in the west, it was only subsistence agriculture. This structure would have remained had the British not confronted a serious problem in the eastern part of their extensive Indian domain.

In 1857, the British had to deal with what their historians called the “sepoy mutiny.” This was the mutiny of local soldiers recruited by the British to help them expand their hold over India. However, the soldiers were not happy with the compensation they received for putting their lives in danger and for fighting what were essentially their own people. The officers who led them were from Britain and did not understand the social mores observed by the people they led. The soldiers mutinied, attacking the officers. The British responded ruthlessly and were able to bring the rebellion under control. But they learnt an important lesson in the process: for them to stay in power, they had to ensure that the citizenry was not alienated and was reasonably comfortable. It was in this period of lesson-learning that famines repeatedly occurred in the eastern parts of the Indian colony – in the provinces of Bengal, Bihar and Orissa. Preventing the recurrence of these famines became an important part of British public policy in India. Much of this policy had to do with the development of agriculture in the parts of the Sub-Continent that later became today’s Pakistan.

London established a series of Royal Famine Commissions to come up with the policy approaches to deal with persistent food shortages in eastern India. The 1898 Commission wrote a 391 page report suggesting a series of approaches that essentially meant increasing the role of the state in all aspects of agriculture: in channeling water to produce more food crops and in importing, storing, and distributing the needed grains. It was led by J.B. Lyall, the British civil servant who was later honored by having the main town of the newly irrigated areas named after him. Later, Pakistan changed the name of Lyallpur to Faisalabad.

Before the state got involved, these functions were performed by the private sector. During periods of shortages, prices increased to the point where large segments of the population could not afford to buy the food they needed. Millions died not because there was not enough food available, but because many people did not have the means to purchase it in the market. This was the conclusion reached by the Indian-origin economist, Amartya Sen, in his study of the devastating Bengal famine of 1943, in which 3 million people died. In his book, *Poverty and Famine*, which won Sen the Nobel Prize in economics in 1998, he demonstrated that decline in food production was not the main reason for famines. In Bengal, for instance, while food production in 1943 was less than in the year before, that was not the main cause for the loss of millions of lives. There were other reasons: declining wages, outright unemployment, rising food prices and poor food distribution.¹ One of the Royal Commissions suggested that the shortfalls could be met not only during period of emergencies but on a regular basis, and that this could be done by bringing into cultivation the vast tracts of virgin land available in the western Punjab and upper Sindh. This could be done by tapping the enormous amount of water that flowed down the Indus River system. The Indus and its five large tributaries had not been methodically tapped for irrigation. The little amount of water that got tapped was in the *kutch* areas that lay next to the riverbeds.

“Except in Upper Burma, there are now large [irrigation] works which are certain to be remunerative awaiting construction or completion within the districts which are liable to famine or in which the pressure of population is most severe,” wrote the Commissioners in the 1898 report.² But all the other reasons in favor of such a policy hold good, and they are strengthened by changes in conditions which have occurred since 1880, namely, the great extension of the railway system, the growth of the export trade in grain, and still greater rate of increase in population. But the Commission’s thinking was not confined to the areas in the colony that were periodically hit by famines. “... we have no hesitation in recommending the rapid extension of irrigation to remote Sindh and the Punjab, however free they may be from liability to famine, and however scanty their population, as the principal means of giving to the country an additional food supply which is beyond the risk of drought, and for increasing the proportion of secure to insecure cultivation.”

By implementing the Report of the Famine Commission, the British administration in India laid the basis for the expansion of agriculture in today’s Pakistan. Water from the well-endowed rivers that flowed through the plains of Punjab and Sindh was tapped to irrigate millions of acres of virgin land to produce large quantities of surplus food grains. These surpluses were transported to the distant food-deficit provinces in the east. Since colonial administrations were not in the business of development, much of the expenditure on constructing the vast system of irrigation was recovered from the farmers who were brought in to cultivate the land that could be brought under the plow. Collecting land taxes was to be done by a system of land administration run by a powerful official – the Deputy Commissioner – who, more often than not, was a member of the elitist Indian Civil Service (ICS).

THE PATTERN OF CROPPING

The main reason for investing large amount of public resources in developing surface irrigation was to produce surplus food grains which could be transported to the perennially food-short regions in the east. Wheat and rice were the main crops grown in the areas which were brought under cultivation. Over time, the state developed a complex set of arrangements to promote the pattern of cropping centered on the production of food grains. This pattern has continued to dominate Pakistan's agriculture even when it became clear that comparative advantage lay in other crops. This was path dependence at work.

Cotton was also a part of the cropping pattern. Once cotton fabrics became popular in Britain, the demand for raw cotton increased enormously. Initially, India was a major source of supply, overtaken later by the United States once a slave labor system was established in the southern states. Wages were low in India, but even then the country could not compete with the free labor provided by slaves. How slavery changed the cotton economy is the subject of a recent book, *Empire of Cotton* by Sven Beckert.³

This three-crop pattern (with the minor addition of sugarcane) has persisted in Pakistan in spite of the enormous changes which have occurred in the structure of international commerce and domestic demand. As we will suggest in a later chapter that discusses the situation of water in the country, the increasingly constrained supply of this important input in agriculture demands a cropping pattern that puts emphasis on the production of less water-intensive crops. As the country's population increases and the proportion living in urban areas grows, non-agricultural use of water will increase. Other sectors of the economy, such as manufacturing, will also need more water. Pakistan cannot remain a prisoner of history; it must make important structural changes.

MARKETING OF AGRICULTURAL SURPLUSES

The 1898 Royal Commission examined the appropriate way of marketing agricultural products. "We have no doubt that the true principle for the Government to adopt as its general rule of conduct in this matter is to leave the business of the supply and distribution of food to private trade, taking care that every possible facility is given for its free action, and all obstacles, material or fiscal, are, as far as practical, removed" (p. 355). Having expressed a strong preference for leaving trade in private hands, the Commissioners did find some reasons for the government involvement. There were "exceptional cases in which the Government might find it necessary to intervene, in departure from the general principle of absenteeism from interference with private trade... These were (1) when it is necessary for the Government to provide food for its own relief works and gratuitous distribution in localities where no immediate arrangements for the supply of food exist; (2) when a stimulus is required to trade where it is sluggish, as for example in districts in which communications or the means of transport are defective, or to which access by railways

or by water cannot be secured at all seasons; (3) when in poor tracts, where wages are paid in grain and not in money and the local demand is not met by imports from distant marts but by small purchases from the stores of the agriculturalists, the agriculturalists refuse to sell and local traders are afraid to import; and (4) when a combination takes place among local dealers to refuse to sell or only to sell at prices unduly raised above the rates of neighboring markets”⁴ (p.355). In other words, the state’s role in agricultural marketing was to be highly restricted.

The state’s role was sustained in the Post-British period with the adoption of a highly restricted procurement plan in the 1960s when the surpluses produced by agriculture were procured at pre-determined prices. The set prices satisfied a number of objectives which were often in conflict. By setting the price, above the market the state wished to encourage the farming community to increase output. However, at the same time it aimed to provide food in the urban areas at affordable prices.

Infrastructure for Transporting Food Surpluses

Once the irrigated areas began to produce food grains which were far in excess of the farming communities’ needs, the British administrations in both New Delhi and Lahore focused their attention on creating physical infrastructure which would move the surplus. Several areas were worked upon. Enormous investments were made in developing elaborate systems of roads and railroads. The road network used the existing Grand Trunk Road originally constructed by Emperor Sher Shah Suri, who briefly ruled in the middle of the 16th century after having defeated Humayun, the second of the six great Mughals. Suri connected the north of India with the Sub-Continent’s east. The origin of what became a vast railway network was related to the development of irrigation. The first rail line in the country was only 15 km long. It connected Rorkhe and Piram Kaliyar; the first train on the line moved on December 22, 1851. This was to help construct an irrigation system which needed large quantities of clay that was available in the Piram Klilyar area. The need to transport clay, a heavy material, could be met cheaply by rail. The network that began modestly was expanded quickly especially after the 1857 mutiny. The British wanted to be able to move large numbers of troops if they were needed for ensuring security. According to Robin Burgess and Dave Donaldson, two railway historians, “the ability of rainfall shortages to cause famine disappeared after the arrival of railways.”⁵

LAND OWNERSHIP AND LAND RECORDS

Most of the land, which could now be cultivated, belonged by default to the government since there was no established private ownership of it. Once irrigation arrived in the vacant lands of the Punjab and northern part of Sindh, people were needed to work the virgin lands. The British administration chose a strategy that simultaneously served two objectives: releasing the growing pressure of population in the Punjab’s eastern districts and bringing settlers to the virgin land

brought under cultivation. Land grants were made to those who were prepared to work the land that now had water available. There was a sizeable migration from the East Punjab to the West Punjab under various colonization schemes. The Colonization of Government Lands (Punjab) Act, 1912 was promulgated to settle the land that could be brought under cultivation. According to Section 10 of the provincial act, “the board of revenue subject to the general approval may grant land in a colony to any person on such conditions as it thinks fit. The Provincial Government may issue a statement or statements of the conditions on which it is willing to grant land in a colony to tenants. Where such statements of conditions have been issued the Collector may subject to the control of the Board of Revenue allot land to any person...as the Collector may by written order declare to be applicable to the case. No person shall be deemed to be tenant or to have any right or title in the land allotted to him until such a written order has been passed and he has taken possession of the land with the permission of the Collector. After the possession has been taken, the grant shall be held subject to the conditions declared applicable there to.” “Colony” was any area that could be designated as such by the provincial government.

The Act created new land rights over which the government could keep a close watch. To do that, an administrative structure was needed which was created by devolving considerable authority to an official called the “Collector.” Most of the “Collectors” who served in the Punjab were from Britain. A large body of local officials helped this official. At the bottom of the structure was the *patwari*, a poorly paid official responsible for keeping land records. His job encompassed visiting agricultural lands in the area for which he had responsibility and keeping track of the changes in land-ownership as well as tenancy rights. The *patwar* system was first introduced during the short but eventful rule of Emperor Sher Shah Suri, the builder of the original Grand Trunk Road. It was further developed by Akbar the Great. Upon assuming power in the sub-Continent, the British made minor adjustments but continued the land administration system. The British paid the *patwari* poorly in order to avoid putting a financial burden on the administration. They were aware that the *patwari* would charge the locals for providing the services required of him. Corruption, in other words, was built into the system of land-record maintenance adapted by the British.

The system developed strong vested interests. The *patwari* and his immediate supervisors cultivated strong links with the more powerful landlords and local elites. The impact of this arrangement has reached down into modern days as the *patwari* system has effectively succeeded in delaying the implementation of a World Bank funded program to computerize the system of land records.

TECHNOLOGY AND AGRICULTURAL PRODUCTIVITY

Britain’s use of the enormous agricultural potential of their Indian colony involved the introduction of new technologies. Two of these, railways and canal irrigation, were game-changers. The

irrigation system was largely constructed in parts of the provinces of Punjab and Sindh, later to be included in Pakistan. The administration in the Punjab also established an infrastructure for conducting research and extension work in the province. While surface irrigation turned the Punjab and Sindh into granaries of India and the railway system carried the surpluses to the food deficit areas of the large colony, agricultural research did not accomplish very much. “Economic historians have written very little about the impact of improved biological and chemical technology on Indian agriculture during the first half of the twentieth century,” wrote Carl Pray in a 1984 paper. “The basic reason is that the aggregate official estimates of yield per acre used to measure technological change do not show any dramatic improvement during the first half of the twentieth century. Both output per acre and output per capita appear to be stagnant or declining. The accuracy of official statistics, however, has been challenged in recent years.”⁶ According to George Blyn, who studied agricultural trends in British India, for all crops the average annual growth rate was an insignificant 0.01 percent a year. Food grain yield per acre actually declined by 0.18 percent annually for the period 1891 to 1947. Output increased entirely because of the increase in the area under cultivation. Rice was by far the most important crop; its output per acre decreased by 0.57 percent, pulling down the yield for all food grains.⁷

Pakistan has invested very little in developing a strong technological base for the agriculture sector. In fact, the institutions it had inherited from the British rule have been allowed to deteriorate, a point developed at some length in a later chapter.

CONCLUSION: THE ROLE OF THE STATE

On August 14, 2017, Pakistan will celebrate its seventieth birthday. It has yet to settle down as a state, let alone a nation. A state does not necessarily make a nation. A state is a collection of governance institutions that can perform some basic functions. A nation, on the other hand, is a composite of history, culture, beliefs and attitudes. A functioning state does not mean it is necessarily working for a nation. It may be delivering basic services to the people who live in a specified geographic space, but the residents of that space may not think of themselves as a nation. A functioning state, however, does create an environment within which its citizens can begin to define themselves as a nation. This juxtaposition of state and nation is a dilemma that Pakistan has not been able to resolve in the seventy years since its birth.

That a state that works well will eventually create a nation out of its people is well illustrated by the case of the United States. What strikes many who were not born Americans but have lived in the country for decades is the striking sense of pride, nationalism and patriotism possessed by the citizens of the country. Many Americans call themselves a “nation of immigrants.” What is striking about the large cosmopolitan places in the country such as New York, Los Angeles and Washington is the ethnic, cultural and linguistic diversity of the place they call home. It is apparent

from the color of their skins, the languages they speak, the food they eat, even the history to which they are attached. The United States works as a nation because, by large, the state has worked to deliver most of what the citizens want from it.

Turning to Pakistan, we should ask a simple question that is not easy to answer: Why has it been so difficult for the country's citizens to go beyond their separate ethnic and religious identities? Karachi and several other cities of southern Sindh are good examples of how ethnic politics has obstructed the development of the country's political structure. These urban areas are dominated by a political group that now calls itself the *Mutahida Qaumi Mahaz* (MQM) that is entirely focused protecting and promoting the rights of the descendants of the people, *the muhajirs*, who migrated to Pakistan from the Muslim minority provinces of India. This ethnic orientation of the MQM reached the point at which its founder who lives in exile in London addressed his followers in Pakistan and called the country a "cancer" on the world polity.

One possible answer is that the state has not settled down as an apparatus that works for all segments of the population. For the last 70 years, those who held the reins of power tried several different systems to provide what the people want. That experiment continues into the seventieth year of independence.

As already discussed in the context of the development of Pakistan's agriculture, the country inherited a highly intrusive state from the rule of the Sub-Continent by the British. It has remained largely so even after seven decades of independence. The intrusive state-form was brought from New Delhi to Karachi, Pakistan's first capital, by a group of civil servants who opted to work for the new country. Many of the senior people who belonged to this group were members of the ICS. There were eighty-one ICS officers who chose to work in Pakistan. Not all were Muslims; some, who belonged to Britain, correctly sensing that they will wield more power in a politically weak Pakistan opted to serve in that country. But the ICS was not the only British Indian service that contributed manpower to the senior echelons of the administrative structure being built in the new country. Ghulam Muhammad, Pakistan's third governor general, and Chaudry Muhammad Ali, one of its early prime ministers, came from the Accounts Service while General Iskander Mirza was a member of the Indian Political Service. The fact that bureaucrats dominated the policymaking apparatus in Pakistan while in neighboring India, born a day after Pakistan's birth, politicians were in full control was the result of the relative maturity of the Indian political system. It was perhaps due to the bureaucracy that Pakistan was able to overcome so many of the problems it faced at birth.

However, civilian bureaucrats had little knowledge of agriculture and little interest in developing the sector. They promoted the country's rapid industrialization by providing incentives to the private sector to make investments in consumer goods industry. An effort was needed to overcome

severe shortages of the items of daily consumption when the government in New Delhi imposed a trade ban on Pakistan. This was in 1949, only two years after the country had gained independence and was still struggling to stand on its feet. As chronicled by Harvard University's Gustav F. Papanek, who served as an advisor to the Planning Commission, private response to the incentive structure was impressive. Value-added in manufacturing increased by 18 percent a year, propelling the economy at a rate not rivaled by any other place in the developing world.⁸

The neglect of agriculture in the first post-independence decade was to result in the appearance of severe food grain shortages in the mid-1950s, which brought the country to a near-famine situation. There was considerable irony in the fact that Pakistan was to become heavily dependent on food grain imports having once fed the food-deficit areas in British India. Not possessing the resources to buy food from abroad, it appealed to the United States for help. This was provided as a part of a program called the PL-480 that allowed Washington to receive payments in local currency, the Pakistani rupee. These payments were used to finance a large aid program in the country. This turn of events was to profoundly impact Pakistan's foreign relations and also the structure of incentives for the farming community.

In October 1958, General Muhammad Ayub Khan took control of the country and introduced the military into the bureaucratic-political system. The civil-military combine sidelined politicians and concentrated on developing the country's economy. Unlike the civilian bureaucrats, who had wielded enormous policymaking powers in the first post-independence decade, Ayub Khan had strong links with the country's rural economy. He "indigenized" Pakistan's political system by bringing in large landlords as his political partners.⁹ He thus prepared the ground for the arrival of the "green revolution" in the country.

But this process was disrupted by the rise of an exceptionally talented but flawed politician, who by raising the "roti, kapra, makan" slogan was able to attract the segments of the population who felt that they had been left behind by the Ayub Khan's "decade of development."¹⁰ Zulfikar Ali Bhutto did not realize that he needed a well-functioning state to deliver on his promises of providing citizens their basic needs. He failed and saw the military come back to power. General Ziaul Haq not only took power from Bhutto but also his life. For three decades after the Zia-intervention, Pakistan see-sawed between military and civilian rule. It was in 2007 that the rule was challenged by the Pakistani version of what four years later came to be known as the "Arab Spring." The lawyers' movement, which saw General Pervez Musharraf out of the political door, set the stage for Pakistan's delayed political development. The country is now in the process of establishing a representative political order that is likely to be inclusive. It promises to serve all people, not just a limited few. But for this experiment to succeed, the political system must put in place a working structure that can deliver economic and social services for the entire population.

With this as the background, we can conclude this discussion of the management of the important sector of agriculture by the state. What is now required is a state that is not intrusive but supportive. The elaborate structure built by the British to serve their interests needs to be totally overhauled. Some of what London did then cannot – in fact, should not – motivate the state. The laws put in place at that time need to be removed, replaced by a system of regulation that enables agriculture to realize its enormous potential. One good example of the moves the government needs to make is in marketing where the Agricultural Marketing Act oversees a complex marketing structure in which the state plays an important role. The state is also involved in the procurement of food grains at specified prices, resulting in introducing severe distortions in the sector.

Chapter 3

Historical Overview of Agricultural Development in Pakistan: Successes, Weaknesses and Growing Challenges

Chapter 3

Historical Overview of Agricultural Development in Pakistan: Successes, Weaknesses and Growing Challenges*

INTRODUCTION

The chapter examines long-term growth trends in Pakistan's agriculture and attempts to link these broadly to policy and investment considerations. Starting in the 1960s, we see a connection between agricultural growth rates and the expansion of canal and ground water availability. Agricultural growth is also linked with the adoption of new high-yield seed varieties and greater fertilizer use in rice and wheat cultivation. However, despite the quick diffusion of this Green Revolution technology package over the 1970s and a significant burst in cotton productivity in the late 1980s, estimates of total factor productivity suggest limited growth in agricultural productivity over the long run. Apparently, low returns to irrigation water use as well as less effective use of seeds and fertilizer after the 1960s constrained productivity growth. Lack of significant diversification to higher value added crops has also hampered overall growth in agricultural productivity. With productivity growing slowly and the availability of irrigation water leveling off after 2000, the overall rate of agricultural growth has come down despite a strong performance in the livestock sub-sector.

Against this background, the present government's objective "to attain a sustained agricultural growth rate of four to five percent"¹ is unrealistic. The average growth rate since 2006-2007 has been a little over two percent per annum. Pakistan cannot count on any significant increase in irrigation water supplies in the near future. The use of nitrogenous fertilizer is at near optimum level. Government policies have been preoccupied with major crops, especially wheat, and have not given sufficient support to higher value crops and the livestock sector.

Fortunately, Pakistan's full agricultural potential remains under-exploited. Better use of irrigation water can help revive agricultural growth rates. So can a strategy focused on higher value added commodities such as oilseeds, fruits and vegetables, milk and meat. This is especially so because the prospects for expansion of wheat output are limited.

In retrospect, the near trebling of water supply during 1960-90 made possible by the Mangla and

*This chapter was prepared by Parvez Hasan

Tarbela Dams and the expansion of groundwater exploitation via private tube wells were a mixed blessing. It is not too late for Pakistan to emphasize primarily on improving agricultural productivity through a combination of better use of water and fertilizer, agricultural research and extension focused on improved seeds, and much greater attention to higher value added activities with an eye to raising exports.

AGRICULTURAL GROWTH AND POLICY IN THE 1950s²

Agricultural growth in the then West Pakistan during the 1950s was below the rate of growth of population and was almost entirely due to the expansion in cropped area from 24.5 million acres at the end of 1940s to 28.5 million acres at the end of the 1950s. Average yields of principal crops stagnated or declined notably, the only exception being cotton. The biggest failure was in wheat, the staple diet in Pakistan. Average wheat production at the end of the 1950s was actually lower than a decade earlier. This had adverse consequences on food grain availability and average living standards. Per capita availability of food grains in the late 1950s was about 10 per cent lower than a decade earlier.

Crops	1948-9	1957-8
	to 1950-1	to 1959-60
Wheat	3.92	3.76
Rice	0.79	0.94
Other Food Grains	0.75	1.10
Sugar	6.67	11.32
Cotton	0.21	0.27
Jute	0.88	1.05
Rice	7.46	7.33

Large-scale imports of food grains first became necessary in 1952 and 1953 because of poor crops. But by 1956, they had become a permanent feature of the economic picture. During the years 1957-1959, wheat imports averaged 0.75 million tons and were equivalent to about 20 percent of wheat production in West Pakistan. In the second half of the 1950s, the bulk of imports of food grains were financed by concessional PL 480 assistance from the United States. This reduced the urgency of increasing food grain production, which in turn compounded the neglect of agriculture.

1952	323	1956	427
1953	1,189	1957	792
1954	135	1958	759
1955	-	1959	722
1960	1,220		

(Source: Economic Survey, 1960-61, Table 29, Government of Pakistan.)

No doubt, floods, drought, and uncertain availability of water from rivers controlled by India adversely affected agricultural production, especially in food grains. However, a good deal of the blame can also be laid at the door of agricultural policies. In the years immediately after the partition, policymakers were preoccupied with stimulating industrial growth. Food grain availability had been comfortable in pre-partition years and, therefore, food self-sufficiency was taken for granted.

The failure of wheat crops in 1952 and 1953 was considered a temporary phenomenon. The Korean War led commodity boom, which generated a very large increase in earnings in early 1950s from agricultural commodity exports, especially cotton. This probably compounded the complacency about agriculture. It could also be that the major transfer of population after the partition in 1947 adversely affected production. While the departure of Hindu moneylenders was a source of relief for indebted farmers, it is also likely that new credit mechanisms did not emerge quickly.

The 1949 exchange rate decision not to follow pound sterling's devaluation in relation to the US dollar also hurt agriculture partly because it revalued the Pakistan rupee in relation to the Indian rupee. The overvaluation of the exchange rate transferred income away from agriculture, the main source of exports, to the rest of the economy. The deterioration in agricultural terms was compounded by the regime of export duties on agricultural commodities, price controls, and compulsory procurement of wheat at below market prices. Export duty on cotton remained high even after the reduction of exceptionally steep duties imposed during the Korean War commodity boom. Cotton export duty, which ranged from Rs 90 to Rs 135 per bale during 1953-8, constituted a tax on export value of around 30 per cent. The procurement price of wheat was increased to Rs 12 per maund in 1953 but remained at this level for the next five years in spite of a general rise in the price level. Even at the official exchange rate, the procurement price remained well below world prices in the second half of the 1950s. The result was that even though procurement was compulsory, disappointing amounts were procured. In 1958, for instance, only 242,000 tons or less than 7 per cent of the wheat output were procured against the target of 400,000 tons. As the release price of wheat was also controlled, the imported wheat had to be subsidized. The 1956-1957 budget white paper implied that the subsidy on imported wheat was close to 45 per cent. This subsidy was, in turn, financed by the counterpart funds generated by food aid and loans which in the second half of the 1950s provided 85 percent of wheat imports. In this case, not only was foreign aid used to finance consumption rather than investment, but the food aid availability also seriously undermined the long-term incentives for agriculture.

By the mid-1950s, plans and public statements emphasized the priority of agriculture. However, there was little follow-through except for an increase in government investment in irrigation. Failures of agricultural policies had thus multiple dimensions. First, exchange and trade policies as well as direct controls on food grain prices and compulsory procurement of grains had serious disincentive effects for agriculture. Second, the issues relating to land reform were not seriously considered, much less addressed, because political power had moved towards the landed aristocracy. Third, the support packages for fertilizer, seed, and upgrading of extension services were slow in developing. However, despite emphasis on public investment in power and industry, investments in water projects were not neglected.

STRONG AGRICULTURAL GROWTH DURING 1960-2000

The agricultural sector did much better in the four decades that followed the 1950s. As Table 3.3 shows, agricultural growth averaged well over 4 percent per annum during 1960-2000, a record matched by few countries over such a long duration. The remarkable growth was the result of a combination of factors. The most important of these were a three-fold increase in supply of irrigation water over 1960-1990, a speedy and effective response to the adoption of the green revolution in wheat and rice in the second half of the 1960s, rapid increase in fertilizer use and a major breakthrough in cotton productivity in the second half of the 1980s.

In between, there were periods of slow growth as well. For example, growth during the 1970s dropped to 2.4 percent as a result of the uncertainty created by land reforms (and their selective implementation) in 1972 and 1977, severe climatic shocks, a cotton virus that depressed production for most of the decade, and political instability. The

recovery in the 1980s and early 1990s was due to the introduction of new cotton varieties and improved management techniques, as well as to a gradual improvement in economic incentives.³

There are few parallels in the world history to Pakistan's achievement of increasing the overall availability of irrigation water at the farm gate from around 50 million acre feet in 1960 to well over 125 million acre feet by 1980. This expansion was due to two major developments: public investments in dams and barrages under the Indus Basin Treaty and a spontaneous private sector revolution in tube well development starting in the early 1960s.

LAND USE AND CROPPING INTENSITY

The increase in irrigation water availability led to a sharp increase over time in area under major crops from 10.5 million hectares in 1970 to 15.4 million hectares in 2000. Area under minor crops, oilseeds, pulses, fodder and fruits and vegetables remained almost unchanged at nearly 5.06 million hectares over the period. The increase in cropped area reflected mainly increased crop-

Table 3.3
Agriculture Growth Rates (at constant factor cost)
(% per annum)

Years	Growth rates
1960s	5.1
1970s	2.4
1980s	5.4
1990s	4.4
2000s	3.2
2003-04	2.4
2004-05	6.5
2005-06	6.3
2006-07	3.4
2007-08	1.8
2008-09	3.5
2009-10	0.2
2010-11	2
2011-12	3.6
2012-13	2.7
2013-14	2.5
2014-15	2.5
2015-16	-0.2

Source: Pakistan Economic Survey, various issues. Economic Indicators

ping intensity made possible by greater availability of Rabi water mainly through increased water storage and further tube well development. The total farm and cultivated area in 2000 at 20.4 and 21.1 million hectares respectively was more or less unchanged from 1972. Of the increase in cropped area (see Table 3.4), 55 percent was accounted for by wheat and the rest by rice (over 15 percent), cotton (18 percent) and sugarcane and maize (6 percent).

Table 3.4
Area Under Important Crops

Years	(000 Hectares)					
	Wheat	Rice	Maize	Sugarcane	Cotton	Total*
1960	4,639	1,181	480	388	1,293	7,981
1965	5,155	1,393	542	597	1,561	5,155
1970	5,977	1,503	640	636	1,733	10,489
1980	6,984	1,933	769	825	2,108	12,619
1990	7,911	2,113	845	884	2,662	14,415
2000	8,181	2,377	944	961	2,928	15,390
2010	8,901	2,365	974	988	2,689	15,917
2015	9,180	2,891	1,130	1,141	2,961	17,303

*Total Area under wheat, rice, maize, sugarcane, and cotton

Source: Pakistan Economic Survey, Ministry of Finance

CANAL AND GROUND WATER DEVELOPMENTS

Total water and power investments during the 1960s exceeded US \$2.5 billion and accounted for more than 50 percent of total public development spending. This was a clear indication of the priority given to water and power development. There is thus some validity to the view that “the big landlord used the political power at his disposal to make available to his class the resource over which the government had the greatest control, that is, irrigation water.”⁴ However, it was Ayub’s political decision to go ahead with the Indus Basin Treaty in 1960 that accelerated the pace of investments in water and power.

Meanwhile, concerned with growing problems of salinity and water logging, Pakistan sought advice from the US. This resulted in the launch of a large number of Salinity Control and Reclamation Projects (SCARPS) involving the use of public tube wells to lower the water table. Meanwhile, farmers had begun pumping water out of the ground through tube wells on their own, but the scale of this private effort did not become known until around 1967 when a World Bank study drew attention to it.⁵ Unfortunately, the public tube well program turned out to be expensive, unwieldy and of long gestation. It was eventually wound down.⁶ Ground water availability at the farm gate increased from 4.2 million acre feet (MAF) in 1960-61 to 50 MAF in 2000-01, but nearly 75 percent of this increase (35.5MAF) came from private tube wells. Despite huge public expense and subsidies, public tube wells added only 12 MAF to irrigation water availability.

