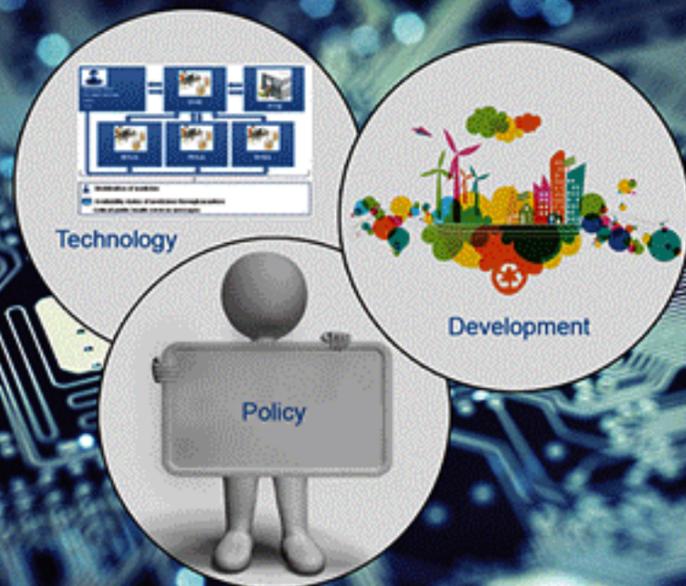


THE STATE OF THE ECONOMY: Technology and Development



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

Eighth Annual Report 2015

**THE STATE OF THE
ECONOMY:
Technology and
Development**

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

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Dedication

“This report is dedicated to my late brother **Maj Gen. Farhat Ali Burki** and to my late brother-in-law **Dr. Muhammad Afaf**. Both of them made important contributions to the induction of modern technologies in various aspects of Pakistan’s development. Their families have made important financial contributions to our institution’s endowment fund.

Shahid Javed Burki
Chairman

The Shahid Javed Burki Institute of Public Policy at Netsol (BIPP)

The Shahid Javed Burki Institute of Public Policy at NetSol (BIPP) is an independent, not for profit institution which aims at: promoting rights and evidence based inclusive policy making; filling institutional void and professionalizing the key public policy areas; and serving as a knowledge hub for policy analysis, development, and implementation. BIPP was formally launched on 1st March 2015 as a successor to the Beacon house National University Institute of Public Policy with a rich legacy of over eight years of research and policy analysis.

The Institute aims at synergizing the research, education, and think tank functions to become a knowledge hub and Centre of Excellence in Public Policy. BIPP's mission is to improve welfare of the citizenry with particular emphasis on identifying policy measures that will lead to inclusive growth, socio-economic stability, and sustainable development besides fully harnessing the potential for regional and global integration. BIPP's areas of interest are social, economic, environmental and political development, trade and foreign policy.

BIPP's Board of Directors comprises eminent economists, experts, members of academia and development practitioners from private, public, and non-governmental sectors who are committed to improving public policy development and implementation in Pakistan. The members are:

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- Mr. Salim Ghauri Director
- Mr. Khalid Sherdil Director

Dr. Mahmood Ahmad is the Adviser, Research and Coordination of the Institute.

FOREWORD

This is the eighth annual report produced by the Institute of Public Policy (IPP), now renamed the Shahid Javed Burki Institute of Public Policy at NetSol (BIPP). It was our practice in the past to make our reports public a month or so before the federal and provincial governments began work on their annual budgets. The timing of the release was in the expectation that some of what we wrote would influence the making of financial and economic policies at both the provincial and federal levels. The tradition, inherited from the British, that the budget is the most important economic and financial statement issued by the government was continued by Pakistan.

However, we were not able to follow the timing this year. The main reason was the reorganization of the institute which is no longer associated with the Beaconhouse National University (BNU). We have delinked ourselves from BNU, our parent institution for several years, for the reason that the new framework under which universities function does not allow them affiliation with institutions with their own budgets and revenue sources.

With these links severed, the institution has formed a close association with NetSol Technologies, Pakistan's largest information technology (IT) firm. The company has a large presence in Lahore. Its campus on the Lahore Ring Road near the Allama Iqbal International Airport gives it exceptional salience. It employs 1,200 software engineers who develop, produce, and service the products it develops. These products have an international market. As we discuss in greater detail in the main report, this association with a large IT firm will provide us with the opportunity to explore the nexus between technology and development.

As has been the practice in the past, the annual reports have come in two parts. In the first we analyze the state of the Pakistani economy at the time of a particular report's writing. The assessment we made sometimes was not too different from the one provided by the government; sometimes there were differences. In addition to the assessment of the economic situation, we provided detailed analysis of a "development subject" we regarded to be pertinent for the economy and the social system.

Several important subjects received our attention in the past. One year, we investigated the cost to the economy of the rise of extremism and terrorism associated with it. According to our assessment, the most significant consequence was on the rate of private investment in the economy and a sharp decline in foreign direct investment. Both reflected loss of confidence by potential investors in the economy's future. In the same report, we estimated the price paid by the economy of severe shortages of electricity and natural gas. These estimates were made on the basis of surveys carried out by the staff of the institution involving randomly selected entrepreneurs around the country. The main conclusion of this work was not surprising: the economy was performing well below its potential because of these unfortunate developments. While public policy was not the immediate reason for the rise of extremism, energy shortages were the result of public policy failures.¹

In another report we examined the effect of the extensive devolution of government functions brought about by the adoption of the 18th amendment to the Constitution in April 2010. Our main

conclusion was positive. A country that had been through a long period of rapid population growth and consequently had a population of more than 180 million people at the time of the adoption of the amendment could not be governed effectively from one central point. For many people and communities, Islamabad was just too distant for the government to fully appreciate their problems and comprehend their aspirations. Government had to