Table 3.5
Irrigation Water Supply
Total Availability at Farm Gate

(million acre feet)

Years	Canal Water Kharif	Canal Water Rabi	Public Tubewells	Private Tubewells	Total
1960-61	33.6	16.6	--	1.4	51.6
1970-71	45.3	24.7	-	13.2	83.2
1980-81	59.8	40.7	NA	25.2	125.7
1990-91	52.0	31.4	12.4	38.2	133.3
2004-05	53.4	32.2	9.9	40.1	135.6
2009-10	58.4	25.1	9.7	40.5	133.7

Source: Pakistan Economic Surveys, Planning and Development Division and IRSA

FOOD SUFFICIENCY AND SUPPORT PRICES

During 1965-1970, wheat and rice output in West Pakistan increased by nearly 75 percent; fertilizer use increased nearly fivefold; the number of private tube-wells doubled, and new seeds covered nearly 75 percent of the irrigated area as under wheat and rice. The policy motivation for food grain self-sufficiency came from the end of the PL480 agreement with the US in 1966. By then the attitude of the US government towards supplying wheat to Pakistan had changed, partly due to political factors and partly due to reduced surpluses. In 1967, the government of Pakistan had to commit substantial cash foreign exchange for food grain imports. This ended the relatively relaxed attitude of Pakistani planners towards domestic food grain production. The President directed that plans be prepared for attaining self-sufficiency in wheat and rice in the shortest time. This was a clear case where reduced foreign aid availability forced greater domestic effort.

The successful implementation of the West Pakistan Food Self-sufficiency Programme also demonstrated the strengths of the planning and economic policy coordination mechanisms developed in the 1960s. Major policy adjustments were carried out in such areas as irrigation water and tubewell development, fertilizer supply and distribution, and rice support and procurement management.

There was a major reorientation of public expenditure priorities in water and power in West Pakistan. The public tube well investment program was discontinued and WAPDA was given a target of 5,000 electric connections per annum for private tube-wells. Fertilizer use expanded at an annual rate of 35 to 40 percent during 1967-1970. At this level, the effort required for retail fertilizer distribution proved beyond the capacity of the public sector and the private sector was brought in to help.⁷

Procurement prices were increased as well, by over 25 percent in the case of the 1968 wheat crop. This provided much windfall income to the more prosperous farmers as no system of agricultural taxation was in place. This decision was motivated perhaps not so much by class interest as by nervousness about future food supply. The basic idea of a relatively high guaranteed support price for wheat, however, was quite sound and stabilized the grain supply position at a critical time.

Heavy procurement at generous support prices seriously tested the government purchase and storage capabilities. With the bumper crop of 1968, the marketable surplus of wheat, which had averaged about 400,000 tons annually in previous years, trebled to 1.2 million tons. Because of the subsidy on the release price of wheat, the government had to purchase the bulk of the marketable surplus. The implied credit needs were large and special accommodation had to be provided by the State Bank of Pakistan. It is doubtful whether the private sector and the banking system would have shown sufficient flexibility and speed in entering this new field if the government had not intervened.

A combination of policies thus delivered large increases in food grain output in a short time. As pressure on public resources became more intense and foreign aid more uncertain, private sector alternatives for tubewell development and fertilizer distribution were successfully explored. Had it not been for the changed attitude of the United States about food grain supply to Pakistan, government machinery would not have been geared up quite as strongly, as it was in support of the Green Revolution. In this respect, the resource-tight context of the Third Plan years (1965-1970) did have a silver lining.

PRODUCTIVITY AND YIELDS

The substantial increase in wheat, rice and cotton yields per acre over the 1960s involved a substantial increase in input of water per unit of land. The area under major crops did increase by 31.4 percent over the 1960s, but it did not match the increase in irrigation water availability of 60 percent over the period (See Table 3.6 below). The greater use of water per unit of land and substantial increase in fertilizer would suggest that, despite the use of improved seed varieties, factor productivity did not increase very much if at all. Apparently, ample availability of water and fertilizer at very low cost assured high profitability without much attention to be paid to the care with which inputs were used.

In the next two decades (1970-1990), agricultural growth was sustained at a high level as irrigation water supply increased further by 50 percent, fertilizer consumption expanded rapidly and raw cotton production experienced a breakthrough. The sharp improvement in cotton productivity from 265 kg per hectare in 1976-1978 to the peak of 769 kg in 1991 was reflected in two-and-a-half-fold increase in production in the 1980s. This remarkable expansion in cotton productivity

cannot be directly related to price incentives. The cotton/wheat price ratio was actually less favourable in the 1980s than in the 1970s. The domestic cotton price also remained well below the international prices for most of the period.

Table 3.6
Yield Per Hectare of Major Agricultural Crops

Years	Yield Per Hectare of Major Agricultural Crops					(Kg/Hectare)
	Wheat	Rice	Sugarcane	Maize	Cotton	
1965	811	969	33,818	1,060	286	
1970	1,083	1,464	36,426	1,122	313	
1980	1,643	1,616	39,223	1,262	339	
1990	1,825	1,528	41,562	1,367	560	
2000	1,841	1,543	40,712	1,401	615	
2010	2,833	2,039	55,981	3,806	725	
2015	2,775	2,423	54,910	4,155	802	

Source: Pakistan Economic Survey, Various Issues

FERTILIZER USE

Rapid growth in fertilizer use began in the late 1960s and continued over the next three decades. Fertilizer consumption increased 10 fold between 1970-1971 and 1999-2000 to reach 3 million tons of total nutrients.⁸ This was a very impressive average annual rate of growth of 9 percent. However, consumption of fertilizer grew by only around 3.3 percent per annum over 2000-2010 and actually declined by 15 percent over 2010-2015.

Table 3.7
Trends in Annual Fertilizer Offtake

	Years							Annual growth rate (%)			
	1965	1970	1980	1990	2000	2010	2015	1970-80	1980-90	1990-2000	2000-2010
Nitrogen	251.52	69.83	842.93	1,471.64	2,264.49	3,133.50	2,521	23.5	7.5	5.4	3.8
Phosphorus	30.45	1.22	226.9	388.5	676.73	767	796	64.5	7.1	7.4	1.3
N:P	8:1	1:0	4:1	4:1	3:1	4:1	3:1	0.3:1	1.1:1	0.7:1	3:1
Potash	1.24	-	9.63	32.76	22.75	32.3	23	67.7	24.0	-3.1	4.2
Total	283.21	71.05	1,079.46	1,892.90	2,963.90	3,932.80	3,341	28.1	7.5	5.7	3.3

Source: Pakistan Bureau of Statistics.

Most of the fertilizer is used on irrigated wheat, cotton, sugarcane and rice. "On these crops the nitrogen application rate is 80 percent of the recommendation, compared with about 40 percent or less, depending on the crop, in the case of phosphate. Scarcely two percent of farmers apply potash: the quantities used are applied to fruits and vegetable crops and sugarcane. Micronutrient deficiencies are common as less than 5 percent of farmers apply micronutrient fertilizers".⁹

Effective, balanced and greater use of fertilizers for minor crops and fruits and vegetables remains a major issue. However, the government deserves credit for phasing out the heavy subsidies provided for fertilizer in the 1960s and 1970s. An FAO 2004 paper had this to say about government fertilizer policy: “The government privatized and de-regulated fertilizer imports and prices. In 1986, all subsidies on nitrogenous fertilizer were abolished followed by phosphates in 1993 and potash in 1997. Provincial quotas were abolished, provincial supply organizations in the public sector abandoned and import controls lifted. All imports are affected by the private sector. In 2001, the government imposed a 15 percent sales tax on all fertilizer products. Farmers have to pay international prices for imported products, apart from urea.”¹⁰

Fertilizer policy has continued in a similar vein. Currently, the share of the private sector in fertilizer marketing is 89 per cent compared to 11 per cent for the public sector. The private sector handles about 90 percent of the urea and 100 percent of the other fertilizers. There has also been a reduction in the reliance on imports. Whereas in the 1960s a lot of fertilizer was imported, by 2015-2016 almost the entire requirement of urea was met from domestic production

TERMS OF TRADE

It needs to be noted, however, that the terms of trade remained unfavourable for agriculture almost the entire period of 1960-1990. Hamid Nabi and Anjum Nasim estimate that total price interventions, direct and indirect (including overvaluation of the exchange rate) may have reduced output compared to potential of wheat by 12 percent, Irri rice by 25 percent, basmati rice by 32 percent and cotton by 42 percent.¹¹ The Export Bonus Scheme particularly harmed the interests of the agriculture sector and provided excessive subsidies for manufactured goods especially cotton textiles. Even after the formal devaluation and unification of the exchange rate in 1972, advantage for agriculture was offset partly by export duties. The terms of trade effect were not offset by the continued large subsidies on fertilizer and pesticide, which continued throughout the 1980s.

It should also be emphasized that distribution of growth benefits in agriculture did not fully reach the small farmers mainly because land reforms both under Ayub and Bhutto were not far reaching. Under Ayub, about 5,000 landlords surrendered 2.35 million acres, but less than one million acres were of relatively good quality. Its distribution benefited mainly about 200,000 tenants who received an average of 3.85 acres. In Bhutto years, the area that resumed the 1972 land reforms was only 1.3 million acres or less than half the area acquired under the 1959 reform though the conditions of tenancy were improved.

GROWTH IN LIVESTOCK SUBSECTOR

During the 1990s, there was very limited further growth in overall supply of irrigation water because of no addition to water storage after the Tarbela Dam. A national consensus on new dam building has proved elusive all the way into the current decade. Despite this, overall agri-

cultural growth remained well over 4 per cent per annum. Two main factors helped to sustain agricultural growth. First, the terms of trade for agriculture were improved by finally eliminating the heavy duty on raw cotton exports, which had long favored the domestic textile industry; also, the support prices of wheat and rice were raised sharply – at a rate substantially higher than the rate of inflation. Equally important was the sharp rise in livestock production mainly reflecting the increase in the production of milk and meat, which was largely a result of private initiatives.

Table 3.8
Trends in Annual Production of Milk and Meat

Product	Years					Annual growth rate (%)		
	1980	1990	2000	2010	2015	1980-1990	1990-2000	2000-2010
Milk	9,267	15,481	26,284	37,475	42,454	6.7	7.0	4.3
Meat	856	1,581	2,015	3,095	3,696	8.5	2.7	5.4

Source: 1) Pakistan Bureau of Statistics.

RECENT TRENDS

Agricultural growth has clearly slowed down in the last decade. Output growth averaged only two percent per annum during 2006-16 and was negative in 2015-16. Factors responsible for the decline of 6.25 percent in the crop sector in 2015-2016 included a sharp drop of 28 percent in cotton production due to a severe attack of pink bollworm. However, the production of major crops has been growing slowly for quite some time. Excluding the last bad year, the overall rate of growth of value added in major crops over 2006-2015 was only 1.5 per cent per annum. In contrast, growth in the livestock sector has been 3.3 percent per annum over the last decade. The share of the livestock sector in agricultural product that was already 52 percent in 2005-06 rose to 59 per cent in 2015-16. Within the livestock sector the rise in milk and poultry production has been the major source of growth.

While major crops have limped along at a slow rate during the last decade, the value added in the other crops, which include fruits and vegetables and oil seeds, actually dropped slightly from 14.5 percent in 2005-2006 to 11.3 percent in 2015-2016. The relative neglect of these other crops is also reflected in the worsening balance of payments in respect of these crops. Pakistan's exports of fruits and vegetables amounted to Rs.2336 billion in 2014-2015 while its imports of fruits and vegetables were Rs 4622 billion.¹² It thus incurred a net deficit of US \$ 220 million instead of a significant surplus as a large potential exporter of fruits and vegetables to neighboring high-income countries. In addition, edible oil imports have grown enormously over time. According to the State Bank of Pakistan, annual imports of animal, vegetable fats and oil products averaged over US \$2 billion over the last three years.

Table 3.9
Agriculture Sub-Sector growth (Base=2005-06) Per Annum

Sector	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16P
Agriculture	1.8	3.5	0.2	2.0	3.6	2.7	2.5	2.53	-0.19
Crops	-1.0	5.2	-4.2	1.0	3.2	1.5	2.64	1.04	-6.25
i) Important Crops	-4.1	8.4	-3.7	1.5	7.9	0.2	7.22	-0.52	-7.18
ii) Other Crops	6.0	0.5	-7.2	2.3	-7.5	5.6	-5.71	3.09	-0.31
iii) Cotton Ginning	-7.0	1.3	7.3	-8.5	13.8	-2.9	-1.33	7.24	-21.26
Livestock	3.6	2.2	3.8	3.4	4.0	3.5	2.48	3.99	3.63
Forestry	8.9	2.6	-0.1	4.8	1.8	6.6	1.88	-10.43	8.84
Fishing	8.5	2.6	1.4	-15.2	3.8	0.7	0.98	5.75	3.25

Source: Pakistan Bureau of Statistics

P: Provisional

The weak growth in the crop sector has occurred despite substantial state support and the exemption of agricultural income from the income tax. On the input side, very low charges for canal water remain a major subsidy. *Abiana* rates have remained pitifully low and do not cover any significant portion of even variable costs of providing water. Another source of market distortion is the high support prices for wheat. These have been steadily raised at a rate much above the rate of inflation and are now far above the international price of wheat. The procurement and distribution of wheat through an extensive state controlled system is both inefficient and unnecessary.

Table 3.10
Wheat Procurement/Support Prices

		(Rs per 40 kg)	
1969-70	18	1999-2000	300
1976-77	40	2006-07	425
1979-80	58	2010-11	950
1986-87	80	2011-12	1050
1990-91	112	2012-13	1200
1994-95	173	2014-15	1300

Some studies show that the total factor productivity in crop agriculture increased from about 1970, with estimates ranging from 1.5 percent to 2.3 percent per year.¹³ However, it is not clear that these studies take into account the proper cost of canal irrigation water; other studies paint a different picture. For example, some studies suggest that since the early 1990s, Punjab's total factor productivity has at best remained constant and may have even declined.¹⁴ The World Bank 2007 report indicates that from 1993-2003, total input use increased by 1.80 percent per year. Thus, total crop productivity in Punjab agriculture fell by 0.11 percent per year over the period. According to the World Bank, "severe droughts in several years are part of the explanation. There is also evidence of long-term deterioration in water and soil quality. Reduced effectiveness of agricultural

research and extension services also played a role.” But it must be added that limited growth in agricultural productivity also reflects the fact that, over time, there has not been much diversification to higher value crops partly because the government’s policies have been pre-occupied with major crops especially wheat.

Raising the sector growth rate from 2% to 4% per annum would require much greater productivity growth in the major crops and a strong policy push for exports of fruits and vegetables, meat and possibly milk and focused efforts to increase oilseeds production, especially of sunflower and canola.

As discussed above increased water supplies have been critical for agriculture in the past. Pakistan cannot count on increased irrigation water supplies for at least a decade or so. The prospects that work will start soon on a new dam project (such as Basha or Kalabagh) are slight. Meanwhile, the capacity of Tarbela and Manglais slowly declining because of silting. In addition, the demand for water for non- agricultural uses is rising sharply with population growth and urbanization. It is necessary, thus, to assume and strive for a pattern of agricultural growth which does not involve additional supplies of water for irrigation.

The efficiency of water use in agriculture can be improved in various ways. One important step must be a sharp and steady increase in water rates to strengthen incentives for economizing water use. If irrigation water’s full cost is charged, highly water-intensive crops will not be profitable and a shift to less water intensive like oilseeds (sunflower and canola, maize and vegetables and horticulture) could result in large water savings as well reducing environmental degradation.¹⁵ In the public sector, substantial additional revenue collected from higher water charges could be used for much-needed improvements in the irrigation system including drainage, control structures and conveyance mechanisms.¹⁶

RECENT RELIEF MEASURES FOR AGRICULTURE

Recently the government announced a substantial relief package totaling Rs 341 billion for the agriculture sector. The details of this package are given in the Box. 3.1. A large part concerns agricultural credit: Rs 147 billion of the total allocation of Rs 194 billion for the sector. The government will also guarantee fifty percent of collateral loans (worth Rs 30 billion) for 300,000 small farmers. The State Bank will reduce the mark-up on agricultural loans by 2 percent totaling a relief of Rs. 11 billion.

Farmers cultivating rice and cotton at up to 12.5 acres will be given cash support of Rs 5000; this will benefit 4 million farmers and cost Rs 20 billion. Reduction of the price of potassium and nitrate fertilizers, electricity prices for tube wells and custom duties and sales tax on agricultural machinery are also envisaged.

The emphasis on small farmers is well-placed. Encouragement of future investment, through exemption from income tax for Halal meat plant and lowering the cost of imported agricultural machinery, appears sound – though the negative impact on local industry should be assessed. The government's offer to bear a part of the cost of crop insurance is also a step in the right direction.

However, the idea of reaching 4 million farmers with a grant of Rs 5000 each is not practical given the great institutional weaknesses in the government machinery. The objective of grant assistance to small farmers is also not clear.

More importantly, the strategy behind the support package is not clearly defined. Hopefully, the committee set up under the Federal Minister for National Food Security to work out the ways to increase per acre yield and reduction of agricultural inputs will provide a clear strategic direction though it should be noted that the terms of reference of the committee deal only with the crop sector.

Box 3. 1

Prime Minister's Agriculture Relief Package

A mega relief package of Rs 341 billion has been announced by Prime Minister of Pakistan for small farmers including direct cash support and provision of soft agriculture loans. It is aimed at introducing progressive agriculture on scientific lines, reducing production cost of crops and making the small farmers prosperous.

Under the Package:

- Small farmers would get the chunk of Rs 147 billion as direct benefit while Rs 194 billion has been allocated for agriculture loans.
- The farmers cultivating rice and cotton at up to 12.5 acres of land would be given cash support of Rs 5,000 per acre. The government on this facility will bear the cost of Rs 20 billion cash for rice and cotton crops.
- Rs 20 billion fund would be set up to reduce prices of fertilizers which will lessen Rs 500 per bag of Potassium and Nitrate fertilizers. Also, the government was negotiating with local fertilizer manufacturers and gas companies to revert the increase in prices of fertilizers which has gone up by Rs 200 per bag.
- It had been decided to provide Liquefied Natural Gas (LNG) to fertilizer companies to overcome the shortages of gas supply.
- The government would bear the Rs 2.5 billion premium on the agricultural insurance which will benefit 0.7 million small farmers.
- Solar tube wells would be provided on mark up free loans to the farmers who own up to 12.5-acre land. The mark up of seven years would pay by the federal government with a cost of Rs 14.5 billion. This would ensure a saving of Rs 1,600 and Rs 500 per day for the farmers running tube wells on diesel for five hours daily and on petrol for the same duration, respectively.
- The electricity price for running tubewells at peak hours has been fixed at Rs 10.35 per unit and Rs 8.85 at off-peak hours. The sales tax on these bills amounting to Rs seven billion would be borne by the federal government.
- The custom duty, sales tax and withholding tax on the agriculture machinery have been reduced from 45 percent to nine percent.
- The rice millers have been given full exemption on the turn-over for year 2015-16.
- The traders of agriculture commodities, fruits, vegetables and fish would get an exemption of three years on income tax while the sales tax on cold chain machinery has been reduced from 17 to seven percent.
- Halal meat production units registered before December 31, 2016 will be given a four-year exemption on income tax.
- The government would provide Rs 30 billion as the fifty percent guarantee to banks on loans. This will benefit around 0.3 million farmer households though Rs 0.1 million each with collateral loans.
- The time-limit to pay back Rs 34 billion outstanding loan on the rice traders has been extended up to June 30, 2016.
- The government and the State Bank of Pakistan are working to reduce the mark-up rate on agriculture loans by two percent which would give a benefit of Rs 11 billion per annum to farmers
- The Zarai Taraqati Bank Limited and commercial banks would provide one-window facility to the farmers seeking loans.
- The value of production unit has been increased from Rs 2,000 to Rs 4,000 which would help farmers get double the amount of loan against their land value.
- A committee under the supervision of Federal Minister for National Food Security & Research has been set up which would work out the ways to increase per acre yield and reduction of agriculture inputs.

Source: Press Release by Prime Minister's Secretariat

Chapter 4

Key Areas of Concern for Agricultural Sector Policy

Chapter 4

Key Areas of Concern for Agricultural Sector Policy*

International and domestic agencies have reviewed and analyzed Pakistan's agricultural performance numerous times. They have typically identified the following key areas of concern: procurement pricing, seed policy, water use and management, research and extension services; standards and marketing, and financial services. This chapter elaborates on these areas of concern. It does so by first providing a discussion of recent developments in selected agricultural sectors, such as wheat, cotton, and horticulture among crops, and milk and meat production from livestock. This discussion highlights various areas where reforms are needed; these are taken up in detail in subsequent sections.

SELECTED AREAS OF CONCERN

Wheat: Productivity and Pricing Issues

Wheat output in Pakistan features low productivity due to lack of progress in developing new seeds after the initial break throughs more than three decades ago. At the same time, wheat price policy has been erratic, leading in recent years to surplus stocks that cannot be disposed of in export markets.

Figure 4.1 shows current wheat yields in Pakistan and selected comparator countries. Yields are far below those in China and Egypt and somewhat below those in India as well. Pakistan grows most of its wheat in irrigated areas, but even so it is unable to raise yields beyond 60% of potential. Many other countries achieve better yields even under rainfed conditions with their attendant uncertainties. Pakistan, however, has neglected research into rainfed wheat production. More could be done to adopt water-harvesting practices, develop an early warning system to predict rainfall and develop varieties suited to *barani* (rain-dependent) areas.

Wheat is priced in Pakistan using a two-tier system. The procurement price is that at which the government purchases wheat from farmers. The issue price is that at which the government provides wheat to flour mills. Both have typically been kept below international market prices so that wheat can be provided to consumers at a subsidized rate. The subsidy is charged to the national budget.

*This chapter was prepared by Mahmood Ahmad

In addition, government interventions in domestic wheat markets generally make private international trade (wheat imports or exports) unprofitable. In most years from 1990 to 2006, domestic sales of government imports of about 2 million tons/year kept domestic prices below international (import parity) prices, so private imports were not profitable. When international prices rose sharply in 2008,

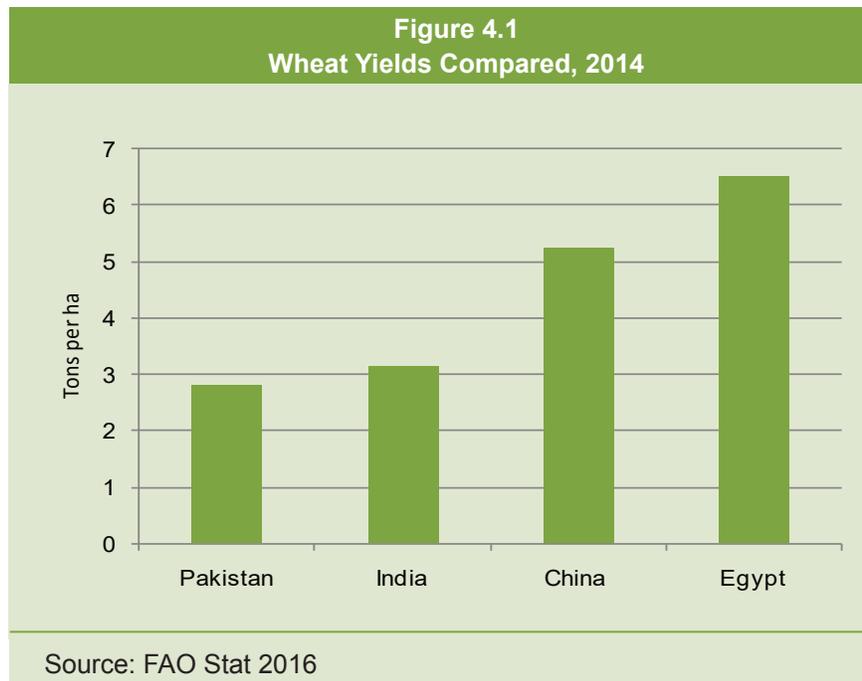
export restrictions prevented exports and kept domestic prices from rising to export parity levels.

In recent years, domestic wheat pricing went the other way. First, when international prices rose sharply in 2010 to record highs, the domestic procurement price was increased significantly though still kept below international prices. For example, in mid-2010, a gap of Rs. 50 per ton existed between international prices (around \$400 per ton) and domestic wholesale prices (around Rs. 350 per ton). However, when international prices dropped sharply to Rs. 200 per ton by 2014-15, the domestic support price was not reduced and wholesale prices remained at around Rs. 350 per ton. This created a gap in the other direction from historical practice.

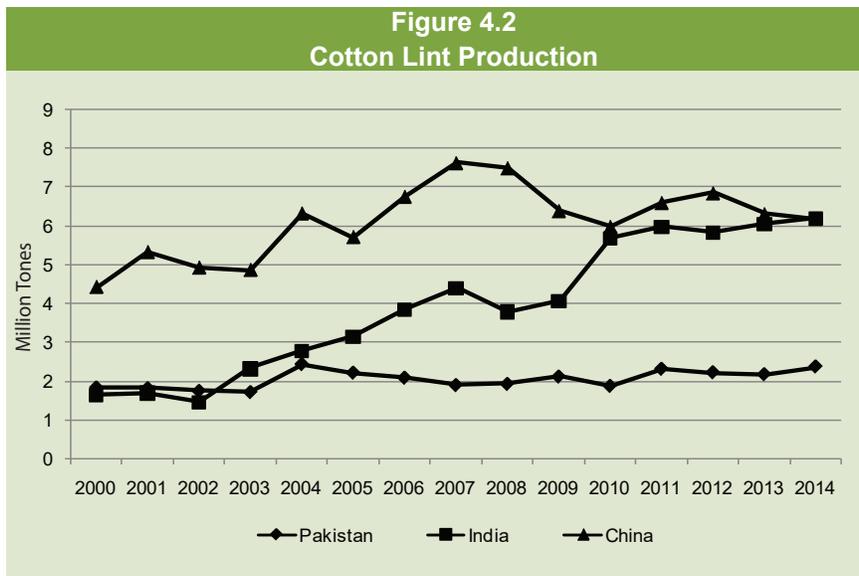
Such a large gap has generated some undesirable effects. First, wheat supplies have risen beyond what domestic storage capacity can handle. High rates of spoilage and wastage have occurred. Second, consumers are paying a much higher price for wheat than they should. Of course, wheat growers have benefited, but this has come at a high cost for consumers and the national exchequer.

Cotton: Seed Policy Issues

Figure 4.2 compares cotton production among Pakistan, India and China. It shows, in particular, that cotton production has stagnated in Pakistan while it has risen strongly in India. In 2000, both countries were producing around 19 million tons. By 2014, India's production had risen to 60 million tons while Pakistan's rose to only 21 million tons. This outcome is even more startling given that India produces most of its cotton from rainfed areas whereas Pakistan does so using valuable irrigation water.



One reason for this comparatively poor performance has been the failure of Pakistan to adopt a seed variety called BT cotton using local varieties. Other major producing countries, such as the United States, China, and India, have all made far more progress in the development and cultivation of BT cotton varieties. Though experimental work in devel-



oping local BT varieties has been going on in Pakistan for several years, little has been released or introduced yet, and international patents have not been acquired either.

The cotton gene revolution that has raised yields and output elsewhere has largely bypassed Pakistan. Delays in passing legislation and undertaking the needed research have deprived Pakistani cotton farmers of huge benefits. Considerable research¹ shows that BT cotton has an advantage over regular cotton varieties in productivity as well as has environmental benefits arising from the lower use of pesticide and water.

Horticulture: Weaknesses in Marketing

With a variety of climatic zones, low labor costs, and close proximity to growing markets in the Gulf and Southeast Asia, Pakistan has the opportunity to expand horticulture exports. However, it has been unable to exploit this potential and its production of fruits and vegetables has been flat for many years, the exception being a recent uptake in fruits (see Figure 4.3 and 4.4). The key constraint to date has been the inability to overcome weaknesses in marketing of perishable products. These weaknesses are reflected in poor transport arrangements inside the country and expensive freight charges for overseas-bound perishable items. Lack of cold chain arrangements for storage and transport is another major limitation in this regard.

Other problems faced by the sector include lack of modern fruit and vegetable nurseries, especially to cultivate new hybrid seeds. Seedless orange varieties (mandarin and clementine) are claiming market share in many countries while Pakistan's *kinow*, which has seeds, finds it hard to compete (Ashraf, 2016).

Pakistan needs a comprehensive horticultural policy that creates relevant institutions, makes rules for coordination, sets safety standards and provides an incentive system for various stakehold-

ers. Within this framework, the government's role may be confined to policy formulation, regulation, capacity building and coordination, while the private sector should take the lead in investment and value chain development, on its own or on a public-private partnership basis.

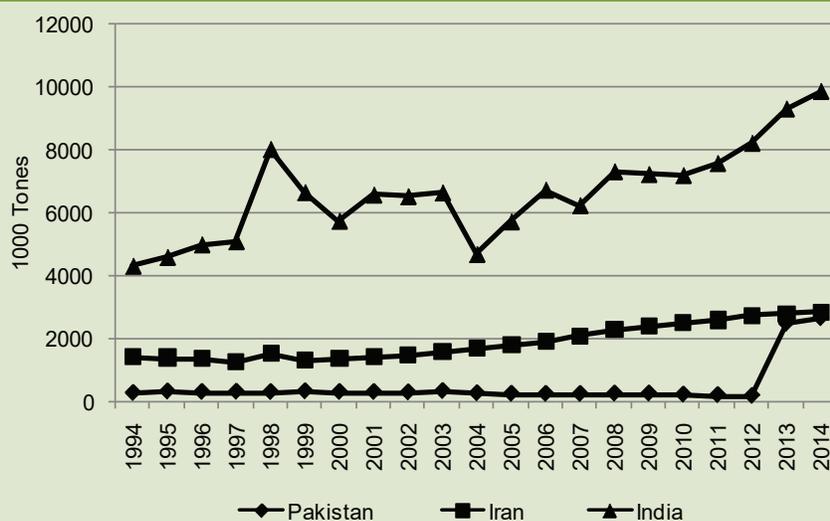
Milk: The Importance of Improving Yields

In Pakistan, small-scale herders and farm families produce 36.30 billion liters of milk annually. Yields are low when compared internationally, and output of dairy products is insufficient to meet local needs leading to annual net imports of around 1.2 million kilograms of dairy products. Most milk is sold in raw form with only a small number of multinational and domestic companies processing less than 5% of total production as UHT milk.

Ex-farm milk prices in Pakistan are in the range of 50-60 cents (US) per Kg. This is high in comparison to such major milk producers as New Zealand (\$0.26), Germany (\$0.27), Russia (\$0.34), USA (\$0.38), and India (\$0.45).² Despite this, the average dairy farmer in the country makes a net loss on milk production. This is largely a function of low yields. Furthermore, small producers dominate the sector and they do not operate on a large enough scale to reduce costs appreciably (LUMS, 2016).

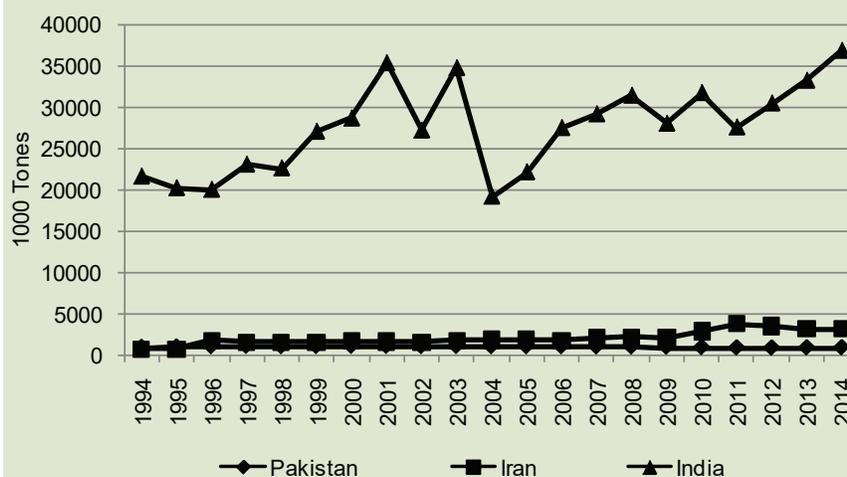
In the short term, increasing productivity would entail very simple interventions such as providing

Figure 4.3
Fruits Production Compared



Source: BIPP, FAO Stat 2016

Figure 4.4
Vegetables Production Compared



Source: BIPP, FAO Stat 2016

balanced feed and more water and space. In the medium term, it would include providing shelter, improving animal quality through genetic breeding and herd health management. The key is to place greater emphasis on demand management than supply enhancement, meaning producing more with less animals who are competing for resources in producing dairy products.

In Pakistan, livestock productivity is usually raised by introducing exotic breeds. This is a commercially risky arrangement as such breeds are expensive and often less tolerant to local climate and diseases. Genetic improvement of local breeds through artificial insemination is an alternative that can offer a two to three fold increase in milk production.

Meat: The Importance of Standards

The meat sector has a great potential in terms of growth, income generation, foreign exchange earnings and poverty reduction. Major importers of Pakistani mutton and beef are Saudi Arabia, UAE, Iran, Afghanistan, Kuwait, Qatar, Oman, and some East Asian countries. During July-March 2015-16, thirty-one private businesses exported 46.24 thousand tons of meat, fetching \$144.86 million. To increase meat exports, the Livestock Departments at Provincial and Federal level plans to encourage commercial farming with emphasis on value addition, covering the entire meat value chain from 'farm to fork'.

A recent study of the meat sector, released by the Competition Commission of Pakistan, highlights the following observations:³

- Pakistan has not tapped into the huge halal meat market, where India is the leader. This requires setting and meeting higher sanitary and health standards.
- Trans-boundary animal diseases need to be controlled. Without overcoming such diseases, Pakistan cannot get itself registered as a meat exporting country. There is an urgent need to mobilize livestock departments in the provinces to carry out disease control campaigns, improve the working of current animal quarantine stations and set up new stations.
- There is scope for more public-private partnerships in the establishment of additional slaughterhouses, especially in KPK and Baluchistan

KEY REFORM AREAS

Agriculture has become unprofitable in recent years as output prices for many crops have declined while input costs have kept rising (see accompanying table 4.1). This gives urgency to the need to implement reforms to enable agriculture to become more sustainable. The relief package introduced in 2016-17 was discussed in the previous chapter. The present section discusses the main areas where longer-term reforms are needed.

Pricing and Procurement Policies

As noted earlier, procurement and issue prices differ from market prices. The motives include protecting grower incomes but also keeping urban consumer prices low and stable. The government

Table 4.1
Agriculture Commodities Vs Input Costs 2010-2015

Crops	Price(Rs/Md)		Variation in Commodity Prices (Rs/ Md)	Input	Input cost per acre		Increased cost Rs/ Acre
	2010	2015			2010	2015	
Wheat	950	1300	350	UREA	710	1900	1190
Cotton	3800	2500	-1300	DAP	1900	3200	1300
Rice	2000	900	-1100	Land Preparation	2800	5000	2200
Maize	1080	800	-280	Irrigation	2400	8000	5600
Sugarcane	125	180	55	Pesticide	1000	3200	2200

Source: Pakistan Agriculture, Issues and Prospective, 2015, Sarsabz Fertilizer, FATIMA Group. NFDC for Fertilizer prices, other input costs calculations are derived from the farmers of different cropping zones

also intervenes through sales from stocks or via quotas and tariffs on trade in agricultural commodities. Such interventions have a number of side effects. They usually incur a high fiscal cost. They sometimes distort intra-crop incentives and result in excess production of one and under-production of another. Mostly, they end up protecting urban consumers and rural farmers. The cost is borne by the national exchequer.

Changes in the mix of cotton and sugarcane output illustrate the impact of pricing policies on intra-crop incentives. In recent years, the support price of sugarcane has been set higher than the import parity price. This has induced a switch to greater acreage under sugar, including some at the cost of cotton. This is problematic because sugarcane is more water-intensive than cotton, and because cotton is an important input for the textile export industry. In addition, the country now has surplus sugar that can only be exported at a loss.

Recent issues in the oilseed sector illustrate what happens when multiple agencies are involved but responsibilities are not clear. A project to support oilseed production failed because of confusion regarding which agency would pay the support price announced at the beginning of the project.

When domestic prices are below import parity prices, smuggling ensues. Experience shows this to be a significant problem with respect to such commodities as wheat that is easily smuggled to neighboring countries. Thus, the original intention of the policy to keep domestic prices low is defeated.

Seed Policy

Government seed farms have not been dynamic and have failed to introduce improved varieties at a pace comparable to that seen in India and Bangladesh. Meanwhile, the majority of Pakistan's farmers rely on seed saved from their last crop or purchased from neighbors or dealers. The seed that is generally available through private sector sources is often of poor quality.

Government seed agencies undertake genetic research, varietal development, bulking up, certification, registration, production and marketing. Many of these topics are highly technical and require well-trained seed scientists and technologists. Such capacity is lacking in the country.

The main issues facing the seed sector include the following:

- Low acceptability of certified seed by the farmer.
- Lack of success so far with a seed variety called BT cotton(see Box 4.1).
- Lack of DNA bar coding & finger printing lab to certify nursery.
- Lack of truth in labelling regulations and enforcement.
- Lack of farmer input into R&D plans and priorities of research institutes.
- Lack of research in oil seed crops.
- Lack of technical capacity among staff of seed farms, especially at the provincial level.

According to a recent report by FAO,⁴ the majority of public sector plant breeders in Pakistan only use conventional breeding methods; most do not use biotechnology, traits or IT solutions. Most experts are of the view that a more dynamic seed industry could be established if the public sector monopoly is modified and a bigger role for the private sector is allowed.

Box 4.1 BT Cottonseed

The genetically modified 'BT' cottonseed, introduced in Pakistan a decade ago, has not yet been very successful. Genetically modified (GM) cottonseed worth \$2.4 million was imported from the Beijing Silverl and Biotechnology Company in China and commercially sown in 800 acres. This experiment failed partly because the seed was reportedly substandard and partly because it had not been adapted to local conditions.. Pakistan introduced the GM cottonseed "too soon and without conducting trials to determine if imported varieties would perform well in local conditions."

Pakistan also failed to address the Cotton Leaf Virus, a big threat to cotton production

Adapted from Dawn, November 30th, 2015

Water Use Policy

During the 1960s and 1970s, improvements in water supply together with new seeds and fertilizers enabled a quantum leap in farm productivity. Irrigation continues to underpin agriculture in Pakistan. But water use (or misuse) is now starting to have consequences in terms of low water productivity, ground water depletion and poor governance. In addition, there is increasing competition for water from urban and industrial users whose willingness to pay is much higher. In the future, the agricultural sector will have to produce more with less water, meaning more crop and more value from the application of each drop.

A key issue is the low price set for irrigation water. This has encouraged the prevalence of a "flooding" system of water application that is very wasteful. Water charges have not increased

over time while output values and other input costs have risen. By now, the share of water in the cost structure of the typical farm is less than 3%. At current prices, farmers have limited incentives to save on water application, to choose crops that are less water intensive, or to invest in water saving technology.

Over the medium term, Pakistan has no choice but to raise agricultural water charges incrementally. This is a politically sensitive matter. Accordingly, regulations to control the use of water by quotas may also be needed.

Research and Extension

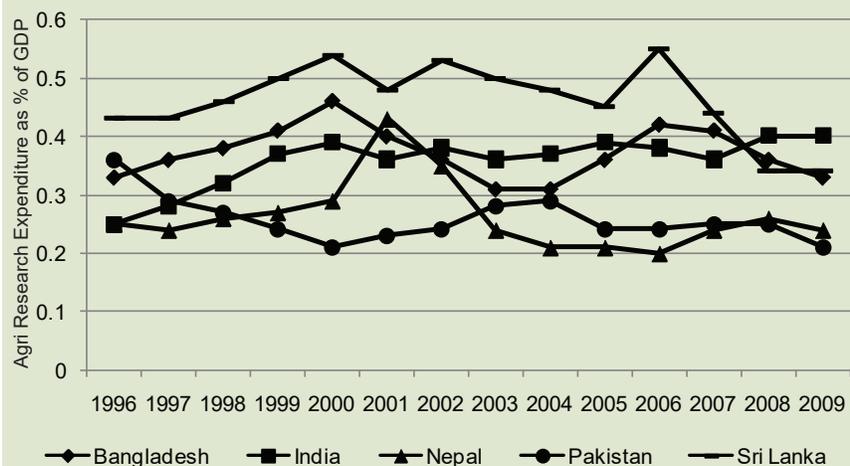
Since the 1970s, technical change and value addition in Pakistan's agriculture has been limited by low investment in research and development (Figure 4.5), the inability to maintain an effective agricultural education and extension system and the failure to invest appropriately in post-harvest handling and cold chain infrastructure. What is needed urgently is a more decentralized and demand-driven research system that can provide solutions to the problems confronting farmers and promote high value commercial agriculture.

At the same time, agricultural extension services lack capacity to support farmers in coping with the changing climate; managing natural resources; addressing issues related to water shortages, declining productivity, new market demands and natural disasters.⁵ The system is supply-driven and top-down, technology based and male-focused. It suffers because each field extension agent is expected to support too many farmers and cover too large a geographical area. Salaries are low and monitoring of service quality is non-existent.

Marketing

In Pakistan, agricultural markets (*mandies*) still operate under the spirit of legislation put in place as far back as 1939 whereby farmers are required to sell to licensed traders (*arthies*) only. These traders effectively have an oligopsony at the *mandi* level within their districts, especially at harvest time. Over the years, such traders have consolidated their hold over small

Figure 4.5
Benchmarking Pakistan's Expenditure on Research



Source: World Bank, 2016. Strengthening Markets for Agriculture and Rural Transformation in Punjab (SMART), Presentation to Chief Minister, Punjab

farmers in particular by enmeshing them in a complex relationship where they are also the principal suppliers of agricultural credit and inputs to the farmers. As a result, it is felt that middlemen (including *arthies* and other distributors up the chain) pocket a substantial part of the consumer's price.⁶ Reforms that increase the bargaining power of farmers through collectives, increase the number of trading licenses available and introduce a system of transparent auctions at the *mandi* level would be highly desirable.

The SAFAL, which is the Mother Dairy's fruit and vegetable unit, in use for horticulture crops in India, combines some of these desirable characteristics. Under this, Farmer Associations (FA) collect and pool produce and bargain for better prices and payment terms as well as establish stronger backward and forward linkages. Farmers are trained to produce A or B quality market goods, and accordingly products are clearly marked. The FA also provides transport and storage facilities. The quality assurance department at SAFAL Market checks and grades the quality of the produce received prior to auction. Farmers receive training on technical aspects like pest and disease/nutrient management for different crops. The FA charges a fee of about 3.5% of the wholesale price for its services.

SAFAL facilitates transparent auction and marketing processes as well. In some cases, electronic auctions are used whereby selling and buying take place at the press of a button. SAFAL also runs daily fresh shops. There are seven such outlets in Bangalore that sell directly to urban consumers. In Delhi, 279 specially designed modern retail outlets have been set up to sell fresh and frozen fruit and vegetables directly to customers without the involvement of any middlemen. The shops are equipped with electronic machines that automatically weigh the produce and print item bills (Ahmad, 2010).

Financial Services

Existing financial services in Pakistan are largely channeled to large-scale farmers with political connections. Small farmers tend to rely mostly on informal sources, including local moneylenders. Recently, a number of new financing models aimed at small farmers have been introduced. These include the following:

- Choupal Model (successfully used in India)
- Tameer Bank (successfully piloted in Pakistan)
- Mercy Corps Pilot (initiated in Sindh; no evaluation available)
- Value Chain Financing (initiated last year in Pakistan; no evaluation available)
- Warehouse Receipt Program (successfully used in Africa and India)
- Promoting commodity exchange (see Box 4.2)

There is enormous potential for expanding the coverage of these services especially through mo-

bile telephony. The use of mobile phones is growing in rural areas and opens up the possibility of using this technology to disseminate information on prices of crops and inputs. The Punjab government has recently undertaken an initiative to provide smartphones to 500,000 farmers. These phones will have mobile applications to help farmers apply for agricultural loans as well as receive information about weather conditions, crop diseases, and timely use of fertilizer and pesticides.

Box 4.2

Promoting Commodity Exchanges

A commodity exchange, in its simplest form, acts as an intermediary between a seller (farmer) and buyer (consumer) of the commodity. However, with the growth of modern agricultural practices (and industries), the functions of a commodity exchange have increased. A modern commodity exchange generally offers trade in three broad categories: crops, metals and energy. The Pakistan Mercantile Exchange (PMEX), established in 2002 under the name of National Commodity Exchange, is the sole commodity exchange working in the country offering futures contract of nine commodities.

The vast majority of farmers in Pakistan do not participate in PMEX because of financial illiteracy, lack of access to capital, and lack of access to PMEX offices. International experience suggests a way forward to link small farmers with commodity exchanges. For example, in Kenya, the Agricultural Commodity Exchange links small-scale farmers with national and regional commodity markets. It uses information technology to disseminate updated crop prices among farmers. It also serves as a clearing-house and arranges logistics. E-Choupal provides similar services in India.

Annexure Priority Policy Action Matrix					
The Matrix Below Summarizes Selected Interventions and Their Impact on Key Commodities.					
	Wheat	Cotton	Dairy/Meat	Horticulture	Oilseed
Rationale for selection	Enormous scale- Principle crop for smallholders - Food and cash crop - Projected demand growth	Country is largely a cotton economy Still provides employment and foreign exchange	Many smallholders engaged (and typically the tenant farmers High participation rate of females A food and income generating product	High value product, with potential for value addition Many smallholder producers	High demand growth Relatively non-perishable product Relatively un-intensive crop (e.g., water efficient)
Specific intervention areas (secondary interventions)	Replace current wheat procurement scheme with targeted food distribution scheme Wheat specific production techniques (e.g., seed selection) Warehouse receipts systems Crop insurance	Complete legal framework to promote BT cotton Invest in value addition Stop promoting sugarcane which taking over cotton Reduce export taxes on cotton	Dairy specific production techniques Improved breeding management Fodder production and feed management. Remove price controls on meat and milk	Date specific production technique Value addition initiatives Production of improved fruits varieties. Reduce the direct role of government in markets to setting health, hygiene and regulatory standards.	Oilseed specific production techniques Value addition initiatives (bottling and labelling) Adoption of higher yielding seed varieties
Impact	Increased household food security Increased smallholder income Increased availability and affordability of flour products for local consumers	Save valuable foreign exchange Uplift the economic wellbeing of poverty belt of Punjab and Sindh	Increase in incomes for fodder producers Increase in incomes for smallholder dairy farmers Improved milk availability and affordability for rural consumers	Increased incomes for producers Increased employment opportunities through value addition activities Increased export receipts from higher value exports	Increase in producers incomes Sizeable increase in processors incomes increase in producers incomes increase in processors incomes Improved oil (and oilseed cake) availability and affordability for rural consumers (and dairy producers)
Challenges to design and implementation	Government involvement in price setting and procurement	Developing a competitive cotton industry	Possible government intervention? Perishability of product?	Ability for smallholders to engage in downstream activities Ownership of the land and the plantations	Government involvement in other crops (e.g., wheat) distorts incentives to invest in oilseed production
Cross-cutting intervention areas (priority interventions)	<ul style="list-style-type: none"> Adopting new technologies and applying new skills. Restructuring of the extension service; include introducing pay for performance and market based salaries Building linkages between extension services and private sector through public private partnerships Improving enabling environment Water: Improving productive efficiency (more crop per drop) and importantly improving allocative efficiency (more value per drop), revise Abiana rates and improve collection Introducing Co-operative & Corporate farming Introducing Commodity Trading Houses Eliminating dual taxation system to establish trading houses Providing zero GST regime on all agriculture inputs Promote Crop zoning on Natural resource base of each ecological region Giving or promoting investment subsidies to farmers Introducing market reforms with inclusive growth Improving access to and utilization of financial services 				

Chapter 5

Agriculture Related Water Management: Issues and Options

Chapter 5

Agriculture Related Water Management: Issues and Options*

This chapter presents an overview of water management issues in Pakistan as they relate to the agriculture sector. The relevant concerns may be broadly divided into supply and demand issues. Supply side issues relate mostly to the availability of water resources while demand side issues relate to pricing and regulatory policies that affect the use of water in the agriculture sector. Pakistan faces a serious water scarcity problem due to growing demand and limited supply. The main challenge is to maximize the use of available water in an efficient and effective manner.

THE SUPPLY SIDE: WATER AVAILABILITY

Pakistan has a federal system of government, and the provinces enjoy a fair degree of autonomy. Water management is a divided responsibility. The national authorities are in charge of the macro-level distribution of water through the Indus River System Authority (IRSA) and manage the multipurpose reservoirs on the Indus and its tributaries. The provinces administer the conveyance and distribution of water within their territories.

Pakistan has a total area of 196 million acres (MA) of which 74.6 MA is useable/cultivable. Of this nearly 54.5 MA is currently being cultivated – 47 MA through canal and ground water irrigation and the rest through rainfall. An overview Pakistan's land suitability and location is shown in the map below. About 20 MA of potentially cultivable land is currently not being used for lack of water (see Figure 5.1).

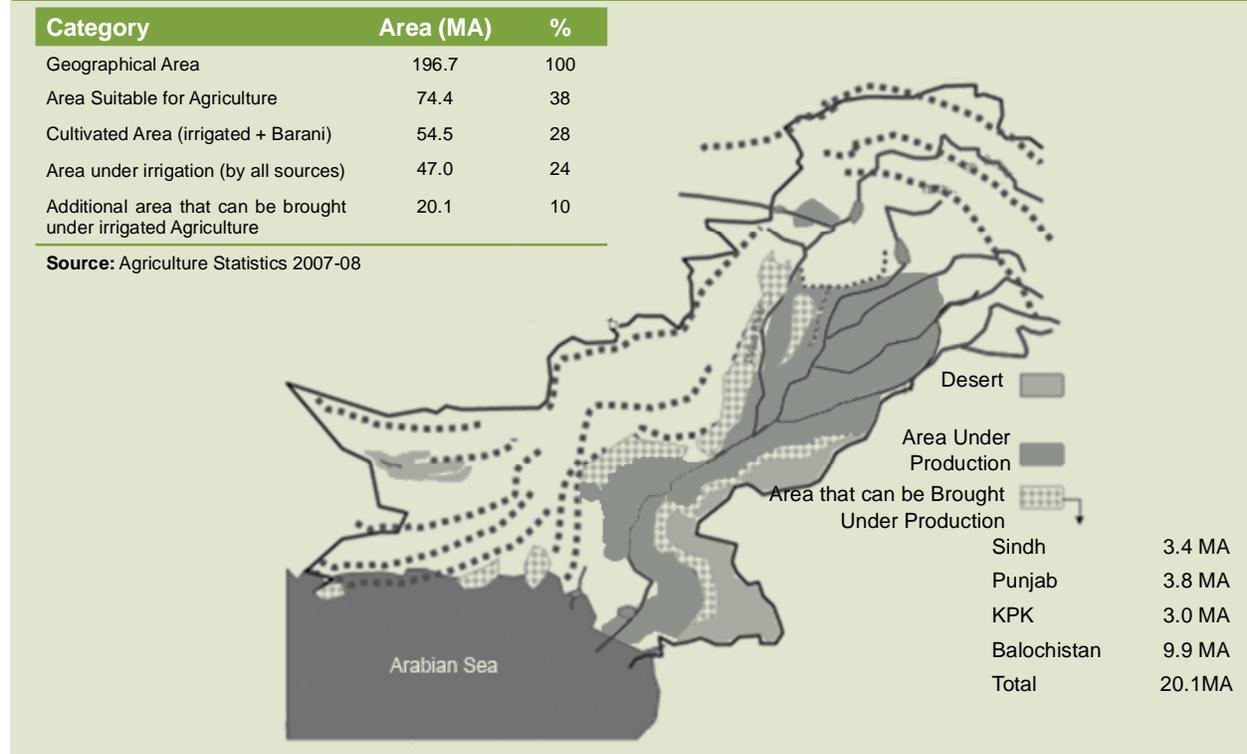
Nearly 50% of Pakistan is arid; 40% is semi-arid and 10% is humid. The average annual rainfall of about 9.4 inches is both insufficient and irregular for agriculture. About 85% of the rainfall inflow into rivers occurs in the monsoon months (July-August) when the demand for water is hardly 40% of the flow. This additional water mostly goes into the sea. The only way Pakistan can utilize this wasted resource is through additional storage capacity.

The three sources of water in Pakistan are: rainfall, river and surface flows from glacier melt and ground water. Rainfall contributes, on the average, to only 10% of agriculture water use. The agriculture sector is the predominant user of water in Pakistan accounting for just over 93% of the total available though other usages, such as in households and industry, are on the rise. The main

*This chapter was prepared by Daud Ahmad and Mahmood Ahmad

supply source is the Indus Basin River System (IBRS). Pakistan's dependence on a single system river system makes it more vulnerable than is the case for countries with multiple river basins and a diversity of water resources.

Figure 5.1
Land Use in Pakistan



Source: Rao Irshad Ali Khan , 2011, “Water & Resource & Development & in & Pakistan”, Round table Discussion on Agriculture & Water in Pakistan – World Bank , Indus & River & System & Authority (Irsa)

WATER SECTOR OVERVIEW

Water use has been growing globally at more than twice the rate of population increase in the last century. Although there is no global water scarcity as such, an increasing number of regions are chronically short of water. As the world population continues to increase, and rising incomes and urbanization cause food habits to change towards richer and more varied diets, even greater quantities of water will be required to guarantee food security (UN Water and FAO, 2007).

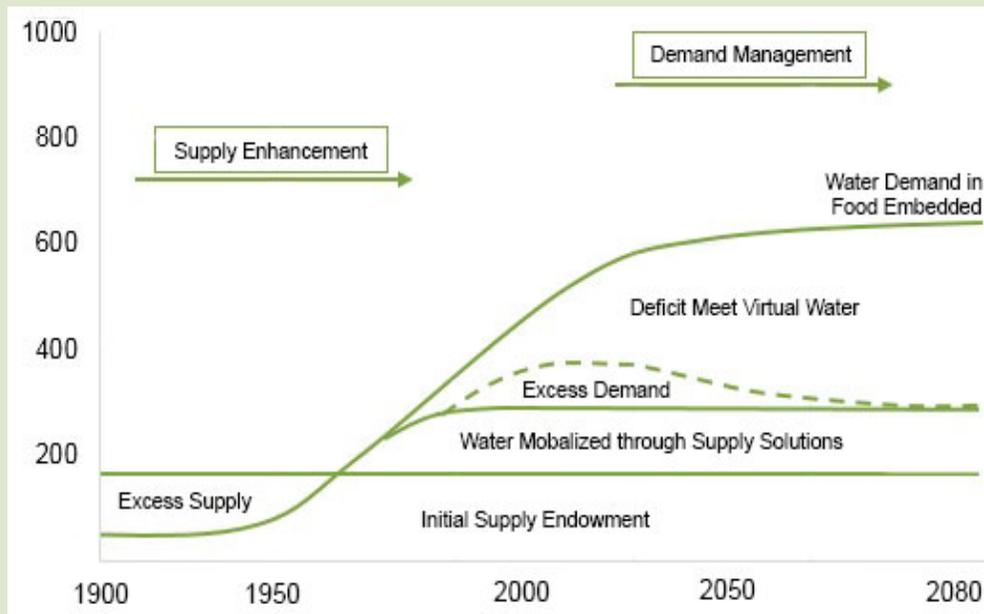
Water use varies with income and location. Typically, one person requires a mere two to five liters of water a day for survival and 20 to 50 liters for cooking, bathing and cleaning. However, in urban areas, the average household water consumption is about 200 liters per person per day. This includes all uses of running water in and around the home, plus other withdrawals from city water supplies for use by public or commercial properties. In agriculture, FAO estimates that it takes an average of about 1,000 to 2,000 liters of water to produce one kg of irrigated wheat and 13,000 to 15,000 liters to produce the same quantity of grain-fed beef. Thus, each human being consumes an average of 2,000 liters of water/day.

Not long ago, Pakistan was a country blessed with plenty of water as measured by per capita availability. Pakistan now appears to be entering the category of water scarce countries. This changing scenario has evolved in three phases (see Figure 5.2) that highlight the nature of water policy issues not only in Pakistan but also for many other countries in the Near East, Central Asia and Asia. The stylized figure shows that most countries initially go through a supply enhancement phase, involving a mix of surface water storage and canalization as well as ground-water extraction. However, because supply is finite but demand keeps growing (due to income and demographic factors), a demand management phase follows.

The following table provides an overview of various comparative indicators of water availability and use for selected countries. Pakistan is currently facing a shortfall of around 40 MAF, which is likely to rise to 100 MAF by 2025. Water storage capacity, ideally recommended to be around 1,000 days of annual demand, now stands at a meager 30-day supply for Pakistan. In addition, some water is needed for preserving the environment. There is no additional water available from the main sources – rain fall, surface and ground water.

The Indus river has an annual flow of 138 to 145 MAF. Average flow downstream at Kotri, the last control structure in the system has been about 36 MAF. It is estimated that 10 MAF is required to

Figure 5.2
Issues: What Happened Over Time



Source: Adapted from A.R. Turton, L. Ohlsson, 1999, Water Scarcity and Social Adaptive Capacity: Towards An Understanding of the Social Dynamics of Managing Water Scarcity in Developing Countries. <https://www.soas.ac.uk/water/publications/papers/file38360.pdf>

flow to sea to prevent salt intrusion. Since about 35 MAF of water flows into the sea in the monsoon season, about 25 MAF could be available if additional storage capacity existed. The potential contribution of this unutilized water is estimated at US \$ 25-40 billion per year. It needs to be recognized that some of these losses are regained through ground water extraction.

IRRIGATION ARRANGEMENTS

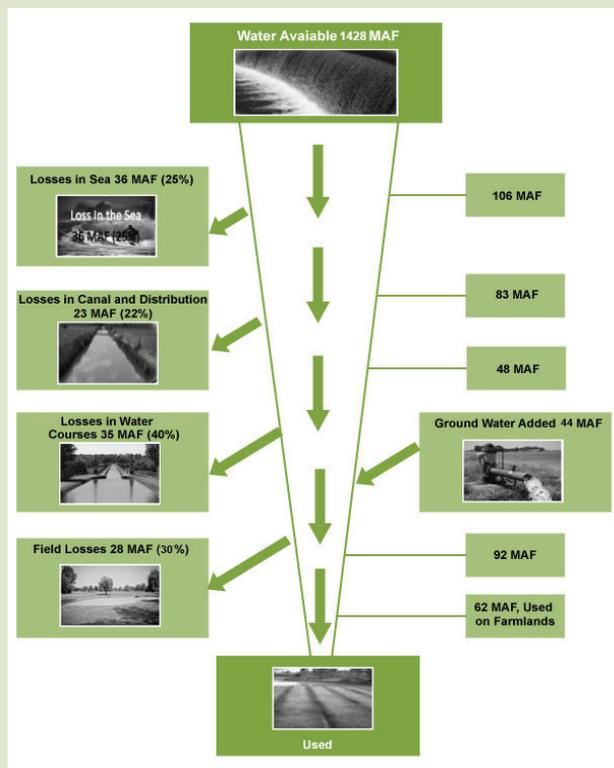
Pakistan has the largest integrated irrigation network in the world, serving an area of 36 million acres of contiguous cultivated land. Over 80% of Pakistan's population lives in this area. The Indus river and its tributaries annually carry just over 150 MAF of water. The three western rivers contribute about 142 MAF, while the three eastern rivers contribute 8.4 MAF per year. About 104 MAF of this flow is diverted for irrigation; the rest flows into the sea. Currently, the system consist of three major reservoirs: Mangla, Tarbela and Chasma – total storage capacity 12.7 MAF; 80 small dams; 19 barrages; 12 inter river link canals; 45 canal systems and more than 107,000 water courses. The aggregate length of canals is 34, 834 miles. The system also avails an estimated 41.6 MAF of ground water pumped through nearly 600,000 tube wells, mostly private.

The development of Pakistan's irrigation system, better known as the Indus Basin Irrigation System (IBIS), took place in several phases. In the pre-partition period, the British colonial authorities initiated the integrated development of the irrigation system in Punjab, which they saw as a potential granary for the rest of the country. In 1947, Pakistan inherited the world's largest integrated irrigation system, mostly in Punjab and NWFP. The Sukkur Barrage in Sind, constructed in 1850, had the largest irrigation network serving 3 m ha of agriculture land. During the 1947-1960 period, the Pakistan government built additional barrages, such as Guddu and Tuansa.

Soon after partition in 1947, internal as well as external (with India) water issues started to emerge. In 1960, through the arbitration of the World Bank, the Indus Basin Treaty was signed which allocated water rights on the three eastern rivers to India and on the three western rivers (Indus, Jehlum and Chenab) to Pakistan. To compensate for the loss of the eastern rivers, Pakistan built two large dams (Mangla and Tarbela) and 12 link canals over the following decade under the Indus Basin Project.

After completion of the Indus Basin Project, inter-provincial conflict emerged regarding the sharing and use of irrigation waters. A series of high level commissions¹ were formed and the matter was settled through the Water Apportionment Accord of 1991, which provided a season-wise share to each province. An independent body, the Indus River System Authority (ISRA), was established to implement the Accord. ISRA worked satisfactorily for a while but growing water demands and diminishing reservoir capacity have made it increasingly difficult to meet the expectations of the provinces and a politically-charged situation continues to prevail.

Figure 5.3
Pakistan Water Budget - Indus Basin Irrigation System Annually



Source: Ahmad. M, 2011 Water Management Practices in Pakistan Issues & Options for Productivity Enhancement , South Asian Conservation Agriculture Network (SACAN) <http://www.sacanasia.org>

Pakistan has a very large stock of major irrigation and bulk water infrastructure which, according to the World Bank, has an estimated replacement cost of about US\$ 60 billion. Much of this infrastructure is very old, with major structures operating well beyond their design life. The services provided by this infrastructure are critical for national well-being. Neither the Federal Government nor any of the provinces in Pakistan have an adequate asset management plan in operation, and thus there are no reliable estimates of the annualized costs of replacing and maintaining this infrastructure. The funds available for maintenance and rehabilitation of this infrastructure system are grossly inadequate.

The Indus basin has a large groundwater aquifer that has become a significant supplemental irrigation source. This is estimated to have a potential capacity of 50 MAF and is recharged by rainfall and surface flows, including seepage from canals and water courses and field application losses. The use of ground water through tube wells started in the mid 60s and has grown exponentially. Currently, it is estimated that there are about 562,000 private and 10,000 public tube wells extracting about 44 MAF annually. However, the potential for expanded use of ground water is limited, as suggested by the increasing salinity of ground water in many areas and falling water levels in others. While the use

of ground water by private farmers has brought significant benefits in the past, there is clear evidence now that this is being over exploited. Tube well operations need to be regulated to avoid negative impact on both quality and quantity of the ground water source (see Table 5.1).

Table 5.1
Comparative Indicators of Water Availability and Use

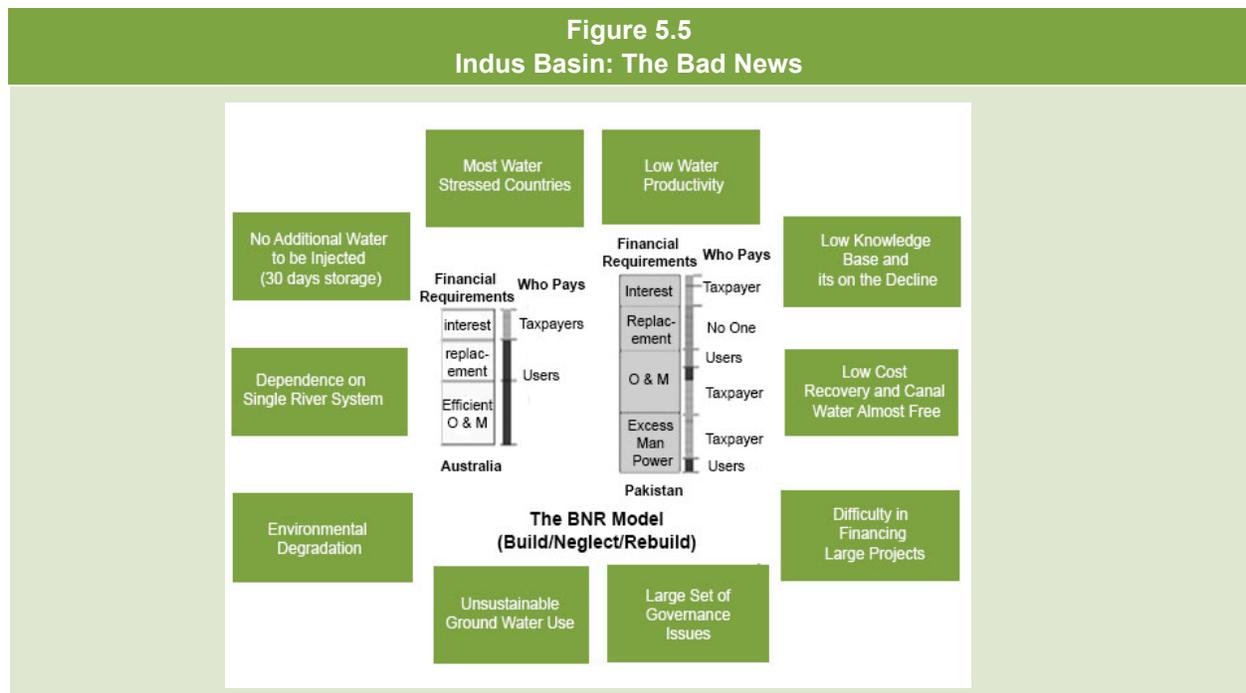
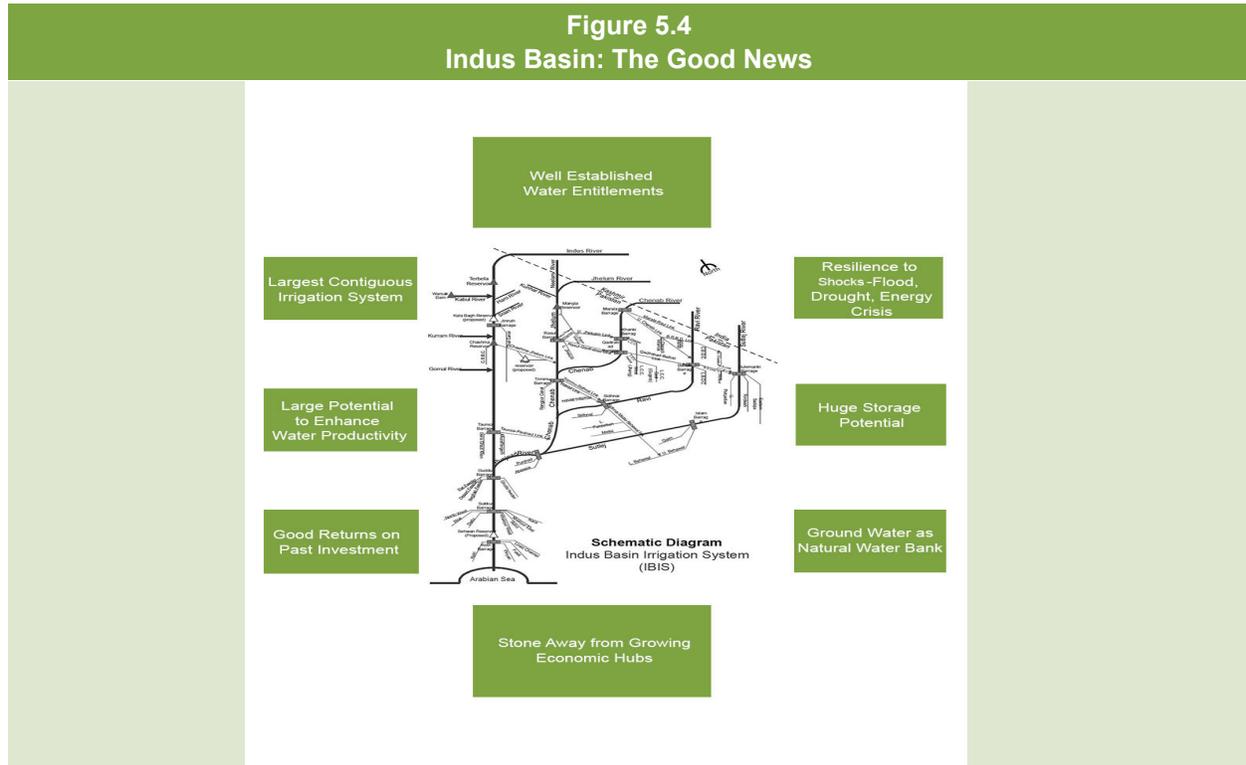
Per Capita Water Availability and Use			Trends in Per Capita Water Availability in Pakistan				
Country	1955	1990	2025	Years	Population	Per capita availability	Where we stand
China	4,597	2,427	1,818	1951	34	5850	Plenty
Mexico	11,396	4,227	2,597	2003	146	1200	Stress
Philippines	13,507	5,173	3,072	2010	168	1000	Scarcity
Iraq	18,441	6,029	2,356	2026	221	800	Scarcity
USA	14,934	9,913	7,695	Source: Water and Power Development Authority (WAPADA) Reports			
Pakistan	2,490	1,672	837				
Source: Population Action International, 1993							
Water Availability in Pakistan			Water used for Agriculture				
Surface Water	154.88 MAF		India	93 %	Korea	46%	
Ground Water			Pakistan	90 %	USA	42%	
Total Area	39.5 Million Acres		China	87 %	Germany	20%	
Saline	24.7 Million Acres		Egypt	85 %	France	15%	
Fresh Water	14.8 Million Acres		Italy	59 %	UK	3%	
Total Quantity Available	59 MAF		Japan	50 %			
Present Extraction	50 MAF						
Balance	9 MAF (economic limit)						
Water Storage in Selected Countries			Per Capita Storage				
Egypt (Aswan)	1000 days (Niles)		America	6,150 m ³ /Person			
America	900 days (colorado)		Australia	5000 m ³ /Person			
Australia	600 days		Pakistan	132 m ³ /Person			
South Africa	500 days (Orange River)						
India	120-220 days						
Pakistan	30 days						
Sources: Rao Irshad Ali Khan , 2011, "Water & Resource & Development & in & Pakistan", Round table Discussion on Agriculture & Water in Pakistan – World Bank, Indus & River & System & Authority (Irsa)							

Water quality, of both surface water and groundwater, is a major issue. While there are laws governing disposal of waste water into the rivers, their enforcement has been ineffective. Access to clean domestic water is limited. Access to proper sanitation facilities is low, and only about 1% of the total waste water generated in the municipal sector is treated before being discharged into the rivers. Improper disposal of solid waste pollutes surface waters. Agricultural drainage is also an issue from the perspective of sustainability of irrigated land as well as the environment.

The Indus basin depends heavily on the glaciers of the western Himalayas which act as a reservoir, capturing snow and rain, holding the water and releasing it into the rivers which feed the plains. It is now clear that climate change is already affecting these western glaciers in a dramatic fashion, far more seriously, for example, than in the damper Eastern Himalayas. While the science is still in its-

fancy, estimate suggest a fifty year period of glacial retreat, during which time river flows will increase. Combined with a higher frequency of flash rainfall and a grossly inadequate reservoir capacity, this will exacerbate the already serious problems of flooding and drainage in the next few decades.

The two slides below summarize the current status of Pakistan’s irrigation infrastructure and management system in terms of strengths and weaknesses (see Figure 5.4 and 5.5).



To summarize, the key challenges for Pakistan on the water supply side are as follows:

- Increasing scarcity resulting from fast-rising demand and diminishing reservoir capacity.
- Excessive (nearly 60%) losses in water conveyance system.
- Deteriorating condition of infrastructure due to inadequate maintenance.
- High cost of financing operations and maintenance and new infrastructure.²
- Excessive/unregulated use of ground water resulting in falling water table and related salinity problems.

WATER DEMAND MANAGEMENT ISSUES

Productive and allocative efficiency are key concepts in the water demand management literature. The first is captured by the idea of “more crop per drop” and the second by the idea of “more value per drop”. The first idea usually applies within the agricultural sector and is relevant to the choice of crops to grow. The second idea applies to a wider domain including non-agriculture. It focuses attention on choosing among competing water uses in a manner that optimizes value per unit regardless of whether the water is used in agricultural uses (such as for crops) or in non-agricultural uses.

Given that the bulk of water use in Pakistan is within agriculture, the first concept is more appropriate for our present purposes. The reallocation of water within the agricultural sector to different crops is likely to offer the largest water-saving potential and efficiency gain at this point in time in Pakistan.

As noted earlier, over 95% of available water in Pakistan is used for agriculture. There are two main issues in the use of this water. The first is the wastage in the process of conveyance to farms. Only 43% of the water made available to agriculture actually reaches the farm gate. The second is wasteful use within farms. This part of the chapter elaborates on these two issues.

In Pakistan flooding is the most common irrigation method practiced by farmers, and it is commonly accepted that its efficiency is not more than 50 percent. In addition, more than 40 percent of canal water is lost between *mogha* outlet and farmers’ fields due to the poor condition of water courses. A significant amount of irrigation water is also lost during application due to uneven fields. This leads to excessive application to low-lying areas and under-irrigation of higher spots. Over-irrigation leaches soluble nutrients from the crop root zone, makes the soil less productive and degrades groundwater quality. On the other hand, under-irrigation of elevated parts of the fields results in accumulation of salts in such patches. Improvements in the water application process could save this scarce resource.

The water productivity of Pakistan’s dominant crops such as rice, wheat, sugar cane and maize is very low. Watto and Muger (2016) estimate water use efficiency of wheat being 0.76 kg/m³ which is 24% lower than the world average of 1.0 kg/m³ and water use efficiency of rice as 0.45 kg/m³ which is 55% less than the Asian average of 1.0 kg/m³. Water productivity for cereal crops is 0.13 kg/m³, which is

very low compared to India's 0.39 kg/m³ and China's 0.82 kg/m³. Such low water productivity is largely due to poor irrigation management and low irrigation water quality (Hussain et al., 2003).³

Water Pricing

Water pricing can improve irrigation efficiency, as farmers change their practices to save water; it can also mobilize funds to maintain the overall irrigation infrastructure. In Pakistan, government policy has failed to meet these two objectives.

Crop budget analysis reveals that water charges for different crops are so low that even increasing them three fold may not affect water use behavior significantly. The cost of canal water is typically less than 1% of overall costs. In addition, flat rate water pricing or uniform water charges militate against the adoption of high efficiency irrigation technologies and practices.

Water charges are currently not linked to O&M needs. The revenues that are collected by the Irrigation Departments, low as they are, become part of general revenue and are not applied to O&M. In effect, in the system currently prevailing in Pakistan, taxpayers end up paying the bulk of O&M costs for water infrastructure while users (that is, farmers) pay very little. A Planning Commission report entitled "Canal Water Pricing for Irrigation in Pakistan: Assessment, Issues and Options" (see Table 5.2) notes that the price farmers pay for water, known as *abiyana*, fluctuates between Rs. 85 per cropped acre in Punjab to Rs. 250 per acre for non-food crops in Khyber-Pakhtunkhwa. These rates, and the rate of collection of *abiyana* by provincial irrigation departments, do not cover O&M costs of the irrigation system, let alone costs of further development.

Table 5.2
Water Charges (Abiana Rates) in Rs/Acre

	Cotton		Sugarcane		Rice		Maize		Wheat	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Punjab	85	93	85	177	85	89	53	85	50	60
Sindh	93	93	182	182	89	89	40	40	53	53
Khyber Pakhtunkhawa	185	290	200	624	185	290	118	250	118	200
Balochistan	142	379	273	727	140	373	63	168	79	210
Average	126	214	185	428	125	210	69	136	75	131

Note: Maximum and minimum shows variations in water charges during ten years time

Some findings of the report are summarized below:

- During 2000-2010, water charges per acre ranged as follows: for cotton, sugarcane, rice, maize and wheat Rs.126-214, Rs.185-428, Rs.125-210, Rs.69-136 and Rs.75-131 respectively.
- The per acre charge for rice and cotton were similar even though rice consumes 60% more water than cotton.
- The average annual *Abana* collection is 60% of the assessed amount, inflicting Rs. 1.2 billion

annual losses at national level (for all provinces).

- The financial performance of four Area Water Boards (AWBs) was poor as they could only recover half of what was due to them from assessments (three in Sindh and one in Punjab).
- The overall canal irrigation system is financially unsustainable as it recovers merely 24% of its annual O&M costs. In absolute terms, government provided Rs.38 billion as subsidy during a seven-year period (or Rs.5.4 billion annually) to fill the gap between increasing O&M cost and stagnant *Abiana* recovery.

The ability of farmers to pay for water can be estimated from existing markets for groundwater. Currently, the average selling price of tube well water is about Rs.300 per hour, for an installed capacity of one cubic foot per second, which is equivalent to approximately one acre-inch of water per hour (100 m³/hr). This charge is more than four times what a farmer relying entirely on canal water pays the government for the same volume of water and for the same crops.

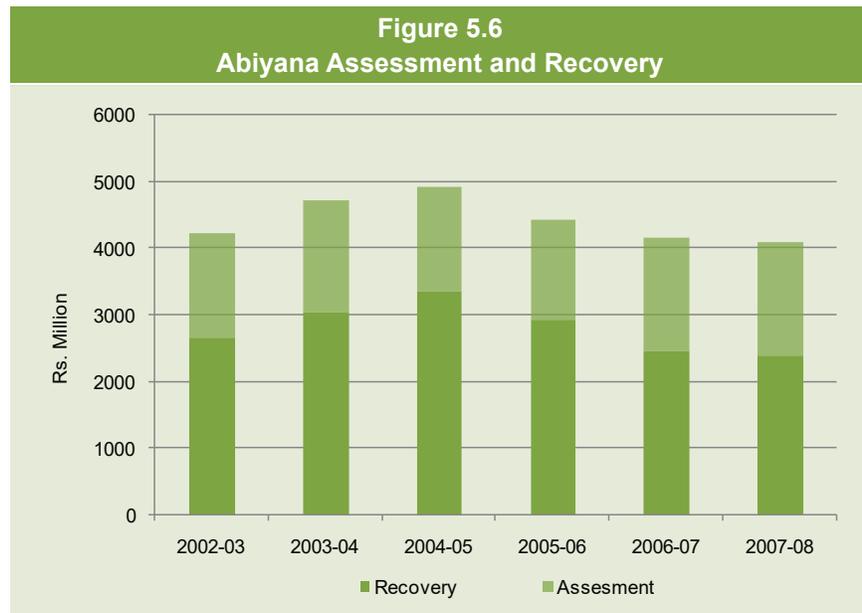
Water charges amounting to about 6% of gross income are common in many Asian countries, including Indonesia, Philippines and South Korea. It is estimated that agricultural water tariffs in Pakistan need to be increased to Rs 630 per acre to cover at least the O&M costs.

Decentralization of Water Management

In 1995, the Government of

Pakistan began to decentralize the operation and maintenance of the irrigation and drainage system and started a program of institutional reforms aimed at establishment of autonomous organizations at the level of the four provinces, 43 canal systems and at the distributary and minor canal level. These institutional reforms envisaged the formation of autonomous, self-accounting and self-financing Provincial Irrigation and Drainage Authorities (PIDAs); AWBs along canal commands; and Water User Associations (WUAs) at the watercourse level.

These reforms have proceeded slowly and to different extents in different provinces. Some aspects, such as AWBs, proceeded satisfactorily for some years but then deteriorated with time mainly due to lack of political, financial and technical support. Others, such as WUAs, have proved



difficult even to get off the ground due to local level politics. While the Government agrees on the direction of the reforms, the pace at which the decentralization and process can be implemented remains unclear. The likely trajectory of institutional reforms in each province would depend on a number of factors, a complex interaction where the outcome is difficult to predict.

Groundwater Management

Decreasing surface water has prompted increasing reliance on groundwater to meet crop requirements as well as urban domestic use. The downside is depletion – more water is being pumped out than can be recharged through natural means.

A recent study by USAID on Optimal Groundwater Management in Pakistan’s Indus Water Basin showed that under common property management, the state of the aquifer deteriorates over time and net benefits fall as a result. The study takes account of the long-term implication of present policies over a period of 50 years. The water table height falls by 12 meters in the first 50 years, while the groundwater salt concentration increases so much that it entails a reduction of 1.25 percent in the annual net benefits. Groundwater extractions fall over time as both the water table height and the quality of groundwater decline, thereby increasing the costs of extraction. The study reveals that as a result of the declining water table and an increase in groundwater salt concentration, net benefits fall by around Rs 30 billion in the first 50 years. This shows the high cost of institutional failure in regulating groundwater use.

AGRICULTURE, WATER, AND ENERGY NEXUS

As water needs for agriculture and domestic use are increasingly met through groundwater resources, the connection between water, energy and food is becoming more important. Relevant considerations include the following:

- Much groundwater is pumped using electricity or diesel. Electricity is subsidized. Power tariffs for agriculture are typically less than for other uses but the cost of diesel is increasing that affects the competitiveness of agriculture.
- Groundwater use exceeds sustainable recharge in most provinces resulting in over-exploitation and aquifer depletion affecting sustainability of agriculture.
- This creates a nexus where one sector (agriculture) is dependent on unsustainable trends in the groundwater and electricity sectors.

Energy and water are essential ingredients for food production and economic development. Energy (electricity and diesel) is required to pump water for irrigation. In turn, water can be used to generate energy, hydropower being one of the cheapest sources of energy. Mini-hydropower projects in KPK provide a good case to illustrate this link (see Box 5.1).

Box 5.1

Mini and Micro Hydropower Projects (MHPs) in KPK, a Success Story of Developing Water/Energy Nexus in a Cost Effective Way

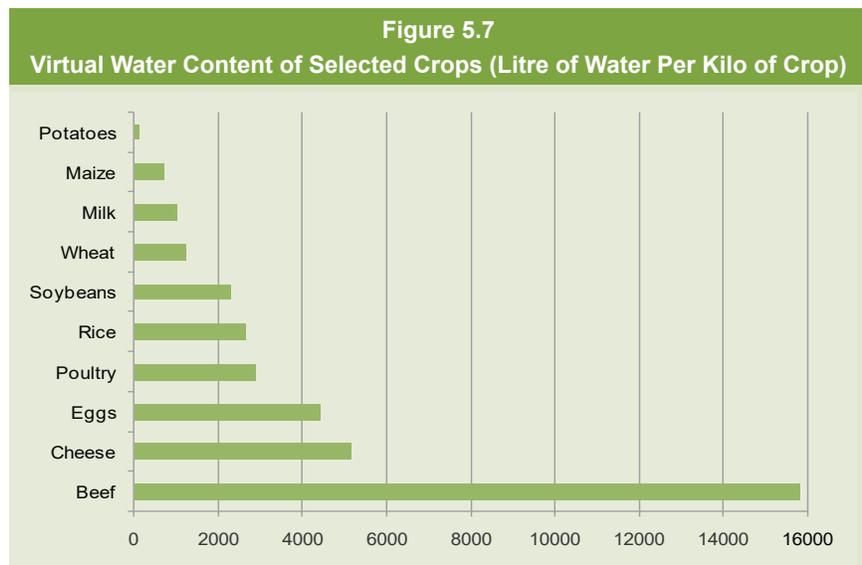
In KPK, 250 mini and micro hydropower projects (MHPs) will become fully operational and functional to provide electricity to around 245,000 people in hilly areas of the province through community-based local institutional mechanisms by the end of 2016. These hydropower projects would help tap the water potential and enable people to get electricity on low cost to increase their income. Besides the people's dependence on fuel (kerosene) would be reduced and they would be encouraged to protect their forests. Further, it will bring local people with low cost electricity from Rs 2 to Rs 4 per unit to the local community.

- Such a policy direction would create a win win situation as:
- Low cost energy would be available to local consumer, much to the benefit of farmers producing high value agriculture.
- Negative environmental impact would be far less than what large scale dams create.
- It does not crowd out funds for alternative use.
- This could largely be a private-public partnership that has better financial sustainability. This is the case with NGOs/construction firms working with the Pakhtunkhwa Energy Development Organization (Pedo) under close supervision of the Energy and Power (E&P) Department of Khyber Pakhtunkhwa since 2014.
- These MHPs were purely government-funded community empowerment and participatory projects working successfully.
- Pedo's new management and E&P Department would be committed to reforming and transforming the organization into a self-sustainable institution that will not only fulfill the provincial energy demands, but also contribute to the national energy security.

Source: Adapted from Dawn, June 27th, 2016

Agriculture-Water Nexus

The agriculture-water nexus may be better appreciated through the concept of virtual water which refers to the water embedded in the production of a commodity. The figure 5.7 shows livestock and dairy products consume a lot more water than traditional crops. A note of caution is that the intensification of dairying might be accompanied by



the intensive use of water in growing feed and fodder that can be threatening for the limited water resources of arid and semi-arid areas of the country with the depletion of these resources.⁴

Pakistan is now becoming a water scarce economy. We have not been able to add value per unit of water to its potential and this should be a central theme of our future water policy discourse. According to Hisaar Foundation report, the water economy of Pakistan should obtain one billion dollar of output per Million Acre Feet (MAF) of water. This would need improving both productive (more crop per drop) and allocative efficiency of water use (more value per drop).

Agriculture-Energy Nexus

Energy is needed to power agricultural equipment such as tractors, harvesters and tube wells. The tubewells using either grid or diesel are now important contributors to agriculture growth. Pakistan irrigation sector is now increasingly dependent on groundwater as it contributes for more than 50 % of water supply. As water needs for agriculture and domestic use are now largely met through groundwater, the connection between water, energy and food is becoming more important.

REFORM EFFORTS AND CONCLUSIONS

Over time, the Government of Pakistan has implemented a variety of reforms affecting both the supply and demand for water in the agriculture sector. These reforms include the following:

- Institutional and policy reforms to improve the management and maintenance of the irrigation system to ensure its long term physical and financial sustainability.
- Water resource management reforms to make intra-province water allocations and distribution more transparent.
- Irrigation service delivery reforms to improve the quality, efficiency and accountability of irrigation services, through greater participation of farmers.
- Reforms to improve water use efficiency and on-farm productivity through a system of incentives and reforms in agriculture marketing and research.

Reforms to improve the management and maintenance of the irrigation system have had very limited success. In the past, Pakistan invested massively in water infrastructure, but much of it got into a state of disrepair leading to the charge of “build-neglect-rebuild” being levelled at Pakistan’s approach. This was true even for some of the major barrages, where failure would be catastrophic.

Irrigation service delivery reforms have also been largely unsuccessful. The underlying problem is that irrigation institutions in Pakistan have not made the transition from the era of development and construction to the era where management of resources and services is the primary challenge. Tail-end and low income farmers typically lose out in the distribution of irrigated water to those who are powerful and politically well-connected.

Reforms to improve water use efficiency and on-farm productivity have succeeded in some aspects but not in others. Areas where more work is needed include the following:

- Most farmers still use flood irrigation. This results in significant losses due to over irrigation during the early stages of growth when the crop uptake is low and the root zone depth is shallow.
- While water losses in channels must be minimized, see page should not altogether be blocked because it plays a part in recharging the aquifer.
- Most programs were implemented in a piece meal approach, started with canal lining, laser leveling and very recently promoting HEIS, these programs should have been promoted in an integrated approach linking farmers to credit and markets.
- Lack of soil moisture monitoring and/or irrigation scheduling. Very few farmers use sensors to check the state of moisture in the soil and to decide when and how much to irrigate. Irrigation scheduling among the farmers is still very primitive, usually based on past experience and by intuition.
- Lack of water metering. Most farmers irrigate on a time base rather than on water volume needs.
- Leaving out of small farmers from most of these programs..

Based on the developments in the sector and on the experience of various reforms, it is clear that *enhancing water storage capacity, improving governance and management of water institutions and effective/rational use of water are the most critical areas for action.*

On the issue of enhancing water storage, we note that the total amount of water available in Pakistan is finite – about 150 MAF per year – and there is little scope for addition in this. About 25 MAF of this is discharged into the sea in the rainy seasons due to lack of storage capacity. Pakistan has not created any additional storage capacity in the last 40 years. Adding to the storage offers possibly the highest return on investment today.

Pakistan has a large but inefficient and poorly managed irrigation system. The system loses about 60% of water during conveyance from canal headworks to the farm gate. Maintenance is inadequate, and no asset management plan is in place. A sustainable financing plan is not available either, and the system continues to rely on budgetary transfers from various levels of government.

Too many institutions (estimated at 18) have been created to manage and develop water. For this reason, recent efforts to formulate water policy have largely failed as different institutions look at policy issues from their own vantage point. For example, there is hardly any connect between two critical institutions, the ministries in charge of agriculture and water/irrigation. Further, the use of groundwater has reached a limit beyond which quality and sustainability concerns loom. Improved regulations are much needed.

If there is very little scope for enhancing water supply, there is considerable policy space to save it. Since 95% of water is used in agriculture, it is where the biggest savings can occur. Water is used inefficiently in Pakistan in comparison with international standards. Better pricing mechanisms for water and energy could help rationalize the use of these inputs among different crops and promote sustainability. Rationalization of water use in agriculture (beginning with rice and sugarcane) is a key factor.

Climate change is already affecting water and agriculture in Pakistan. As water needs for agriculture and domestic use are now largely met through groundwater, the connection between water, energy and food nexus is becoming more important. In this context, mainstreaming climate change concerns should help to achieve sustainable development including eco-system preservation and the rational management and utilization of water.

Chapter 6

Stagnation in Agricultural Exports

Chapter 6

Stagnation in Agricultural Exports*

RECENT DEVELOPMENTS

Figure 6.1 hints at the structural challenge Pakistan faces in its international trade. It shows that exports have been declining since 2013 in nominal dollar terms. Thus, despite the major relief offered by the collapse of oil prices in 2014, the trade balance has not improved much.

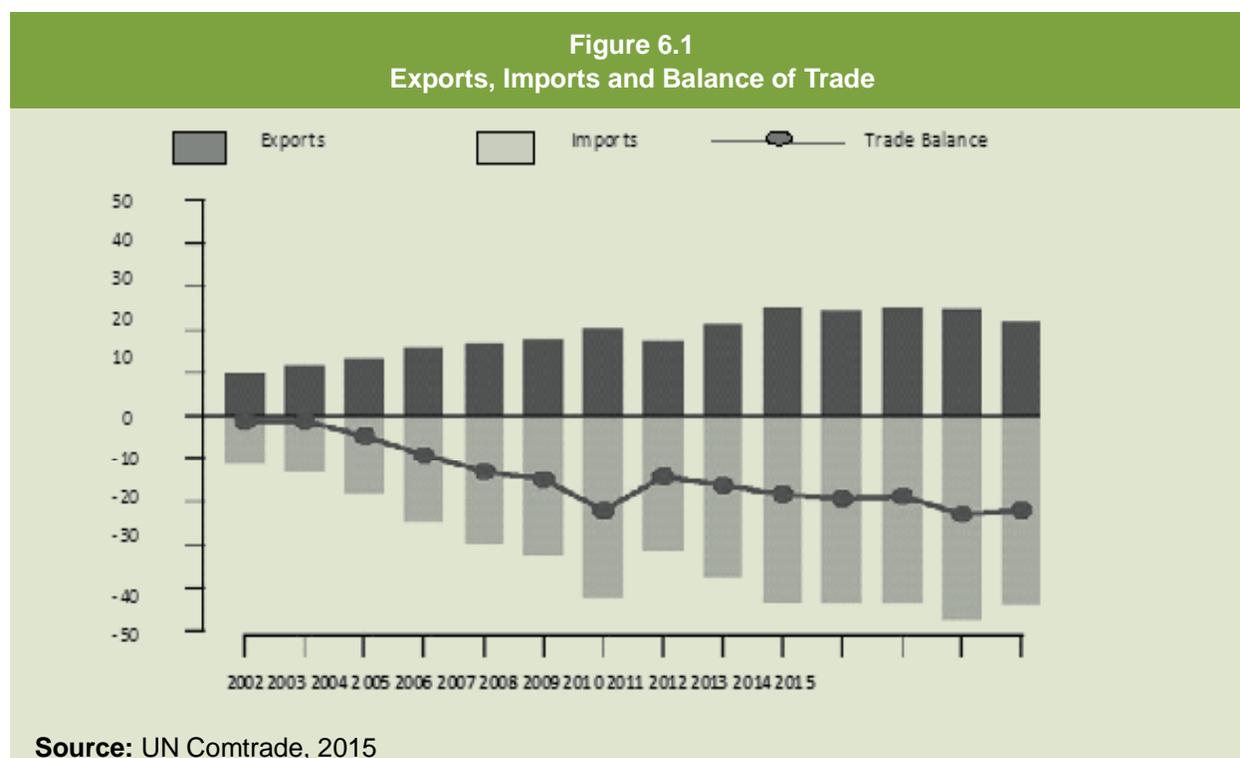


Table 6.1 adds a disturbing detail. It shows that during the last fiscal year, a substantial decline occurred in agricultural exports, which fell by 27 percent. While too much should not be read into one year's performance, this piece of data is consistent with the observation of a structural issue faced by exports over a longer period as well.

Reasons for the poor performance of exports in recent years include weak external demand, lost textile share to new competitors in international markets, lack of value-addition and unfavorable terms of trade for exports. Energy shortages have affected exports for a while though the

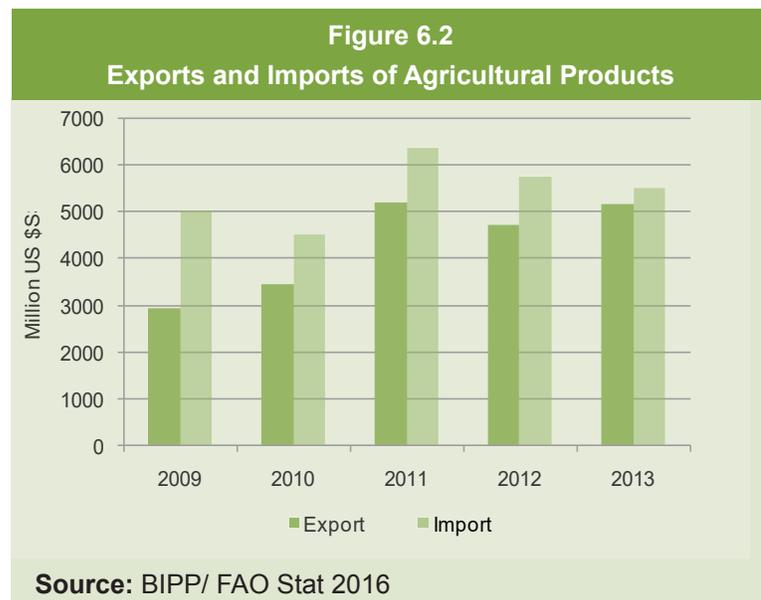
*This chapter was prepared by Mahmood Ahmad

improvement in energy supplies did not much improve exports in 2015-16. The appreciation of the real exchange rate (by 20% in recent years) has also been a source of disadvantage for Pakistan's exports.

Table 6.1 Recent Export Profile (Value in US\$ Thousand)			
Summary	July-June		% Change
	2015-16	2014-15	
Grand Total	20,786,510	23,667,294	(12.17)
Agro & Food	3,667,856	4,249,894	(13.70)
Textile Group	12,142,035	13,164,027	(7.76)
Metal & Minerals	240,865	677,964	(64.47)
Engineering Manufacturing Goods	2,260,532	2,574,087	(12.18)
Other Sectors	2,475,222	3,001,322	(17.53)

Source: Trade Development Authority of Pakistan

Figure 6.2 provides a medium term perspective on Pakistan's trade in agricultural goods. During the years 2009-13, agricultural exports amounted to approximately US\$ 4 billion on average and agricultural imports to approximately US\$ 5.3 billion. Thus, Pakistan experienced a deficit in its agricultural balance of trade which contributed to the deficit in the overall balance of trade. Furthermore, as with overall exports so also with agricultural exports, the last few years have seen a decline in nominal levels.



There is a notable concentration of both imports and exports in very few products, sugar and palm oil being the major agricultural imports, and rice by far the largest export item generating nearly half of farm export earnings.

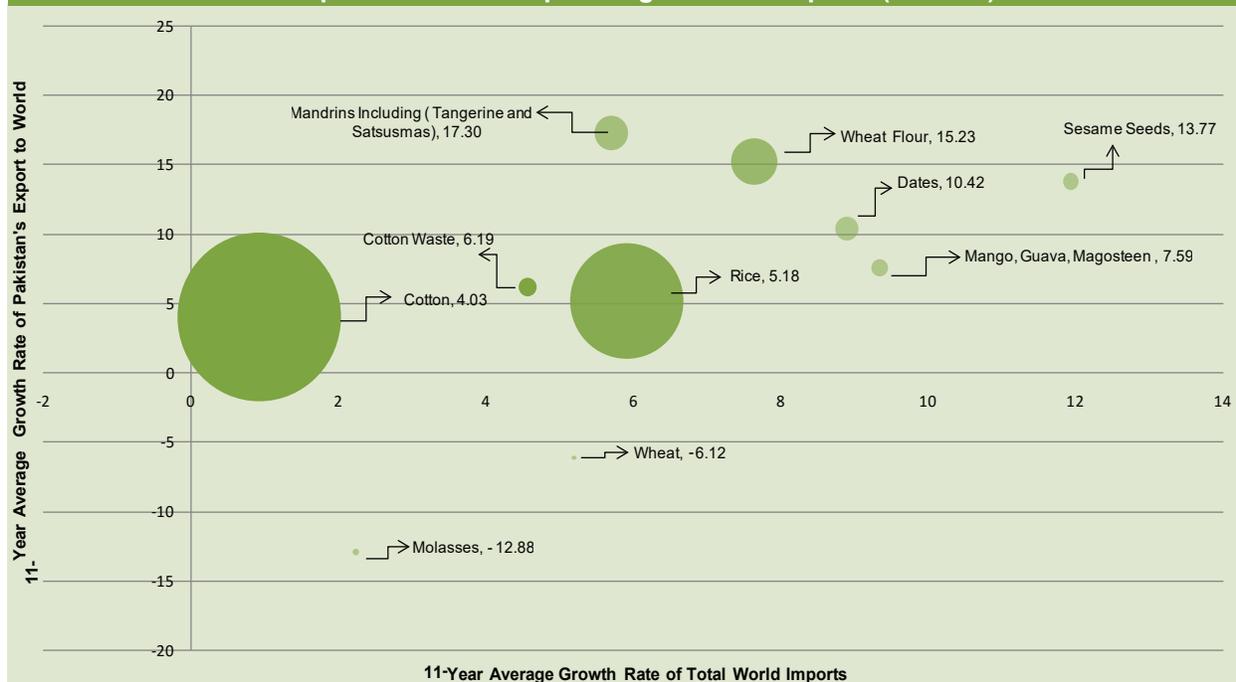
DECLINING COMPETITIVENESS

Comparative growth analysis shows poor performance for rice, wheat, molasses and mango exports but good performance among other items¹ (Table 6.2 and Figure 6.3). Since rice, wheat and mangoes are important to Pakistan's overall exports, the overall trend of concern.

Table 6.2
Trade Competitiveness Matrix for Top Ten Agricultural Exports

Commodity	Growth Rate of World Imports (2004-15)	Growth Rate of Pakistan's Exports (2004-15)	Pakistan's Exports to World in 2015	Growth Rate of Pakistan's Exports Shares (2004-15)
Cotton	0.92	4.03	4040270901	0.82
Cotton Waste	4.57	6.19	45387042	2.39
Dates	8.89	10.42	83214254	0.93
Mandarins/Other Oranges	5.69	17.30	171719818	12.73
Mango, Guava, Mangosteen	9.34	7.59	40900805	-3.20
Molasses	2.24	-12.88	6657347	-15.73
Rice	5.90	5.18	1927200362	-2.21
Sesame seeds	11.93	13.77	40505966	-0.42
Wheat	5.19	-6.12	3194384	3.79
Wheat flour	7.64	15.23	323007204	7.00

Figure 6.3
Competitiveness of Top Ten Agricultural Exports (2005-15)



Source: BIPP/UN Comtrade, 2016

EXPORT POLICY

Pakistan liberalized its trade policy considerably between 1996 and 2003. Government simplified the tariff structure, eliminating most quantitative restrictions and lowering rates while also abolishing many state trading monopolies for agricultural products. However, reforms got off track in 2006 when there was a reversal of a number of the more important liberalizing reforms in agri-

culture, notably related to wheat, sugar and fertilizer policies. Further, in 2008, the government introduced several regulatory duties, in addition to the expansion of Statutory Regulatory Orders (SROs), which since 2006, were used both to give exemptions to normal tariffs, in some cases, and to increase tariffs, in others.

Pakistan's export policy is relatively liberal as compared to its import policy. With some exceptions, export commodities are not typically subject to taxes, duties or bans. Table 6.3 shows the status of current policy with respect to agricultural items.

Table 6.3	
Export Policy for Agriculture Inputs and Outputs	
Products	Status
Rice	Exports subject to procedures of the Ministry of Commerce. Obligatory pre-shipment inspection by Quality Review Committee. Trade with Europe by the Trading Corporation of Pakistan.
Wheat	Since 2011 exports of wheat freely allowed.
Wheat, Flour, Suji and Maida	Export is permissible in accordance with the Ministry of Commerce procedures.
Sugar	Banned for export, but in 2011, 100,000 MT allowed for exports, allocated on a first-come basis (5,000MT limit).
Urea	Banned for export except with the permission of Economic Coordination Committee (ECC) of the cabinet.
DAP, NP, and other Fertilizers	Banned for exports. These products imported by UN and other relief agencies are permissible for re-export to Afghanistan.
Cotton	Export subject to (a) registered contract with Trade Development Authority of Pakistan (TDAP) against 1% of the value of contract as Security, (b) an irrevocable letter of credit with the TDAP to be opened within 35 days of the registration of the contract, the failure of which leads to the security deposit confiscated, and (c) exports shall be allowed against type as well as grade.
Milk and Dairy Products	Freely exportable.

Source: Valdes, 2013, Agriculture Trade and Price Policy in Pakistan

EXPORT PERFORMANCE OF KEY COMMODITIES

Our analysis for major export commodities is based on the Revealed Comparative Advantage (RCA) methodology.² The RCA ratio is the share of a given product in a country's exports divided by its share in the world exports. A rising ratio over time suggests improving competitiveness while a falling ratio suggests declining competitiveness.

Rice

Figure 6.4 shows that rice production has generally declined in recent years and exports have fluctuated, in line with fluctuating global prices.

After rising in the early 2000s, the RCA for rice has broadly declined since 2006-2010 (Figure 6.5). Some of the reasons for this include the following:

Domestic Versus International Prices

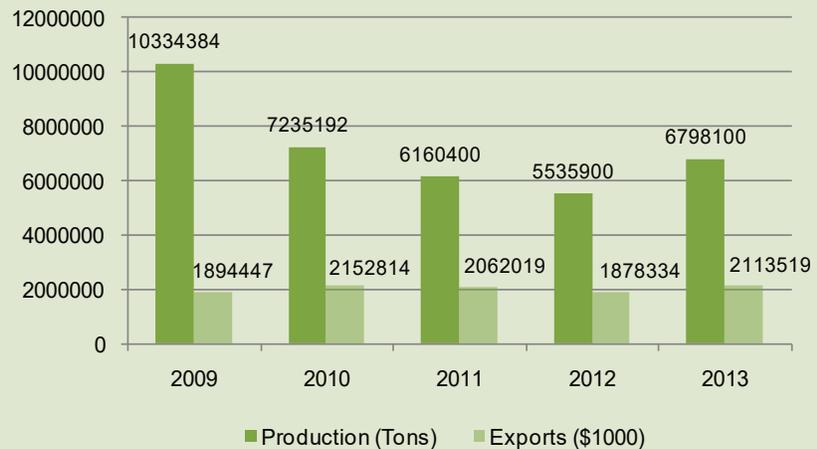
Analysis by Valdes (2013) of data from 2009-2011 shows fluctuations in both border and farm gate prices. The border price in US dollars was \$1088/tonnes for 2008-09, \$830 for 2009-10 and \$828 for 2010-11. The per-kilo prices in rupees at the border and at the farm gate were Rs 85 and Rs 19 in 2008-09, Rs 70 and Rs 24 in 2009-10, and Rs 70 and Rs 28 in 2010-11. Note that in 2008-09, when world price were experiencing sharp increases, the farm gate price was at its lowest of the three years. Translating the border

price into a farm gate equivalent leads to a nominal rate of protection of – 35 percent for 2008-09 and of – 20 percent for 2009. The nominal rate of protection was positive 3 percent for 2010-11. This implies that rice production was effectively taxed in two out of the three years.

Changing Consumer Preferences

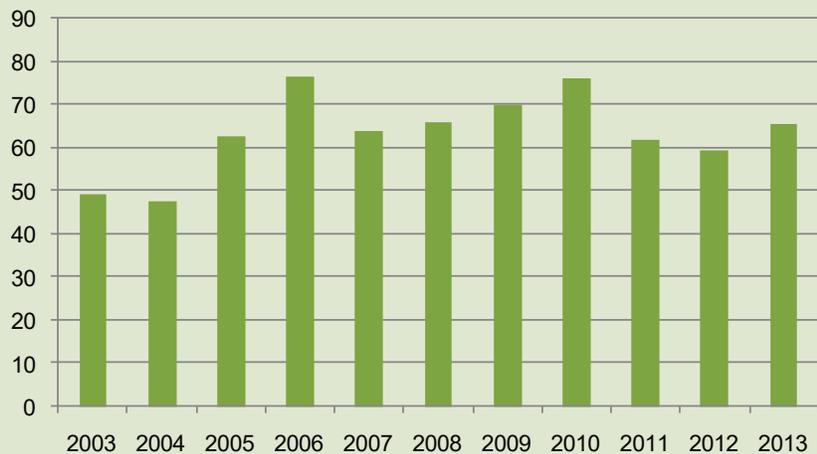
The rice market is changing as consumers are increasingly demanding different types of rice for ethnic and health reasons. Stores now have to carry a larger variety of rice types (such as parboiled rice, organic rice, diabetic rice), brands and qualities, and the market in the richer developed countries is now very competitively shared. Pakistan has not managed to expand rice export varieties and is consequently suffering.

Figure 6.4
Rice Production and Export



Source: BIPP/FAO Stat 2016

Figure 6.5
Rice: Revealed Comparative Advantage (RCA)



Source: BIPP/FAO Stat 2016

Competition

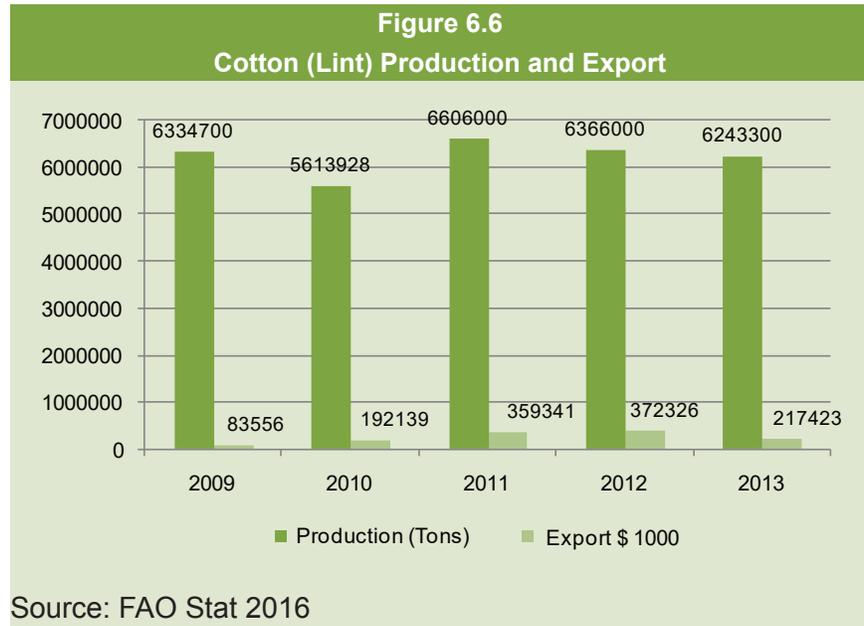
India has developed a basmati look-alike variety that is cutting into Pakistan's traditional basmati export market. Indeed, Pakistani farmers are now themselves moving over to the Indian variety because it grows faster, consumes less water and labor and thus allows them to grow three crops in a year. In part, this response also highlights the lack of dynamism in local research efforts after some success more than three decades ago.

Maintenance of Standards

Rice export markets are increasingly characterized by a focus on quality. Despite the existence of several government agencies in the rice sector, Pakistan lacks adequate mechanisms for ensuring that rice exports meet global quality standards. This affects the reputation and price of our rice exports. Even where some farmers or exporters are keen on meeting these standards, they are handicapped by the lack of government support in this area.

Cotton

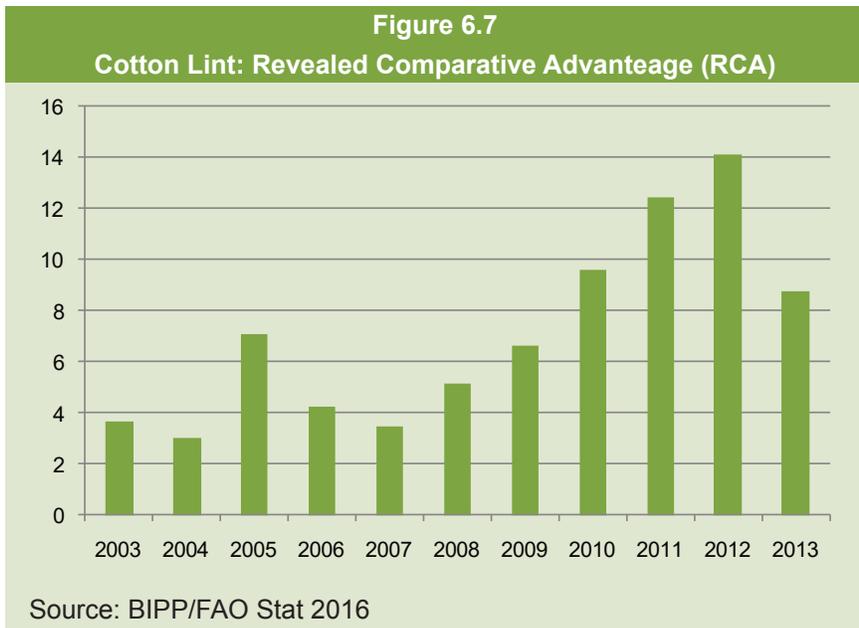
In recent years, the production and export of cotton from Pakistan has somewhat declined (see Figure 6.6). The production decline is due mostly to a disease called the leaf curl virus and other pest attacks and to the slow and unregulated adoption of a harder seed variety called BT cotton. Some experts have drawn attention to climate change as well manifested



in shifts in the timing and duration of the rainy season. The export decline is largely due to the fact the domestic textile sector absorbs an increasingly large share of cotton output.

RCA data for cotton lint (see Figure 6.7) feature three notable aspects. First, Pakistan is very competitive in this product (relatively high ratio). Second, relative competitiveness in cotton rose throughout the decade of the 2000s. Third, relative competitiveness fell during 2012 and 2013 and, although analysis that is more recent is not available, falling nominal exports suggest that competitiveness has continued to fall.

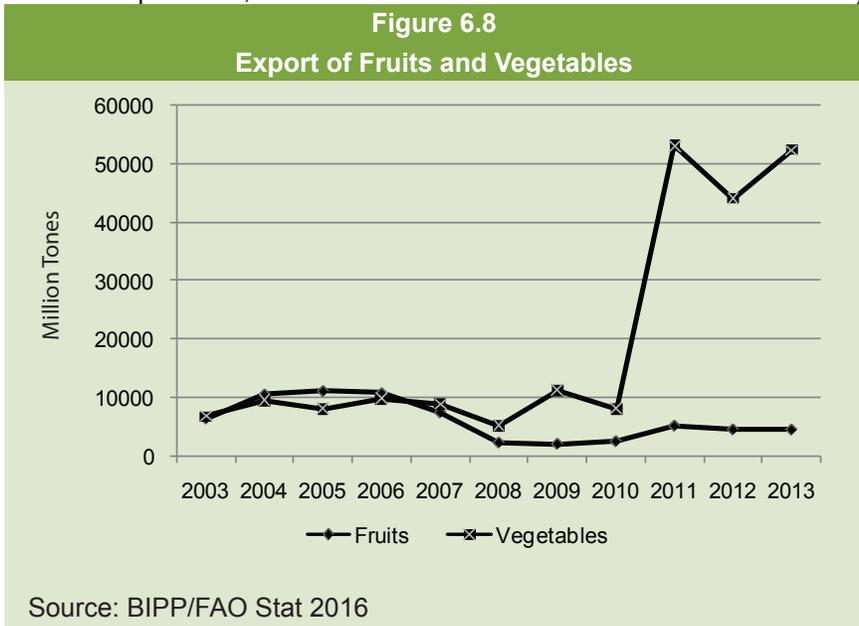
In 1990, the gap between India and Pakistan in textile export earnings was only one billion dollars but now Indian exports have reached \$30 billion while Pakistan's are stagnant at \$13 billion. In addition, Bangladesh converts one million bales of cotton to value added items and fetches about \$6 billion through exports, against Pakistan, which converts one million bales to bring in only \$1.16 billion by marketing value-added textiles.



Horticulture

The Government of Pakistan considers horticulture a priority area for the future for two reasons: a) because of rising demand for fresh produce, both in domestic and international markets b)

because horticulture offers high returns and job opportunities compared to other competing crops. Fruit and vegetable exports have generally been rising in recent years, though from a low base (see Figure 6.8). Vegetables from Pakistan, in particular, enjoy a favorable position in neighboring countries to the west and north. Nevertheless, the current level of exports is



low. Pakistan exported about 0.561 million tons of fruits and vegetables during 2014-15 and earned foreign exchange of US\$ 168.71 million.

Table 6.4 shows the current level of competitiveness of several horticultural crops using selected indicators (defined in footnote).³

Pakistan's horticulture sector is growing slower (3 to 6%) than the world market (12%) per year. It can grow faster. In countries like Jordan, Egypt and Morocco, the sector has been growing recently at rates of 24 %. This happened because of reforms and support policies that Pakistan could also adopt.

Table 6.4
Market Share and Other Competitive Indicators for Selected Commodities in Pakistan

	Base Year 1996	Final Year 2006	Variations	Base Year 2005	Final Year 2015	Variations
Mango						
Market Share	1.17%	4.28%	2.66	4.0%	2.1%	(0.48)
Percentage of Exports	0.05%	0.19%	2.84	0.2%	0.2%	0.07
Specialization	7.52	30.12	3.01	26.1	14.3	(0.45)
Percentage of Imports	0	0	-0.04	0.0%	0.0%	-
Market Share Relative to Rival	0.67	1.94	1.88	0.24	0.22	1.09
Tangerine						
Market Share	0.34%	1.36%	3.06	0.9%	3.9%	3.60
Percentage of Exports	0	0	1.63	0.1%	0.8%	4.83
Specialization	2.16	9.61	3.45	5.6	27.3	3.88
Percentage of Imports	0	0	-0.41	0.0%	0.0%	-
Market Share Relative to Rival	0.75	1.98	1.63	-	242.49	-
Dates						
Market Share	4.44%	7.38%	0.66	7.4%	9.4%	0.27
Percentage of Exports	0	0	-0.02	0.2%	0.4%	0.99
Specialization	28.57	52	0.82	48.7	65.6	0.35
Percentage of Imports	0	0	-0.46	0.0%	0.0%	(0.62)
Market Share Relative to Rival	2.62	2.61	-0.01	90.35	119.67	(6.87)
Potatoes						
Market Share	0.00%	0.11%	21.08	0.1%	3.6%	29.72
Percentage of Exports	0	0	16.63	0.0%	0.6%	38.82
Specialization	0.03	0.75	23.19	0.8	25.1	31.55
Percentage of Imports	0	0	-0.27	0.0%	0.0%	(0.57)
Market Share Relative to Rival	0.17	0.19	0.13	0.23	2.25	14.29
Onions						
Market Share	0.15%	0.38%	1.52	0.2%	0.7%	2.35
Percentage of Exports	0	0	0.97	0.0%	0.2%	4.47
Specialization	0.98	2.71	1.76	1.3	4.7	2.55
Percentage of Imports	0	0	-0.29	0.2%	0.2%	0.17
Market Share Relative to Rival	0.67	0.26	-0.61	0.03	0.09	11.65

Market Share = M_{ij} / M_i , Percentage of Exports = M_{ij} / M_j , Specialization = $(M_{ij} / M_i) / (M_j / M)$, Percentage of Imports = M_i / M , Market Share Relative to a Rival = $(M_{ij} / M_i) / (M_{ir} / M_i)$
M Total import value, M_j Value of imports originated in the Exporter Country (Pakistan). In our analysis it is supposed to be equal to the total exports from Pakistan to the World Market
M_r Value of imports originated in the Rival (Export) Country (India), M_i Value of imports of commodity i, M_{ij} Value of imports of commodity i originated from Pakistan
Source: BIPP, UN Comtrade 2016

Pakistan cannot yet fulfill the requirements of the large buyers who dominate this increasingly sophisticated market. Specific challenges include lack of good post-harvest management (e.g., rapid cooling after harvest, packaging), lack of mechanisms to adhere to export standards and

competition from other countries in Asia and the Middle East. Some of these disadvantages are offset by Pakistan's close proximity to growing markets in the Gulf and South East Asia and its lower production cost due to cheap labor and water.

Non-Traditional Horticulture Items

Non-traditional horticultural items like plums, pears, guava and loquat also have a large potential in the export market. Medicinal plants also hold promise. Turmeric, garlic and ginger present examples where significant growth in production and export is reported.

Table 6.5
Pakistan and World Trade in Medicinal Plants in 2008

Medicinal Plants	World Export (000 US\$)	Pakistan Export (000 US\$)	World Import (000 US\$)	Pakistan Import (000 US\$)
Turmeric	2202	167	12274	1866
Sesamum Seed	140977	29701	1287066	58
Linseed	723430	127	1020732	
Garlic	952975	308	1005228	33105
Coriander Seed	165358	257	122908	3519
Ginger	575573	578	287671	30885
Fennel Seed	46206	1006	5718	554
Caster	7542	240	3701	

Source: FAO Stat 2016, UN Comtrade 2016

COMMON ISSUES FOR AGRICULTURAL EXPORTS

Our Exports are not Price Competitive

Domestic price policy sometimes makes it difficult to export a particular commodity. Taking the case of wheat, the current price support policy keeps domestic prices above international prices and prevents wheat exports without a subsidy. The same is currently true of sugarcane. Thus, sugar from Brazil can capture the Iranian market, as Pakistani sugar is more expensive by 32 percent. Australian wheat seizes the Chinese market as Pakistani wheat costs twice as much. High-yield Indian basmati look-alikes grab 96% of the Saudi market as low-yield Pakistani super basmati is uncompetitive.

Low Unit Export Values

Our exports have low unit value compared to our competitors. This is especially true for such horticulture crops as mangoes and tomatoes. (See Figure 6.9).

Exports do not Meet Quality Standards

The product which reaches the final consumer or export markets is the result of poor production systems coupled with inadequate harvest and post harvest handling, storage and transport systems. Investment in quality is discouraged as there is no credible system to monitor and control quality and assign quality grades.

Market Access

Many developed countries continue to protect their agricultural sectors through tariffs, quotas, standards and anti-dumping practices as well as high levels of domestic price supports. These measures not only restrict the access of competitive foreign producers to their markets, but also induce surplus production, which frequently precipitate global price depressions.

High Input Costs and Low Subsidies

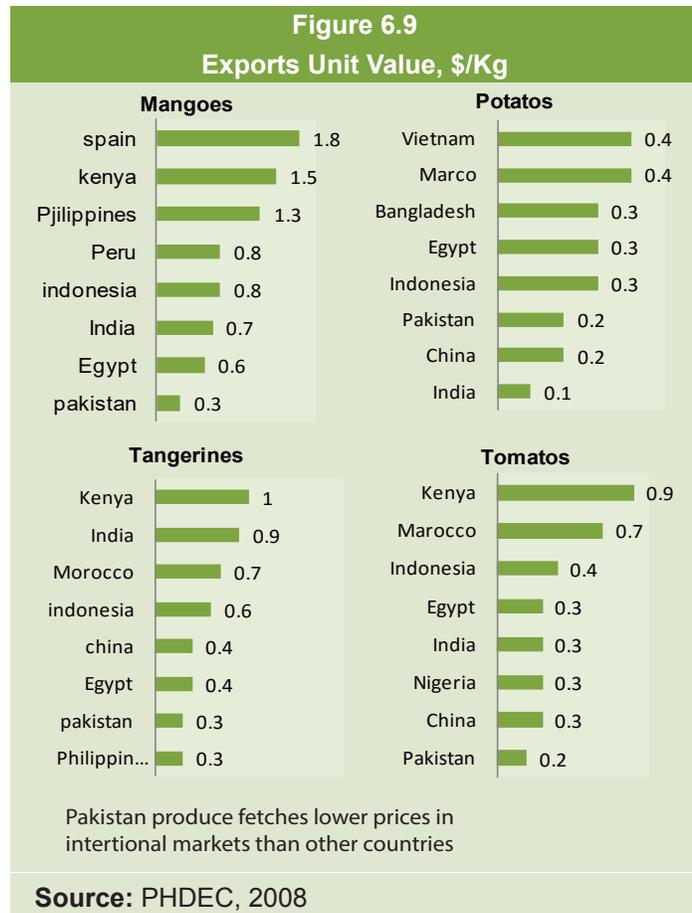
In recent years, output prices of agricultural commodities have declined while input costs in Pakistan have continued to rise, making agriculture a money-losing enterprise. The degree of input-subsidy offered to Pakistani farmers (on water, seeds, fertilizer and electricity) is lower than that provided in such competitor countries as India, making it difficult for our farmers to compete on price.

Lack of R&D

Research and development has traditionally been a low priority. For instance, there is near absence of development of new high yielding varieties of cotton and rice. India has developed many basmati and basmati- look-alike (non-basmati) varieties during the last few years whereas Pakistan has failed to develop any basmati variety during the last 30 years.

PROMOTING AGRICULTURAL EXPORTS

The Ministry of Commerce has developed a Strategic Trade Policy Framework (STPF) that aims to achieve annual exports of US\$ 35 billion by 2015-18 by encouraging transition from a “factor-driven” economy to an “efficiency-driven” and “innovation-driven” economy. The following elements, in particular, are being emphasized to improve export competitiveness: (a) competitiveness (quality infrastructure, labor productivity, access to utilities, and level of technological development); (b) compliance with standards (convergence of local & international standards, protection of intellectual property, and effective and efficient disputes resolution mechanism); (c) creating conducive policy environment (monetary policy, tariff & tax regime, and synergic industrial & investment policies) and (d) achieving market access (multilateral, regional, and bilateral).



In the short run, the STPF aims to reverse the decline in key exports. For agriculture, these include: (a) basmati rice, (b) horticulture, and (c) meat and meat products. The focus of markets export enhancement will be (a) Iran, (b) Afghanistan, (c) China, and (d) the European Union. In particular, Pakistan hopes to benefit from Generalised Scheme of Preferences (GSP) Plus status in the European Union.

In the medium run, the STPF aims to structurally transform the export sector through a three-pronged strategy – sustainability, growth and penetration. The products (e.g. textiles) and markets (e.g. US) where Pakistan is already strong, the ‘sustainability’ of existing shares and consistent ‘growth’ is to be ensured through enhanced competitiveness and removal of inefficiencies. Products (e.g. horticulture) and markets (e.g. China) where potential is under-exploited, a ‘penetration’ strategy, developed in consultation with the stakeholders, is required to realize the potential.

In the long-term, the strategy entails structural reforms of the entire export sector including high tech and innovative products (e.g. engineering and pharmaceutical) in the product mix, value added exports substituting commodities, quality enhancement supplanting price race, value creation through designing and branding replacing private labeling and market diversification towards unexplored markets (e.g. South America and Africa).

Immediate Priorities

Immediate priorities involve the following five areas: (a) changing demand – shifting the production paradigm from supply-led to demand-driven, (b) repositioning our exports, (c) increasing competitiveness through productivity enhancement and improved postharvest practices, (d) value addition by effective use of processing technologies especially for increasing shelf life of perishable products, and (e) compliance with new standards value capturing by promoting international certifications of farms and production facilities.

Changing Demand

Changing food demand patterns worldwide, driven by income growth, urbanization, population growth and cultural change are inducing fundamental changes in the way food gets from the farm to the market. Changes are more visible for the most perishable commodities with the highest income elasticity of demand, such as fish, meat, eggs, and milk but are also increasingly affecting higher value fruits and vegetables. We need to build the capacity of small farmers and SMEs to respond to this changing demand pattern.

Repositioning Exports

This requires moving away from the historical rigid cropping pattern of five crops and letting farmers produce according to market signals. Some tough agriculture policy reforms are in order which have implications on agriculture exports – reforming the wheat procurement policy, price setting mechanization for sugarcane, price controlling on fruits and vegetable in the traditional

markets and rationalizing water pricing in agriculture. The country has relied too long on low value exports, like raw cotton as opposed to value added textiles. Bangladesh and Japan export more textiles than Pakistan without growing a single bale of cotton. Some specific measures to reposition our exports include institutional strengthening of Pakistan Horticulture Development & Export Company (PHDEC), support for international certifications, packaging, development of common facility centers e.g. Pack Houses and Vapour Heat Treatment facilities and development of market linkages with the outlets of international chain stores in Pakistan. Finally, there is considerable potential for enhancement of export of meat products in Iran and Middle East. Under the STPF 2015-18, support will be provided for certification and approval of processing facilities. Exporters will also be helped to establish market linkages through Pakistan's trade offices abroad.

Making Agricultural Products Competitive

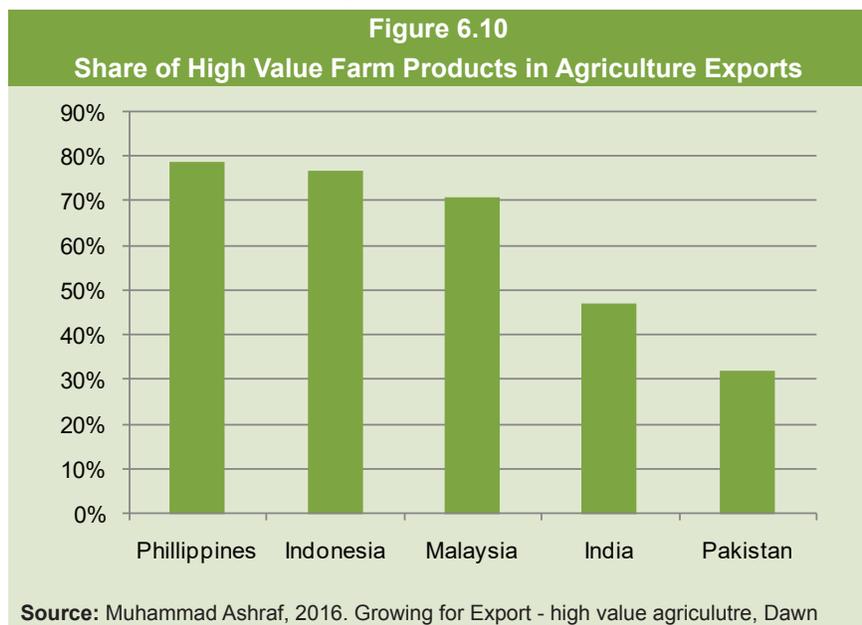
To maintain competitiveness, we need to increase land, water and labour productivity, improve post-harvest handling, create cold chains and, more importantly, produce according to what the market demands in quantity and quality. This, in turn, requires a supportive policy environment featuring a proper incentive structure (right prices), competitive exchange rates (avoid appreciation and overvaluation) and supportive institutions for credit supply and marketing.

Value Added Exports

Allowing market prices to set crop decisions will give farmers an incentive to move into higher value added crops rather than stay with those whose profitability depends on procurement price levels set by the government policy. This will introduce greater risk for farmers but also ensure a greater diversity of crops and long run sustainability of the sector. In particular, it will induce a shift towards more vegetable and fruit production and reduce the acreage devoted to rice and wheat. At present, Pakistan has a low share of high value farm products in its overall agricultural exports (see Figure 6.10).

Compliance with Standards

Food safety is the prime concern in most of high-end export markets such as Europe, USA, and Japan. Food products must comply with stringent sanitary and phytosanitary (SPS) requirements. Consumers in these markets are very demanding regarding the



taste, quality and presentation of food products. The consistency of fruits in terms of size, shape, weight, colour and level of ripeness are important parameters for consumers in making their buying decisions. Issues related to non-compliance of SPS requirements pertain to pesticide residue and the limited treatment facilities that are available close to production areas. Pakistan has lost some markets (such as chillies from Sindh) because of the inability to comply with food safety standards. The enforcement of regulations relating to standards, the assigning of grades to products and investment in treatment facilities are matters for the public sector. They cannot be left to private initiative alone.

Chapter 7

Moving Beyond Traditional Solutions: Innovative Model for Increasing Agriculture Productivity

Chapter 7

Moving Beyond Traditional Solutions: Innovative Model for Increasing Agriculture Productivity*

Agricultural development is fundamental to economic growth, distributive justice and poverty alleviation especially in the developing countries. The adoption of new technologies, investment in the supply chain to add value and agricultural infrastructure (including roads and markets), formulation of appropriate policies and establishment of robust institutions are key to maximizing its potential and transforming the subsistence and semi-subsistence agriculture to commercial activity. This transformation invariably leads to productivity increase of land and labor; efficiency and value gains at each stage of agriculture cycle; enhancement of farmers' income and the workforce associated with agriculture related activity; and sustained boost to the economic activity especially in input, processing, distribution and storage industries. Cumulatively, the multiplier effects go much beyond the agriculture to benefit other sectors of the economy.

The role of the agricultural sector in Pakistan has been a constant subject of debate among economists, policy makers and politicians, and understandably so, given the sector's importance and potential for creating employment, enhancing income of the farmer and stimulating growth and economic development. Previous chapters have discussed some of the causes of low growth, low productivity and lack of diversification in the sector, especially in the last decade or so. They have also considered some traditional remedies focusing on the better use of water, new seed development, more research, marketing reforms, more responsive pricing and better infrastructure. This chapter goes beyond the traditional solutions to propose an innovative intervention model for increasing agriculture productivity and reviving agriculture as a vehicle for sustainable economic growth and poverty reduction.

Pakistani agriculture is bestowed with unique competitive advantages characterized by: the agro-ecology and seasonality; a huge irrigation system in the world; proximity to the major international markets (EU, Middle East, Central Asia) and concomitant lower transportation costs and relatively cheap labor and production cost (despite productivity issues). According to estimates, the share of agriculture in GDP can be doubled in Pakistan provided the sector receives due attention and priority by the government in terms of conducive policy and institutional arrangements

*This chapter was prepared by Shahid Najam

as well as fair terms of trade for the sector. A number of studies have empirically established that the poor people tend to benefit more from the contribution of agriculture sector to economic growth than the growth originating from industrial or service sectors.¹

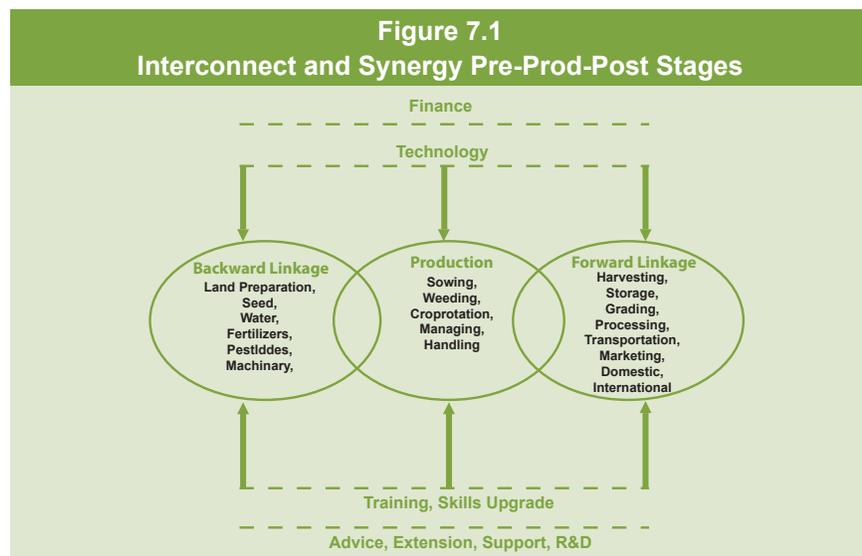
VALUE CHAIN IN AGRICULTURE

The transformative change from subsistence to commercial agriculture could be achieved by fully availing the synergy and connect between the pre-production, production and post production cycles of agriculture. The strategic thrust needs to be on value addition and value chain investment. Agriculture could thus become engine of economic growth and poverty reduction. Figure 7.1 below attempts to encapsulate the major components at each stage of the cycle for targeted and packaged interventions involving finance, technology, skills development and support services to maximize the value addition and productivity enhancement.

Currently, however, a number of bottlenecks and value leakages adversely impact the pre-production, production, processing and post-processing phases of agriculture. These leakages stem from multiple contributory factors including lack of

economies of scale, low quality farming inputs, ineffective crop rotation and water mismanagement. Salinization and perpetual water shortages; lack of skilled workforce and advanced processing capabilities and inadequacy of eco-designs, product diversification and consumer traceability, further aggravate the situation, not to speak of farmers' failure to access and understand the market dynamics and behavior.

These leakages have to be converted into value propositions through value chain development approach, for which a plethora of best practices and success stories, both from the developed and the developing world, already exist. For example, Australia focused on investment in agricultural infrastructure, diversification to agronomic and horticultural crops with high value addition potential and production management and technology. Chile pursued a set of measures aimed at enhanced investment in agricultural infrastructure, investment in value chain, incentivizing multinationals, emphasis on production management and the input technology, establishment of agricultural cooperatives and concluding bilateral fair trade agreements. India's development

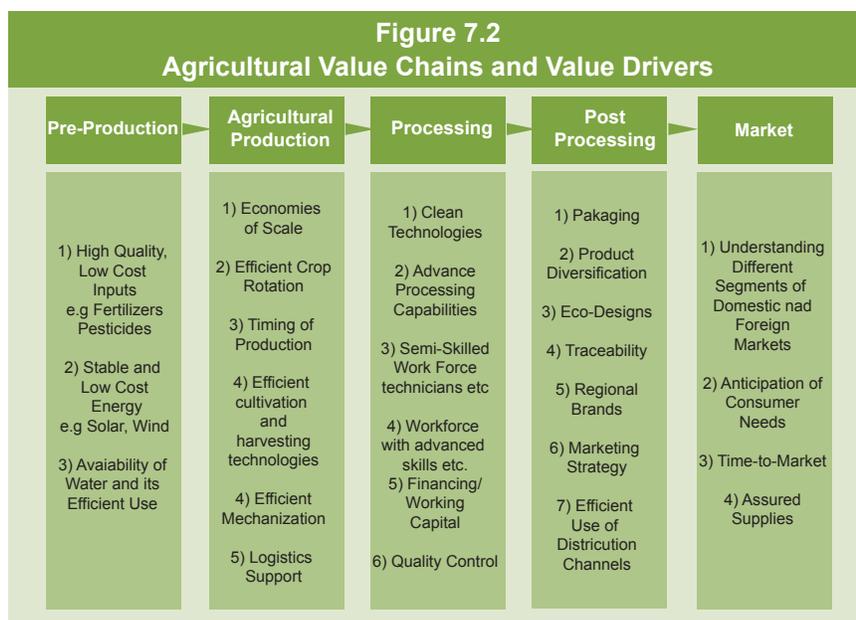


model on maximizing the agricultural potential revolved around a set of policy, institutional and investment measures to improve infrastructure; institutional synergy between the state machinery engaged directly or indirectly with agriculture and incentives for value chain investment. A poor country like Tanzania, embarked on integrated interventions involving all stakeholders in the value chain with special focus on technology transfer, market led production incentives, training rural enterprises in business management, increased access to financial products, reducing logistics costs through creation of production clusters etc.² China registered a remarkable increase during 1985 to 2007 through greater use of input technology, mechanization and growth in total factor productivity, investment in R&D and infrastructure and efficiency improvement all along the value chain.³

Pakistan could learn from these experiences to achieve sustainable increase in the productivity and transformation of agriculture through value chain approach rather than the conventional paradigm focused only on major crops productivity yield. This would, a priori, require that the synergy and the inter-connect of the troika of pre-production, production and post production phases of agriculture are harnessed in a composite manner. For the purpose, it is of utmost importance that the main value drivers at each stage of agriculture supply chain cycle are identified and optimized with a view to reducing the input cost, enhancing the agricultural productivity and maximizing the value addition to revitalize the sector and stimulate broader economic growth. Figure 7.2 encapsulates the main drivers at various stages of agriculture cycle.

These value drivers at various stages i.e. pre-production, production and post production (processing, post-processing and marketing) need to be fully integrated in agriculture development strategies to yield maximum dividends. At the *pre-production stage*, the

emphasis has to be on high quality; low cost inputs like availability and application of the right mix of seeds, fertilizers and pesticides; uninterrupted availability of energy at affordable rates; water use efficiency including adoption of high efficiency irrigation system and the effective control of water losses. At the *production stage*, encouraging collective action by small farmers, contract farming and buy-back arrangements could help achieve economies of scale and modernization



of agriculture. The *processing and post processing stages* require further development of modern processing capabilities. Lack of quality control and proper gradation of products reduces prices and margins for small producers. With proper packaging, branding and grading, such farmers can earn more revenues and profits. As regards *marketing*, a robust market information and intelligence system could help farmers develop a better understanding of domestic and foreign markets.

Against this backdrop, a holistic, integrated and innovative model to harness the full potential of agriculture sector is proposed in this chapter which goes beyond the traditional solutions tried in the past decades. The spate of developments in information and communications technology (ICT) constitute an integral part of the model. As shown in Figure 7.3, the model is based on four distinct pillars relating to (a) finance, (bi) physical infrastructure, (c) marketing infrastructure and information system and (d) capacity development.

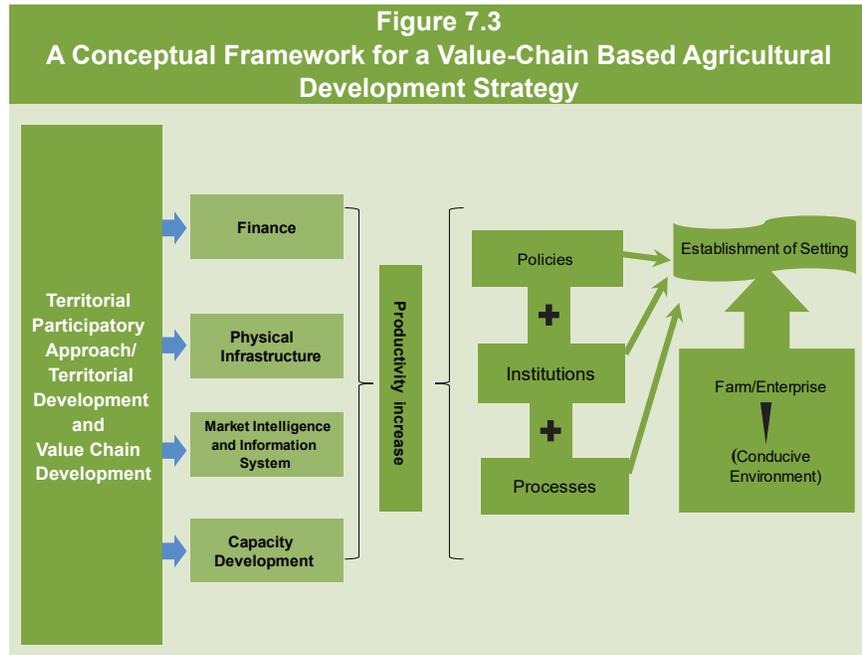
Pillar I: Finance

The traditional solution to the financial constraint faced by farmers has been to develop public sector credit facilities such as Agricultural Development Banks. These facilities have encountered several problems that have limited their usefulness. First, they typically cater to larger and politically connected farmers. Second, they are run on traditional lines with a

heavy reliance on physical collateral. Third, they suffer from weak governance that usually results in high levels of non-performing loans and politically-inspired write-offs of debt.

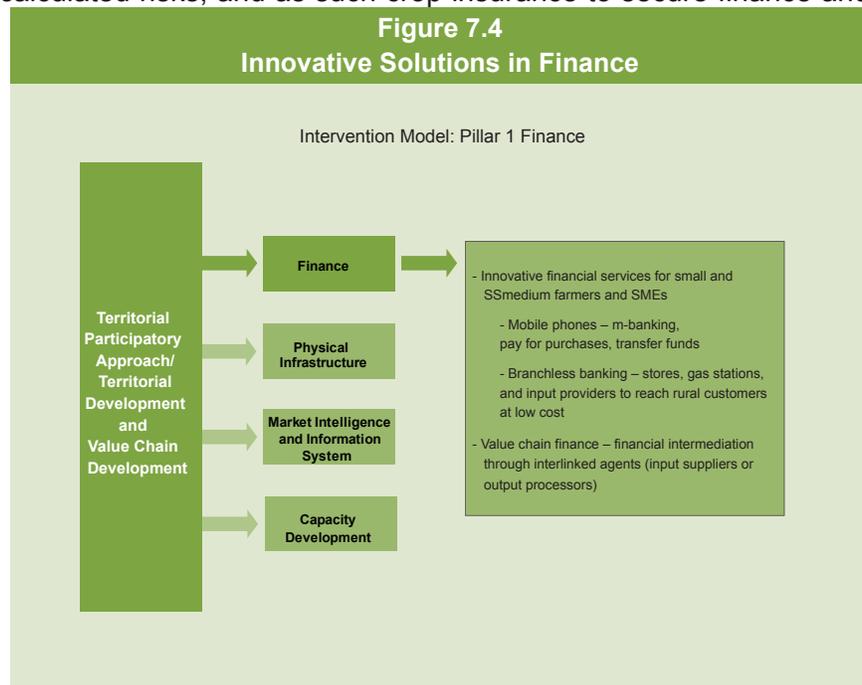
The efforts of non-governmental organizations and recent advances in ICT allow for more private-sector oriented solutions to the finance constraint of the agricultural economy, including for small farmers and traders and input-suppliers. We discuss some of these solutions in the sections that follow. Meanwhile, Figure 7.4 provides a schematic diagram of the finance pillar.

Microcredit schemes have been successful in providing access to small amounts of credit for the rural poor mostly in Asia. While started by non-governmental organizations, these schemes now



involve many private banks as well. This is also the case in Pakistan. These need to be targeted to the small farmers and the rural poor.

Agriculture is replete with uncalculated risks, and as such crop insurance to secure finance and investment is not a viable option for insurance companies. Since the mid-90s, successive governments have attempted to establish crop insurance but without much success. Currently, insurance companies only provide credit insurance, not crop insurance, for which the State Bank is paying premium on behalf of the farmer for up to 12.5 acres. It is essential, as such, to involve professional private sector advisory companies to design and monitor the entire crop process so as to attract insurance companies and make the risk of bank financing more manageable.



Hedging looks for: price lock which is agreed or negotiated and contractual; assured quality, according to pre-determined specifications; assured quantity as per the contract; and timely delivery at provided point of sale. This tool provides great scope for helping the farmers meeting their financial needs. For the purpose, a crop production management company is a solution.⁴

Branchless banking delivers financial services without relying on bank branches. It may complement an existing bank branch network or can work as an independent separate channel to provide a range of financial services to farmers and other customers. Examples of branchless banking technologies are automated teller machines (ATMs), Point of Sale (POS) devices and mobile phones. Pakistan is one of the fastest developing markets for branchless banking in the world. The State Bank of Pakistan (SBP), in July 2016, announced branchless banking regulations to create enabling regulatory environment to promote bank-led model and to ensure customer protection and risk management for banks. The regulations categorized branchless accounts into three levels. The transaction limit for the first two levels has been set at Rs 25,000 and Rs 50,000 per day and Rs 40,000 and Rs 80,000 per month, respectively. However, for the third level the banks have been authorized to set the transaction limit and monitor activities of such accounts.

These regulations are applicable to financial institutions, including commercial banks, Islamic banks and microfinance banks desirous to undertake branchless banking. The other market players also facilitate branchless banking such as telecom companies, technology service providers and agents like fuel distribution companies, Pakistan Post, chain stores etc. Use of technologies like 3G/4G spectrum, radio service, point of sale, internet banking terminals etc. is also making headway.

Mobile phone is one of the most widely used technological devices and has enormous potential in the rural areas for branchless banking. It has already successfully functioned in Kenya, South Africa, Philippines and Indonesia. The advantages of mobile phone include wide coverage, possible 24-hour service a day, very small fee for the agents, no need for a bank account as only a mobile phone number suffices, almost no paperwork (administration), very small bank overhead, suitable for many people with low income and low literacy and reduced transportation costs.

Value Chain Finance (VCF) e.g. trade credit, input supplier finance, contract farming, inventory credit/warehouse receipt finance, collateralized lending and import/export finance etc., is yet another very important tool to help commercialize agriculture. It is important, however, to identify relationships along the value chain, mitigate constraints, exploit opportunities for value chain finance and explore how formal financial institutions can enter the equation. If designed well, VCF can increase the competitiveness of small producers, as well as a range of agricultural and agribusiness enterprises.

Pillar 2: Physical Infrastructure

The traditional approach to rural infrastructure in Pakistan has prioritized roads, electricity and irrigation networks. This is useful and necessary. Such investment in agricultural infrastructure is fundamental to increasing agricultural productivity as it ensures farmers' access to input and output markets, access to finance and credit, access to telecommunication and transportation and, if prudently developed, access to technology and advisory services besides facilitating the integration of less-favored rural areas into national and international economies.⁵ Studies show that investments in agricultural infrastructure provide tangible gains in terms of increased competitiveness, reduced marketing margins and direct improvement in farm incomes (see, for example, Antle 1984; Binswanger, Khandker, and Rosenzweig 1993; Mundlak, Larson, and Butzer 2002; and Fan and Zhang 2004).

But we need to go beyond traditional solutions to re-galvanize agriculture in Pakistan. In this section, we elaborate on the concept of Farm Service Centers or agri-malls as a way to do this. Agri-malls are one-stop shops that provide small farmers with agricultural and veterinary inputs, services, finances and technologies that help them procure better agricultural technology, advice and inputs on the one hand and link them to markets on the other. The concept of agri-malls has

been adopted in one fashion or another in such countries as Afghanistan, Bangladesh, Georgia, India, Moldova and Romania as well as in many African countries. In many of these cases, public-private partnerships have been used to render the concept operational.

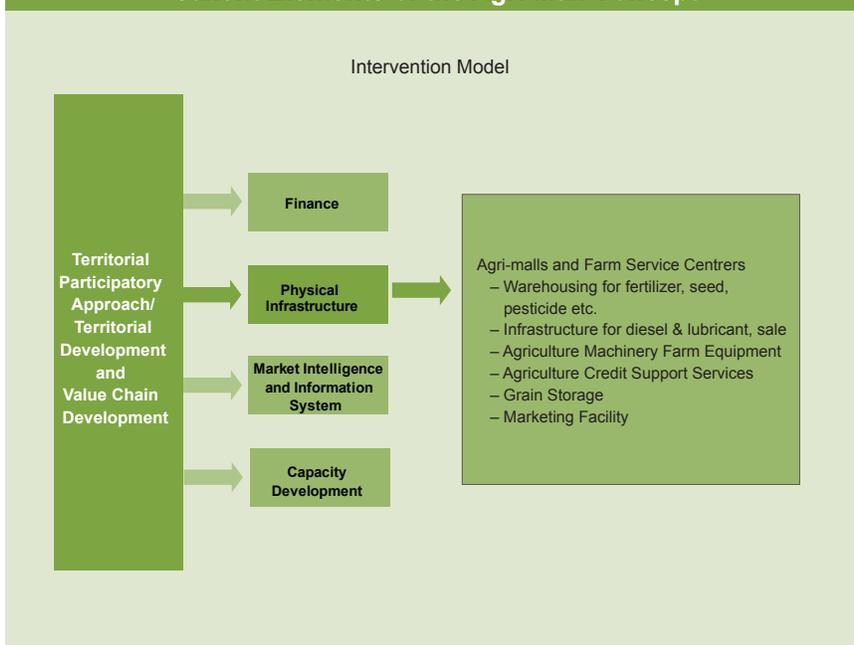
This approach addresses a variety of constraining factors to agri-commercialization including high transaction costs, lack of commercial distribution networks and limited financing. In addition, many smallholder farmers gain understanding of the productive benefits that would be achieved through the use of quality inputs, improved cultivation practices, storage and warehousing facility, grading, machinery and farming equipment, infrastructure for diesel and lubricant and marketing. In addition, equally important factors are access to branding possibility, environmental mitigation measures, worker safety measures, farmer outreach activities and office and/or service-providing equipment.

Agri-malls/Farm Service Centers (FSC) could also host facilities to provide training, technical advice, knowledge and output market linkages. The benefits associated with these agri-malls, in fact, have wider scope to help ensuring: food security (effective intervention, food storage); integration in value chain system including farm inputs, outputs and agriculture finance; farmers' profitability; ensuring right time, price, quality, quantity for farm supplies (seeds, fertilizer, pesticides etc.); reduction in post-harvest losses (currently 30% - 40% for perishables and 15% for grains) and implementation of quality standards – for access to premium markets.

The input infrastructure caters for fertilizers, seeds, pesticides, diesel and lubricants, farm services, rental of farm machinery, extension, training and advisory services. The agri-malls and FSC also provide a range of agri-finance support services, inventory credit, agriculture financing (production and capital loans), commodity financing and value chain financing. The output infrastructure in the agri-malls and FSC include temporary grain storage (silos), bulk handling logistics, electronic marketing and certification. For perishables, these could provide cold storages, sorting platform and grading/packaging facilities.

Agri-malls on average require a piece of land measuring 10 acres or so. Office

Figure 7.5
Salient Elements of the Agri-Mall Concept



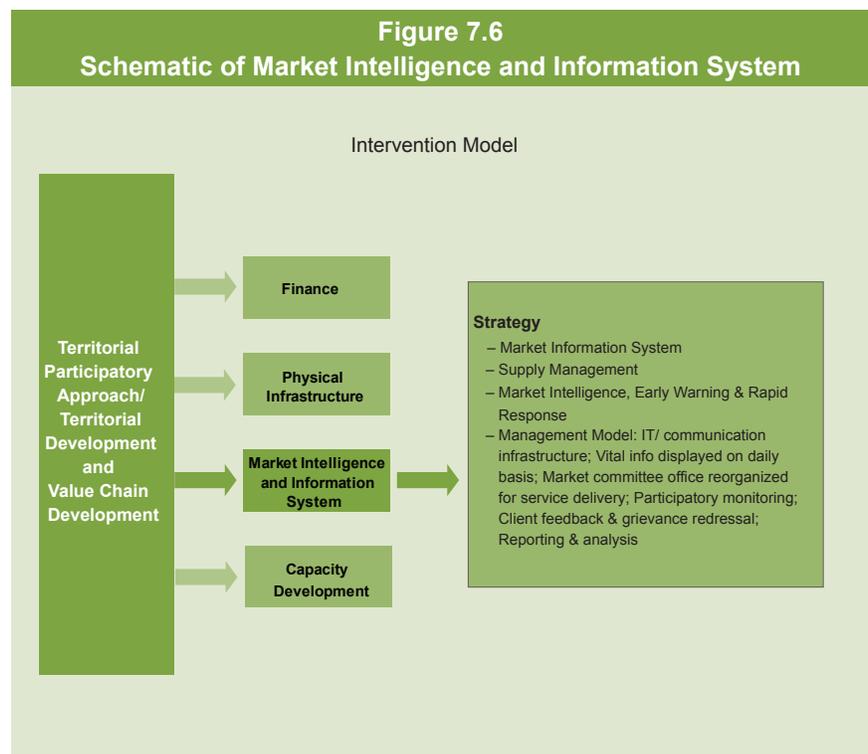
building including utilities (water, electricity, gas, IT) and sorting platforms could be provided by the government while the storage centers, warehousing facilities for inputs, infrastructure for sale of diesel and lubricants, farm equipment etc. and the retail outlets could be financed by the private sector. The agriculture credit support services would be the responsibility of the banking sector. The perishable infrastructure especially the cold storages and packing houses should be provided by the private sector while the certification and testing laboratories, to start with, would rest with the government/public sector. Obviously, the most important intervention from the public sector would be the enabling policy, regulatory and development framework coupled with an attractive incentive package for the private sector to invest in such facilities.

Pillar 3: Marketing Intelligence and Information System (MIIS)

Reliable and up to date information on markets including supply, demand, stocks and export availability enable farmers to make better production decisions. The information system also helps government formulate coordinated policy responses in situations of market volatility. Given recent ITC advances, a good market information and intelligence system can be established to facilitate the above. This could help bring about a paradigm shift in commercializing the agriculture sector. Historically, a network of *Mandi's* already exists within the rural and urban space. Though significant improvements to upgrade and modernize the physical infrastructure needs to be undertaken, the existing marketing network can easily serve as the basis for introducing the soft infrastructure and ICT based information and intelligence system. Furthermore, such a system could be built using the rich information base on prices and costs that is already available from some government agencies, such as the Agriculture Marketing Information Service of Punjab.⁶

Against this backdrop, we envisage a new marketing intelligence and information system featuring: (a) a short-term supply management system to protect farmers and vulnerable consumers from price volatility and (b) a long-term component to link

farmers with local and international markets. Figure 7.6 shows this schematically.



Supply Management System

Periodic shortages and surpluses of agricultural produce are a recurrent phenomenon in Pakistan and are largely due to erratic market signals and lack of access of the farmers to reliable and robust market related information. The shortages lead to price hikes to the detriment of the poor consumers while surpluses not only reduce the profitability but at times also cause huge losses to the farmers. In addition, the agriculture sector is extremely vulnerable to external supply shocks such as weather fluctuations, recurrent flooding, poor disaster management protocols and inadequate hazard warning and response systems.

The model envisages full integration of the major agricultural production centers and crop farming systems, especially related to sensitive food items of daily use so that uninterrupted and smooth supplies are maintained with benefits to both producers and consumers.

Long Term MIIS Integrated Solution

The long-term MIIS solution envisages development and deployment of an integrated solution which allows monitoring of the crop cycle from sowing through harvesting to marketing. Essentially, it revolves around three major components: a management information system, a database and an easily accessible website.

The MIS electronically connects commodity related markets and through the provincial Agriculture Department links up with the international markets. The computerized database is, *inter alia*, a repository of information on sources of supply, wholesale prices and supply volumes. It disseminates on a real time basis through website, display boards, print and electronic media the vital information to the target groups e.g. producers, market intermediaries, consumers and government functionaries.

The MIIS also serves as an early warning and rapid response system to monitor production from sowing stage to harvesting; assess supply and demand situation; identify nearest local/international sources of production, supply and consumption including price variations for selected commodities, identify key players for domestic supplies or international imports/exports (as the situation may be) and, help public and private sector to establish contacts and execute, procure, export as per demand the agricultural produce.

The short term supply management and the long term MIIS marketing solutions are complementary and work in unison. The inter-connect between the two is presented in Figure 7.7 below.

The model has tremendous potential to stimulate export led horticulture especially in view of the uniquely distinct comparative and competitive advantages of the agriculture sector in Pakistan i.e. seasonality and agro-ecology; proximity to the international markets especially EU, Central Asia and Middle East; one of the largest irrigation systems in the world and low labor and transporta-

tion costs. The model helps identify the international market demands for various agricultural commodities around the year, especially, the lean periods and the source of suppliers. It unfolds immense opportunities for the local producers to access the international markets. To illustrate, EU countries imported around 12.2 billion euros worth of fruits and vegetables during 2010-2014 from far away countries including Argentina, Brazil, Chile, Peru, Costa Rica, Ecuador, China and India.⁷ The accompanying enabling legal and regulatory environment and infrastructural support provided

by the government could help farmers realize the full potential of commercial, value chain addition and agri-business enterprises in Pakistan.

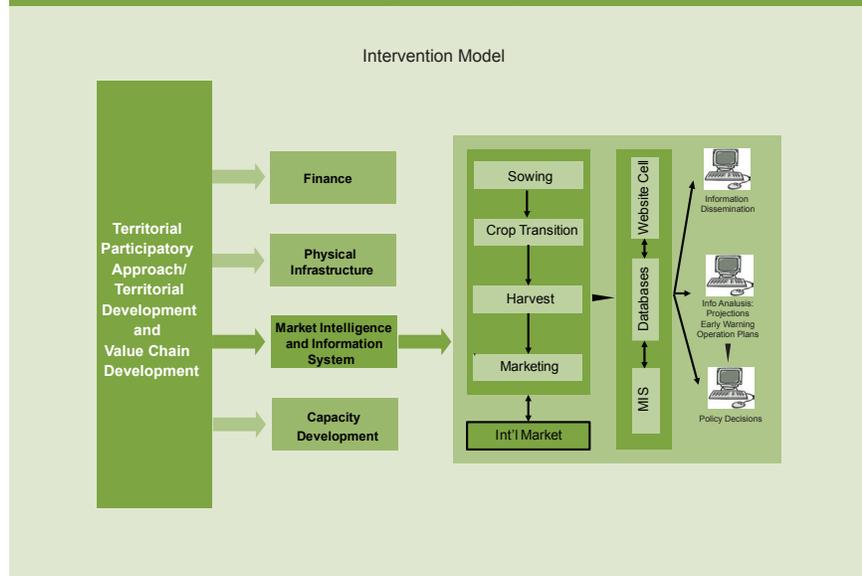
by the government could help farmers realize the full potential of commercial, value chain addition and agri-business enterprises in Pakistan.

Pillar 4: Capacity Development

Capacity development is a fundamental component to increasing agricultural productivity. It is not merely a technical process or transfer of knowledge; it primarily hinges on the ownership, leadership and perspectives of the beneficiaries as well as influenced by the enabling environment- the power structure, institutions and governance. Lack of enabling environment, poor economic policy that discourages pro-poor growth, weak parliamentary scrutiny of the executive branch, lack of effective farmers' voice, entrenched corruption (political and administrative), clientelism etc are major challenges to capacity development. These are aggravated by fragmented government; non-credible or rapidly changing government policies; unpredictable, unbalanced or inflexible funding and staffing and lack of a performance-oriented culture. A massive effort, based inter alia on the following considerations, is required to address this widespread capacity deficit:

- The capacity development interventions for sustainable agriculture productivity must include strengthening of policy analysis; data and statistical systems; educational, research and development entities; extension and advisory services and private sector engaged in agri-business/value chains.
- Institutional changes in key public sector organizations that deal with the agriculture sector

Figure 7.7
Short and Long Term Aspects of MIIS



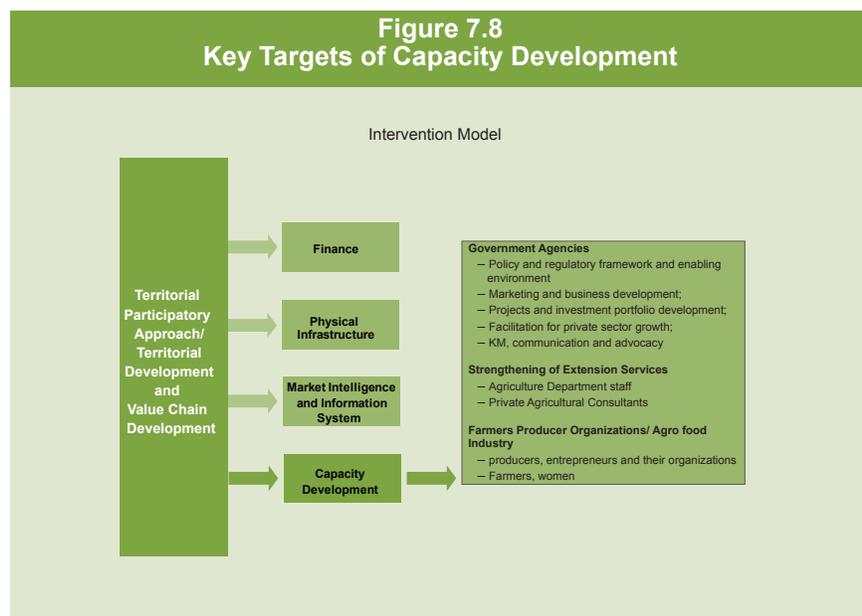
should be the major focus in addition to improving the individuals' skills, competencies and attitudes to derive sustainable results.

- A critical mass of trained human capital (policy makers, extension agents as well as farmers) is sine qua non to catalyze and mobilize farming communities and producers' organizations to upgrade their skills, knowledge and competencies and be ready to assimilate new technologies.
- Follow-up support to trainees should be in-built in the capacity development plans including maintaining contact with trainees to help them overcome difficulties in implementing new technologies, methods and practices.
- Adequate funding and investment for capacity development is essential to ensure that capacity development does not become an ad hoc activity and that it is firmly integrated in the national agricultural planning and programming frameworks and development strategies.

Against this backdrop, the intervention model focuses on three level of capacity strengthening as outlined in Figure 7.8: (a) government agencies related with the agriculture sector responsible for policy, planning and regulatory frameworks; (b) extension and advisory services and (c) farmers and producer organizations engaged in agri-business and agro-industry.

Government Agencies

The capacity strengthening of the government agencies related to the agriculture sector should focus on creating policy analysis capability for formulating evidence based and pro-poor and responsive policies and setting regulatory standards and controls. The research professionals should be trained to pursue a more holistic and interdisciplinary approach with a focus on multi-institutional studies of eco-system management in the wake of rapidity and severity of climate change. The biological interaction of mixed crop, tree and animal production system and assessment of indigenous knowledge and traditional production systems should also be the subjects of major research effort to develop appropriate technologies suited for



high, medium and low potential areas. It may be reiterated that agriculture is more vulnerable to climate change than any other sector. Droughts, floods and warmer temperatures reduce crop yields, and it is estimated that for every 1°C of global warming, grain yields will decline by five percent.

The institutional fragmentation in the National Agriculture Research System (NARS) needs to be addressed upfront through comprehensive institutional audit, clearly laying down roles and responsibilities and coordination arrangements between the federal and provincial agencies. This would involve fuller integration of the private sector R&D and agri-business within the ambit of NARS.

Agricultural innovations and innovative approaches with special focus on the small farmers including women should be on the priority agenda. Apart from the improved and climate resistant varieties and input technologies, better land and water management for agronomic and horticulture crops; use of new breeds, animal nutrition, improved animal husbandry, better rangeland and pasture management for sustainably increasing livestock productivity; sustainable aquaculture and artisanal fisheries should constitute the priority research interventions.

Responsive institutions, good governance, technical competence and client sensitive culture in the public sector apparatus can attract investment and provide the enabling environment for transforming subsistence agriculture to commercial venture. The public sector entities should have the capacity to promote market and business development and incentivize private sector engagement in corporate agriculture. Profitable agri-business models, project and investment portfolios, financing strategy, and effective communication and advocacy strategy play a substantial role in propagating and encouraging the private corporate sector to invest in agriculture sector value chain. The pricing, legal and regulatory support especially establishing and enforcing standards, environmental laws, plant protection legislations, phytosanitary requirements etc. further simulate agricultural trade, commerce and agro-industry.

Extension Services

The last decade has witnessed enormous development in agriculture around the world with more and more emphasis on crop cycle-rotation, cost effective input technology, climate resistant varieties, value addition, and market and demand responsive production. However, these developments have reached only a select few, primarily on account of weak and inefficient extension and advisory services. These services need to have the ability to constantly learn, develop and upgrade their competence-skills mix and to acquire the technical knowledge needed to precisely calibrate the required steps in general farming practice of particular crops and farming systems. They need to have effective on-the-ground knowledge of accurate performance of sequential and concurrent operations; proper process application, timely supply and application of inputs, use

of appropriate farm machinery for precision placement etc. They should also assess the development and training needs of the farmers and target clients, identify the most effective delivery mode for the learning and training initiative, provide follow-up support and be able to periodically evaluate the results achieved.

An effective extension service, good training centers and comprehensive outreach programs benefit the farmers in acquiring the vital skills e.g. input procurement, harvesting, after-harvest handling, storage, processing and marketing. Training programs could also include business management, integrated pest management, environmental mitigation, marketing and communication.

The private agricultural consultancy and advisory services, at the same time, should be encouraged and provided fiscal and development space to work with the farmers and agricultural entrepreneurs. To this end, the government agencies should first profile rural farmers for initiation of a capacity development exercise and then bring the private sector on board for both financial and technical assistance which range from marketing and business development to investment, portfolio development, knowledge management and advocacy.

Farmers and Agri-Business Entrepreneurs

For the farmers, producers and agri-business entrepreneurs, stand-alone training, whether structured or semi-structured, is not sufficient to sustainably increase their productivity or inspire behavioral change. It has to be embedded within the broader capacity development context which addresses gaps for individuals and organizations as well as pays heed to the enabling aspect of the environment. The focus should be on the trioka of knowledge (acquisition of good practices), skills (ability and application of good practices) and attitudes (commitment and consistency in applying good practices). An appropriate set of learning methodologies need to be pursued e.g. face to face training, experimental learning, blended learning, media broadcast (rural radios) and even e-learning or online collaborative learning based on the existing skills-mix of the target clients.

The following modalities for delivery of training have been successfully implemented in many developing and emerging economies which can suitably be tailored to the Pakistani context:

- Farmers Field Days and Schools as a regular feature to bring the educationists, researchers, extension agents and farmers together to test and adopt new technologies, approaches and good practices;
- A network among the farmers to disseminate technology and promote market initiatives especially for organic agriculture and adoption of IPM approaches;
- Master Trainers possibly the more-educated rural inhabitants with sufficient experience and knowledge, trained as service providers by the extension services and engaged to train

farmers, enabling them to become proficient and more productive;

- Domestic study tours for facilitators and farmers for the successful adoption of technology and innovative practices;
- Publication of brochures, posters, newsletters, and other materials.

Succinctly, the intervention model presented above provides a plausible and realistic solution to increasing agriculture productivity and reviving agriculture sector. Its four components: finance and investment; agricultural infrastructure, marketing and market information and intelligence system and capacity development woven around agriculture value chain are positively complementary and can significantly enhance the share of agriculture in GDP. However, the government needs to play its role to set right the policy framework, in particular: rationalize pricing policy; focus on education and training, extension and advisory services to increase farm and farmer productivity; help transform the comparative advantages of agriculture into competitive advantages; open marketing opportunities to ensure that the market works for all. Considerable knowledge and good practices and “low hanging fruits” are already available; what is required is the will and vision to avail and implement them.

Statistical Appendix
Key Indicators

Statistical Appendix

Key Indicators

Table A-1
Level and Pattern of Growth
(Base Year 2005-06)

	GDP Growth Rate (%)	Incremental Capital Output Ratio	Volatility of Growth^a (%)	Extent of Balanced Growth^b	Growth Rate of Labor Intensive Sector^c
2000/01	2.0	9.9	-2.2	6.3	0.8
2001/02	3.1	6.1	-0.2	4.4	0.9
2002/03	4.7	4.1	1.4	4.1	1.1
2003/04	7.5	2.3	3.9	10.2	0.6
2004/05	9.0	2.0	4.8	11.6	0.9
2005/06	5.8	3.4	0.6	17.4	0.7
2006/07	5.5	3.5	-0.5	3.4	0.9
2007/08	5.0	3.9	-1.5	5.4	0.8
2008/09	0.4	7.0	-6.2	5.6	3.9
2009/10	2.6	3.8	-2.6	3.8	1.1
2010/11	3.6	8.6	-0.2	8.6	1.0
2011/12	3.8	3.2	0.4	3.2	1.1
2012/13	3.7	4.4	0.6	4.4	1.2
2013/14	4.1	3.4	1.3	6.6	1.0
2014/15	4.0	3.8	0.5	4.7	0.9
2015/16	4.7	3.3	0.9	14.5	1.0
Average	4.3	4.5	0.1	7.1	0.8

Note: The base year of all calculations has been changed from 1999-00 to 2005-06. The values before 2005-06 will differ compare to previous reports.

Source: Pakistan Economic Survey (various issues)

^a Difference in the growth rate of GDP during a year minus the trend growth rate (as approximated by the average growth rate during the previous five years)

^b Computed as the weighted (share of value added in 2005-06) standard deviation of the growth rates of individual sectors during a particular year. The larger the magnitude of this indicator the less the extent of balanced growth

^c Labor-intensive sectors of the economy are identified as agriculture, small scale manufacturing, construction, whole sale and retail trade, public administration and defence and social services

Table A-2
Level and Pattern of Investment (Base Year 2005/06)

	Gross Domestic Capital Formation (% of GDP)	National Savings as % of Investment	Private Investments as % of Total Fixed Investment	Share of Private Investment in Labor Intensive Sectors (%)
1999/2000	17.4	91	65	51.6
2000/01	17.2	95.8	64.6	46
2001/02	16.8	110.7	72.9	39.8
2002/03	16.9	123.1	73.9	38.6
2003/04	16.6	107.8	72.7	38.6
2004/05	19.1	91.5	74.9	42.9
2005/06	19.3	78.8	76.3	34.3
2006/07	18.8	74.5	73.3	35.4
2007/08	19.2	57.3	72.7	34.6
2008/09	17.5	68.6	73.6	38.3
2009/10	15.8	86.1	73.9	42.4
2010/11	14.1	100.7	74.4	45.9
2011/12	15.1	86.1	71.9	46.4
2012/13	15	92.7	73.1	46.4
2013/14	14.6	91.3	72.6	45.1
2014/15	15.5	93.5	73.4	43.4
2015/16	15.2	94.1	72.1	43.5
Average	16.7	90.8	72.6	42

Source: Pakistan Economic Survey (various issues)
SBP, annual Report (various Issues)

Table A-3
Agricultural Growth and Profitability
(Base Year 2005/06)

	Growth Rate (%)	Share of Growth in Crop Sector (%)	Volatility in Agriculture Growth^a	Change in Ratio of Output Prices to Fertilizer Prices (%)	Change in Agriculture Terms of Trade with Manufacturing (%)
1999/2000	n.a	n.a	1.1	6.6	n.a
2000/01	-2.2	n.c	-7.1	-3.8	4.6
2001/02	0.1	n.c	-2	-5.4	0
2002/03	4.1	57.8	2	-0.3	-0.8
2003/04	2.4	42.4	0.4	-0.3	0.2
2004/05	6.5	90.9	4.4	-4.8	-2.1
2005/06	6.3	n.c	4.1	-4.1	-6.7
2006/07	3.4	55.8	-0.5	10.2	4.2
2007/08	1.8	n.c	-2.7	-20.6	-4.2
2008/09	3.5	62.5	-0.6	-10	9.6
2009/10	0.2	n.c	-4.1	17.3	1
2010/11	2	20.8	-1.1	-4.9	3.3
2011/12	3.6	36.3	1.4	-48.3	-9
2012/13	2.7	23.2	0.5	7.8	6.2
2013/14	2.5	47.8	0.1	10.6	3.1
2014/15	2.5	14.1	0.3	4.7	8.1
2015/16	-2	n.c	-2.9	8.4	11
Average	2.7	n.c	-0.1	-2.7	1.3

n.c. = not computed, n.a. = not available

Source: Pakistan Economic Survey (various issues)

^aThe difference in the growth rate of agriculture during a year minus the trend growth rate (as approximated by the average growth rate during the previous five years)

Table A-4
Area Under Important Crops

Fiscal Year	Wheat	Rice	(000 Hectares)		Cotton
			Maize	Sugar-cane	
2000-01	8,181	2,377	944	961	2,927
2001-02	8,058	2,114	942	1,000	3,116
2002-03	8,034	2,225	935	1,100	2,794
2003-04	8,216	2,461	947	1,074	2,989
2004-05	8,358	2,520	982	966	3,193
2005-06	8,448	2,621	1,042	907	3,103
2006-07	8,578	2,581	1,017	1,029	3,075
2007-08	8,550	2,515	1,052	1,241	3,054
2008-09	9,046	2,963	1,052	1,029	2,820
2009-10	9,132	2,883	935	943	3,106
2010-11	8,901	2,365	974	988	2,689
2011-12	8,650	2,571	1,087	1,058	2,835
2012-13	8,660	2,309	1,060	1,129	2,879
2013-14	9,199	2,789	1,168	1,173	2,806
2014-15 P	9,180	2,891	1,130	1,141	2,961

Source: Pakistan Bureau of Statistics

Table A-5
Production of Important Crops

Fiscal Year	Wheat	Rice	Maize	000 tonnes	
				Sugarcane	Cotton (000 Bales)
2000-01	19,024	4,803	1,643	43,606	10,732
2001-02	18,226	3,882	1,664	48,042	10,613
2002-03	19,183	4,478	1,737	52,056	10,211
2003-04	19,500	4,848	1,897	53,419	10,048
2004-05	21,612	5,025	2,797	47,244	14,265
2005-06	21,277	5,547	3,110	44,666	13,019
2006-07	23,295	5,438	3,088	54,742	12,856
2007-08	20,959	5,563	3,605	63,920	11,655
2008-09	24,033	6,952	3,593	50,045	11,819
2009-10	23,311	6,883	3,261	49,373	12,914
2010-11	25,214	4,823	3,707	55,309	11,460
2011-12	23,473	6,160	4,338	58,397	13,595
2012-13	24,211	5,536	4,220	63,750	13,031
2013-14	25,979	6,798	4,944	67,460	12,769
2014-15 P	25,478	7,005	4,695	62,652	13,983

Source: Pakistan Bureau of Statistics

Table A-6
Yield Per Hectare of Major Agricultural Crops

Fiscal Year	Wheat	Rice	(Kg/Hectare)		Maize	Cotton
			Sugarcane			
2000-01	2,325	2,021	45,376		1,741	624
2001-02	2,262	1,836	48,042		1,766	579
2002-03	2,388	2,013	47,324		1,858	622
2003-04	2,375	1,970	49,738		2,003	572
2004-05	2,568	1,995	48,906		2,848	760
2005-06	2,519	2,116	49,246		2,985	714
2006-07	2,716	2,107	53,199		3,036	711
2007-08	2,451	2,212	51,507		3,427	649
2008-09	2,657	2,346	48,634		3,415	713
2009-10	2,553	2,387	52,357		3,487	707
2010-11	2,833	2,039	55,981		3,806	725
2011-12	2,714	2,396	55,196		3,991	815
2012-13	2,796	2,398	56,466		3,981	769
2013-14	2,824	2,437	57,511		4,233	773
2014-15 P	2,775	2,423	54,910		4,155	802

Source: Pakistan Bureau of Statistics

Table A-7
Exports and Imports of Major Agricultural Crops

Year	Exports				Imports				US \$ Million
	Wheat	Rice	Cotton	Maize	Wheat	Rice	Cotton	Maize	
2003	..	626.6	2532.7	0.2	..	3.4	318.5	11.0	
2004	39.8	682.9	2978.8	0.0	238.1	0.0	641.4	15.3	
2005	0.1	1099.3	3429.0	0.3	136.4	0.9	517.5	20.6	
2006	96.7	1151.9	3601.0	..	107.4	1.5	428.9	20.4	
2007	47.4	1145.7	3439.6	0.4	89.8	0.9	917.8	19.3	
2008	2.7	2439.6	3595.6	20.5	1623.0	1.6	1208.6	63.8	
2009	0.2	1774.5	3203.8	45.8	281.9	7.2	497.8	33.2	
2010	674.4	2277.1	4013.4	2.1	18.2	20.1	830.9	20.2	
2011	45.3	2062.1	5097.1	70.0	10.1	40.9	909.3	35.8	
2012	..	1882.1	5225.7	99.4	..	44.1	684.0	42.1	
2013	39.2	2111.0	5333.8	30.7	118.5	51.1	1046.7	61.6	
2014	8.2	2199.6	4731.4	3.2	185.1	30.6	741.6	66.2	
2015	3.2	1927.2	4040.3	11.7	2.4	21.2	663.0	53.2	

Source: Uncomtarde

Table A-8
Internal Renewable Water Resources

Year	Total Internal Renewable Water Resources (IRWR)	Total Internal Renewable Water Resources Per Capita
1962	55	1167
1967	55	1026
1972	55	896.6
1977	55	775.2
1982	55	659.3
1987	55	559.5
1992	55	484.1
1997	55	426.9
2002	55	381.2
2007	55	344.2
2012	55	310
2014	55	291.1

Source: AQUASTAT, FAO

Table A-9
Level and Pattern of Manufacturing Growth
(Base Year 2005/06)

	Growth Rate (%)	Growth Rate of Export Oriented Industries (%)	Growth Rate of Import Substituting Industries (%)	Share of Growth in Large Scale Manufacturing (%)	Growth Rate of Manufacturing Exports Growth (%)
1999/2000	1.5				
2000/01	9.3	27.6	4.6	76.3	6.2
2001/02	4.5	9.7	3.1	52	1.5
2002/03	6.9	4.3	7.6	68.2	22.2
2003/04	14	8	15.5	84.6	11.6
2004/05	15.5	26.5	12.7	87	15.6
2005/06	8.7	5.9	11.1	75.2	14.4
2006/07	9	9.9	7.5	74.3	3.4
2007/08	6.1	12.8	2.3	58.9	12.2
2008/09	-4.2	4.3	-2.4	n.c.	3.3
2009/10	1.4	6.5	14.8	24.9	0.4
2010/11	2.5	4.7	3.8	54.8	20.3
2011/12	2.1	0.5	4.5	44.5	1.2
2012/13	4.9	1.9	6.3	74.9	0.6
2013/14	5.7	n.a	n.a	78.3	-3.9
2014/15	3.9	n.a	n.a	68.3	-1.6
2015/16	5	n.a	n.a	74.11	-13.8
Average	5.7	9.4	7	77.8	5.85

n.c. = not computed

Source: Pakistan Economic Survey (various issues)
SBP, Annual Report (various issues)

Table A-10
Growth in Employment by Sector

	Employment (000)					2001/02 to 2014-15		
	2001/02	2007/08	2009/10	2013/14	2014-15	Employment Growth Rate (%)	Value Add Growth Rate (%)	Employment Elasticity (%)
Agriculture	20474	21894	23945	24586	25820	1.8	3	0.59
Manufacturing and Mining	4982	6382	7024	8026	9339	5	6.9	0.71
Electricity and Gas*	299	n.a	n.a	n.a	n.a	-0.3	3.9	-0.07
Construction	2757	3093	3565	4126	4456	3.8	4.2	0.91
Wholesale and Retail Trade	5090	7167	8673	8252	8912	4.4	4.2	1.06
Transport and Communication	2216	2700	2820	3109	3296	3.1	5.2	0.6
Finance and Insurance ^a	247	n.a	n.a	n.a	n.a	18.7	17.9	1.05
Public Admin- istration and Community Services	7151	6725	5920	7404	8057	0.9	8.4	0.11
Total	43286	49090	53210	56520	61040	2.7	5.4	0.5

n.a = not available

Source: Labour Force Survey, PBS (various issues) Pakistan Economic Survey (various issues)

^a Period of estimation for these two sectors is 2001-02 to 2005-06, mainly because LFS has stopped giving numbers for them

Table A-11
Inflationary Trends

	Rate of Inflation (Consumer Prices) (%)	Rate of Inflation (Food Prices) (%)	Core Rate of Inflation (Non-Food Non-Energy) (%)	Rate of Inflation in Import Prices (%)	Rate of Monetary Expansion Less GDP Growth (%)
1999/2000	3.6	-	n.a	16.0	5.5
2000/01	4.4	3.6	n.a	15.2	7.0
2001/02	3.5	2.5	n.a	0.0	12.3
2002/03	3.1	2.8	n.a	3.7	13.3
2003/04	4.6	6.0	3.9	14.8	12.1
2004/05	9.3	12.5	8.8	10.4	10.3
2005/06	7.9	6.9	7.0	17.3	9.4
2006/07	7.8	10.3	6.9	7.6	13.8
2007/08	12.0	17.6	10.2	27.7	10.3
2008/09	17.0	23.5	11.4	25.1	9.2
2009/10	10.1	12.6	7.6	6.2	9.9
2010/11	13.7	18.3	9.4	20.7	12.2
2011/12	11.0	11.0	10.6	21.8	9.8
2012/13	7.4	7.1	9.6	7.8	12.3
2013/14	8.6	9.0	8.3	4.3	8.5
2014/15	4.8	3.5	6.5	1.3	9.0
2015/16	2.8	2.1	4.2	-7.5	9.0
Average	7.7	9.3	8.0	11.3	10.2

n.a = not available

Source: Pakistan Economic Survey (various issues)

SBP, Annual Report (various issues)

IMF

Table A-12
Fiscal Policy
(Percentage of GDP)

	Revenues^a	Expenditure^b	Non-Interest Current Expenditure^c	Budget Balance^d	Revenue Deficit/ Surplus^e
2000/01	13.1	17.1	9.4	-4.0	-2.2
2001/02	14	18.6	9.6	-4.6	-1.7
2002/03	14.8	18.4	11.4	-3.6	-1.5
2003/04	14.1	16.9	9.8	-2.8	0.3
2004/05	13.8	17.2	9.7	-3.4	0.5
2005/06	14	18.2	10.2	-4.2	-0.5
2006/07	14.9	19.2	11.4	-4.3	-0.9
2007/08	14.3	21.7	13.1	-7.4	-3.5
2008/09	14.1	19.3	10.9	-5.2	-1.5
2009/10	14.2	20.5	12.3	-6.3	-2.7
2010/11	12.5	19.1	12.2	-6.6	-3.6
2011/12	12.4	19.1	10.8	-8.5	-2.7
2012/13	13	21	11.7	-8	-3
2013/14	14	19	11.3	-5.5	-1.5
2014/15	14.4	19.7	11.4	-5.3	-1.8
2015/16	15.0	19.6	11.6	-4.6	-0.8
Average	13.91	19.04	11.05	-5.27	-1.69

Source: Pakistan Economic Survey (various issues)

SBP, Annual Reports (various issues)

MoF, Fiscal Operations

^a Total revenues of federal and provincial governments

^b Revenue and development expenditure of federal and provincial governments

^c Current expenditure minus interest payments

^d Total revenue minus total expenditure

^e Revenue receipts minus current expenditure of federal and provincial governments

Table A- 13
Fiscal Policy
(Base Year 2005/2006)

	Primary Balance ^a (%of GDP)	Total Government Debt ^b (% of GDP)	Effective Interest Rate on Domestic Debt ^c %	% of Deficit Financed by Bank Borrowing %
2000/01	1.3	82.4	11.3	-18.4
2001/02	0.1	73.1	12.4	7.4
2002/03	0.4	68.9	10.2	-30.5
2003/04	1.1	62.3	9.4	47.4
2004/05	0.3	58	8.5	27.7
2005/06	-0.9	53.1	10.2	21.8
2006/07	-1.3	52.1	13.8	37.5
2007/08	-2.6	56.8	13.7	80.5
2008/09	-0.2	57.8	12.9	54.2
2009/10	-1.8	59.9	12.4	32.8
2010/11	-2.7	58.5	10.5	51.5
2011/12	-2.4	63	10.7	52
2012/13	-3.7	62.7	9.7	79.5
2013/14	-1	65.4	9.5	23.3
2014/15	-0.5	62.0	9.3	61.2
2015/16	-0.3	64.8	6.6	58.3
Average	-0.89	62.55	10.69	36.64

n.a = not available

Source: Pakistan Economic Survey (various issues)

SBP, Annual Reports (various issues)

Ministry of Finance, Fiscal Operations

Ministry of Finance, Debt Policy Statements

^a Estimated as revenue receipts minus total expenditure net of interest payments

^b Includes domestic and external debt

^c Defined as the ratio of domestic interest payment to outstanding domestic debt

Table A-14
Effective Tax Rates
(Tax Revenues as percentage of Tax Base^a)

	Income Tax	Customs Duty	Excise Duty	Sales Tax	Total FBR
	(%)	(%)	(%)	(%)	Taxes
					(%)
1999/2000	4.3	19.1	6.4	11.6	9.1
2000/01	4.2	17.8	4.7	13.1	9.3
2001/02	4.5	12	4.3	14.1	9.1
2002/03	4.4	14.8	3.6	14.8	9.4
2003/04	4	14.3	3.1	12.7	9.2
2004/05	3.8	11.2	2.9	10	9.1
2005/06	3.9	12.1	2.4	10.3	9.4
2006/07	5	10.5	2.7	9.9	9.7
2007/08	4.9	7.6	2.9	10	9.8
2008/09	4.6	5.7	5.7	10	9.1
2009/10	4.8	5.7	5	10.1	8.9
2010/11	4.4	5.6	4.3	10.3	8.6
2011/12	4.6	5.6	3.3	11	9.1
2012/13	4.3	5.5	4.1	11.4	9.5
2013/14	4.6	5.2	4.3	12.6	10.1
2014/15	4.9	6.6	5.3	13.9	11
2015/16	5.3	8.7	5.6	16.1	12.4
Average	4.50	9.88	4.15	11.88	9.58

Source: Pakistan Economic Survey (various issues)
FBR (various issues)

^a Tax bases for various taxes are as follows:

Income tax: Non-agricultural GDP

Custom Duty: Value of imports

Excise Duty: Value of manufacturing

Sales Tax: Value of Imports plus value of manufacturing

Table A-15
Level and Pattern of Trade

	Merchan dise Export Growth (US \$; %)	Extent of Product Diversifi cation of Exports^a	Extent of Market Di versification of Exports^a	Merchan dise Import Growth (US \$; %)	Change in Terms of Trade %	Share of Essential Imports^a %
1999/2000	11.2	0.801	0.23	13.1	-15.3	39.3
2000/01	12.5	0.798	0.221	14.3	-7.1	39.3
2001/02	2.3	0.786	0.221	-7.5	-0.2	36.7
2002/03	20.1	0.791	0.223	20.1	-9.6	35
2003/04	13.5	0.782	0.232	21.2	-4.1	28.8
2004/05	16.2	0.778	0.218	38.3	-6.5	25
2005/06	14.3	0.769	0.229	31.7	-11.7	30.7
2006/07	3.2	0.737	0.228	8	-3.7	29.1
2007/08	16.5	0.722	0.21	31.2	-11.5	38.9
2008/09	-6.4	0.709	0.202	-10.3	2.8	41.9
2009/10	2.9	0.717	0.199	-1.7	0	42.3
2010/11	28.9	0.697	0.184	14.9	2.8	42.7
2011/12	-2.6	0.722	0.183	12.8	-5.9	45.8
2012/13	0.4	0.719	0.189	-0.6	-2.4	42.9
2013/14	1.1	n.a	n.a	3.8	0.9	43.9
2014/15	-3.9	n.a	n.a	-0.9	-0.4	37.8
2015/16	-1.9	0.768	0.202	-8.7	4.2	28.5
Average	7.5	0.8	0.2	10.6	-4.0	37.0

Source: Pakistan Economic Survey (Various issues)

United Nations Conference on Trade and Development

State Bank of Pakistan, Annual Report (various issues)

^a This is estimated by UNCTAD as the Herfindahl Index, which ranges from a value of 0 to 1. The greater the extent of diversification the lower the value of the index

Essential imports are of wheat, edible oil, fertilizers, medicines and POL products

Table A-16
Monetary Policy

	Net Foreign Assets^a (% Change of broad money)	Net Domestic Assets^a (% Change of broad money)	Private Credit Growth %	Interest Rate on Six Month Treasury Bill (%)	Broad Money Growth (%)	Interest Rate Spread^b
1999/2000	2.0	7.4	1.4	8.8	9.4	8.0
2000/01	5.1	3.9	4.0	10.4	9.0	8.3
2001/02	13.4	2.0	4.8	8.2	15.4	9.6
2002/03	17.5	0.5	18.9	4.1	18.0	7.8
2003/04	2.1	17.5	29.8	1.7	19.6	6.3
2004/05	2.2	17.1	33.2	4.7	19.3	7.4
2005/06	2.5	12.4	23.2	8.5	14.9	8.7
2006/07	8.1	11.3	17.2	8.9	19.3	9.0
2007/08	-7.8	23.2	16.4	11.5	15.3	8.4
2008/09	-3.2	12.8	0.7	12.0	9.6	9.8
2009/10	-6.9	0.8	3.9	12.3	12.5	9.3
2010/11	23.5	-2.4	4.0	13.7	15.9	9.0
2011/12	-40.2	5.3	7.5	11.9	14.1	8.3
2012/13	-55.8	4.1	-0.6	8.9	15.9	7.0
2013/14	97.9	-3.1	9.1	9.7	12.5	7.3
2014/15	20.5	-1.3	11.7	8.0	13.2	5.6
2015/16	9.1	-1.0	11.1		13.8	
Average	5.3	6.5	11.5	9.0	14.6	8.1

Source: State Bank of Pakistan, Annual Report (various issues)
IMF Article 4 Consultation's Press Releases

^a Growth rate of net foreign assets/broad money ratio

^b Difference between the interest rate on advances and deposits

Table A-17
Balance of Payments

	Current Account Balance (% of GDP)	External Debt as a % of Exports of Goods and Services	Net Reserves (US \$ Million)	Gross Reserves (In months of next year's imports of goods and services)	Change in Value of Pakistani Rupee per US \$ (%)	Change in Real Effective Exchange Rate (%)
1999/2000	-1.6	322.1	908	0.9	3.0	-0.6
2000/01	-2.7	309.4	1679	1.7	12.8	-2.5
2001/02	3.9	282	4337	3.7	5.1	-2.6
2002/03	4.9	229	9529	6.5	-4.7	-0.1
2003/04	1.8	209.5	10564	5	-1.5	-1.8
2004/05	-1.4	183.7	9805	3.5	3.1	0.3
2005/06	-3.9	167.2	10760	3.7	0.8	5.3
2006/07	-4.8	169.2	13345	4.5	1.3	0.5
2007/08	-8.4	169.7	8577	2.7	3.2	-1.12
2008/09	-5.5	212.9	9118	2.8	25.5	-1.0
2009/10	-2.3	218.9	12958	2.9	6.8	1.0
2010/11	0.1	204.9	14784	3.6	2.0	6.5
2011/12	-2.1	212.2	10803	2.9	4.4	3.1
2012/13	-1.0	182.3	6008	1.5	8.4	-1.3
2013/14	-1.3	204.1	9098	2.7	6.3	7.3
2014/15	-0.8	204.9	13532	3.9	-1.5	5.4
2015/16	-0.9	179.9	18130	9.0	2.7	-
Average	-1.5	215.4	9643.2	3.6	4.6	1.1

Source: SBP, Annual Report (various issues)
IMF Article IV Consultation's Press Releases

Table A-18
Trend in Income in Equality
Growth in Real Household Income by Quintile
(Annual Growth Rate, %)

	Total	1st	2nd	3rd	4th	5th
Growth Rates between 2001-02 to 2007-08						
Pakistan	4.7	2.5	3.6	3.4	4.2	5.9
Pakistan Urban	2.8	2.2	2.2	1.5	1.7	3.1
Pakistan Rural	5.3	2.6	3.9	4.1	5.4	8.9
Growth Rates between 2005-06 to 2007-08						
Pakistan	-1.3	-1.8	-1	-2.7	-2.3	-0.8
Pakistan Urban	-0.2	5.7	3.3	-1.3	1.1	-0.5
Pakistan Rural	-2.1	-3.2	-2.4	-3.3	-4.1	-0.9
Growth Rates between 2007-08 to 2015-16						
Pakistan	1.5	1.9	1.2	1.8	2.0	1.5
Pakistan Urban	1.9	0.8	0.5	1.4	2.3	1.9
Pakistan Rural	1.1	2.1	1.4	1.9	1.8	0.4
Growth Rates between 2001-02 to 2015-16						
Pakistan	3.0	2.2	2.3	2.5	3.0	3.5
Pakistan Urban	2.3	1.4	1.3	1.4	2.0	2.4
Pakistan Rural	3.0	2.4	2.5	2.9	3.5	4.2

Source: Calculated using numbers from Household Integrated Economic Survey, Federal Bureau of Statistics.

Table A-19
Trend in Regional Inequality Coverage of Education and Health Services

	1998/99	2001/02	2006/07	2007/08	2008/09	2010/11	2012/13	2013/14	2014/15
Punjab	75	76	100	97	97	98	98	100	97
Sindh	64	63	79	80	84	84	81	76	79
K-PK	70	77	82	83	87	89	91	89	90
Balochistan	64	62	72	75	75	74	73	67	71
Max/Min	1.172	1.242	1.389	1.293	1.293	1.324	1.342	1.492	1.366
Ratio									
Net Primary Enrolment Rate									
Punjab	44	45	62	61	62	61	62	64	61
Sindh	41	40	50	51	54	53	52	48	51
K-PK	39	41	49	49	52	51	54	54	56
Balochistan	36	32	41	41	44	47	45	39	46
Max/Min	1.222	1.406	1.512	1.488	1.409	1.298	1.378	1.641	1.326
Ratio									
Gross Middle Enrolment Rate									
Punjab	43	45	55	59	57	58	60	59	59
Sindh	38	34	43	46	49	48	48	46	46
K-PK	37	38	53	52	54	57	61	61	61
Balochistan	29	33	34	35	36	35	39	41	40
Max/Min	1.483	1.364	1.618	1.686	1.583	1.657	1.564	1.487	1.525
Ratio									
Net Middle Enrolment Rate									
Punjab	19	18	20	19	22	23	25	25	25
Sindh	17	14	17	18	18	19	19	17	18
K-PK	11	12	16	17	17	17	21	26	21
Balochistan	9	8	9	11	11	13	14	12	13
Max/Min	2.111	2.25	2.222	2	2	1.769	1.786	2.083	1.923
Ratio									
Gross Matric Enrolment Rate									
Punjab	37	44	51	54	57	61	62	65	63
Sindh	51	42	45	44	50	55	54	50	54
K-PK	36	41	45	48	51	54	58	56	60
Balochistan	41	29	33	34	34	38	37	33	40
Max/Min	1.244	1.517	1.545	1.588	1.676	1.605	1.676	1.969	1.575
Ratio									
Net Matric Enrolment Rate									
Punjab	12	12	11	13	13	14	15	17	16
Sindh	10	13	10	11	11	11	12	11	12
K-PK	6	10	6	6	8	7	10	9	10
Balochistan	3	6	5	5	5	6	6	5	7
Max/Min	4	2	2.2	2.6	2.6	2.333	2.5	3.4	2.285
Ratio									
Literacy Rate (10 +)									
Punjab	46	47	58	59	59	60	62	61	63
Sindh	51	46	55	56	59	59	60	56	60
K-PK	37	38	47	49	50	50	52	53	53
Balochistan	36	36	42	46	45	41	44	43	44
Max/Min	1.417	1.306	1.381	1.283	1.311	1.463	1.409	1.418	1.432
Ratio									
Full Immunisation									
Punjab	55	57	83	76	85	86	89	86	90
Sindh	38	45	65	67	69	75	74	61	73
K-PK	54	57	76	74	73	77	76	75	78
Balochistan	34	24	54	57	43	56	53	41	51
Max/Min	1.618	2.375	1.537	1.333	1.977	1.536	1.679	2.097	1.765
Ratio									

Source: Pakistan Social and Living Standard Measurement Survey, PBS (various issues)

Table A-20
Trends in Regional Inequality
Growth in Real Household Income by Province
(Annual Growth Rate, %)

	2001-02 to 2007-08	2005-06 to 2007-08	2007-08 to 2015-16	2001-02 to 2015-16
Overall				
Pakistan	4.7	-1.3	1.5	3.0
Punjab	5.6	-0.8	1.6	3.5
Sindh	3	-2.8	0.5	1.6
KPK	5	-2.6	3.0	3.9
Balochistan	-0.6	3.3	2.5	1.1
Urban				
Pakistan	2.8	-0.2	1.9	2.3
Punjab	3.4	-1.2	2.9	3.1
Sindh	2	2.3	0.1	1.0
KPK	3.3	-7.2	3.3	3.3
Balochistan	0.5	8.2	1.6	1.1
Rural				
Pakistan	5.3	-2.1	1.1	3.0
Punjab	6.7	-0.5	0.7	3.4
Sindh	2.3	-9.5	0.5	1.3
KPK	5.3	-1.4	2.9	4.0
Balochistan	-2.5	-1.5	3.0	0.4

Source: Pakistan Integrated Household Survey, Various Issues
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Notes

Chapter 1

1. Pakistan's fiscal year runs from July 1 to June 30
2. The PICSS report can be accessed at <https://www.picss.net/picss-annual-report>
3. Budget data are from the latest IMF Review (IMF, 2016).
4. When viewed in the context of the recent experience of other developing countries with similar international ratings, there appears to be room for further improvement in the terms obtained by Pakistan. For example, Egypt (S&P rating of B-), floated a \$1.5 billion ten-year Eurobond at 5.875% in 2015.
5. International ratings agencies have not been overly concerned about the medium-term sustainability of the public debt as witnessed by ratings upgrades announced for Pakistan by Standard and Poor and by Moody during 2015 and 2016
6. Recently, the Ministry of Water and Power submitted financial details of eight power sector projects to a parliamentary committee. These show that high rates of return are built into the agreements. For example, the return on equity in the Sahiwal Coal Power Project is above 27 percent while that of the Thar Coal Power Project is above 34 percent (as reported in Farrukh Saleem, The News, February 19, 2017).
7. Ahmad (2016) notes that Pakistan does not follow international accounting standards in provisioning for contingent liabilities such as those featured in the CPEC energy projects.
8. An estimate of Rs. 150 billion worth of tax exemptions for CPEC-related projects is reported in a newspaper article (The Express Tribune, January 13, 2017, page 10).
9. The bilateral trade deficit with China was \$4.6 billion in FY15 and \$6.2 billion in FY16 (State Bank of Pakistan, 2016, Table 6.2).
10. On the repeated failure of successive Pakistani governments to expand the domestic tax base, see Ahmad (2016).
11. Less than 1 million persons out of a total population of close to 200 million are registered as income tax filers. This is far less than the number who should be in the tax net. Using other sources of information, such as houses, cars, bank accounts and overseas trips, it has been estimated that at least 2 million additional individuals should be filing.

12. These ranks are reported in World Bank (2016).

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3. Sven Beckert, *Empire of Cotton: A Global History*, New York, Knopf, 2015

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8. Gustav F. Papanek, *Pakistan's Development: Private Incentives and Social Progress*, Cambridge, Mass. Harvard University Press, 1967.

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Chapter 3

1. Government of Pakistan, Ministry of Finance, *Economic Survey 2015-16* p.41

2. This section draws heavily on author's earlier work "Pakistan Economy at the Crossroads: Past Policies and Present Imperatives". Oxford University Press Karachi Pakistan, 1998

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6. See Parvez Hasan, *My Life My Country, Memoirs of A Pakistani Economist*, Ferozsons Lahore 2011 pp. 200-201

7. Parvez Hasan, Pakistan Economy at the Crossroads, Oxford University Press, 1998, p.155
8. FAO, Rome 2004, Fertilizer Use by Crop in Pakistan
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10. Op.cit. p.15
11. Hamid Nabi, and AnjumNasim, Trade Exchange Rate and Agricultural Pricing Policies in Pakistan, World Bank, Washington D,C.1990
12. Ministry of National Food Security and Research, For Fruit, Vegetables and Condiment Statistics of Pakistan, 2014-15
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14. World Bank, Pakistan: Promoting Rural Growth and Poverty Reduction, May 2007, p. 39
15. Op. cit p.54-56
16. Op. cit p.54-56

Chapter 4

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2. Muhammad Ashraf, 2016, Milky Way to farm income, Published in Dawn, Business & Finance weekly, August 29th, 2016
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- 5.FAO, 2014, Pakistan Priority areas for investment in the agricultural sector, FAO Investment Center, FAO, Rome
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Chapter 5

1. Akhtar Hussain Committee (1968); Fazale Akbar Committee (1970); Indus water Commission/ AnwarulHaq Commission (1981) and Haleem Committee

2. According to one source, the average cost of irrigation development is estimated at US\$ 1300/ha, the cost of drainage at around US\$ 2659/ha, of O&M at US\$65/ha, and of sprinkler and micro irrigation at around US\$ 1750/ha. This level of funding is not feasible under the present charges and cost recovery arrangements in Pakistan. (Hisaar Foundation Report, Think Tank on the Rational Use of Water, 2016)

3. Read more at <http://smithandfranklin.com/current-issues/Agricultural-Productivity-Current-Scenario-Constraints-and-Future-Prospect-in-Pakistan/14/8/256/html#RZlvebyPyoJYv068.99>

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Chapter 6

1. One indicator of competitive performance in a given export market (world market in our case) is the gain (or loss) of market share over time. The Y-axis shows the growth rate for the commodity relative to total imports by the world; the X-axis denotes the imports growth rate in commodity imported to the world market.

Chapter 7

1. Ravallion and Datt (1996): How Important to India's Poor is the Sectoral Composition of Economic Growth; Ravallion and Chen (2004): China's Progress Against Poverty; and Timmer: Agriculture and Pro-poor growth (2002,2005)

2. Tanzania Agriculture Productivity Program 2009-2015 USAID

3.China Economic Review: Total Factor Productivity Growth in China Agriculture Sector" Dec 2008

4."Farm Sector Productivity Enhancement: More with Less; More Crop per Drop" Asif Sharif October 2016

5. Rural Infrastructure and Agricultural Development, Per Pinstруп-Andersen, and Satoru Shimokawa May, 2006

6. Existing marketing laws and regulations(Agriculture Produce Market Act 1939 and provincial laws etc.,) which constrain the farmers to sell and market his produce will have to be reformed as also the Market Committees which exercise control on sale and purchase of agriculture produce in their respective areasnotified under the provincial Agriculture Produce Marketing Ordinance 1978 (Punjab).

7. CBI Trade Statistics 215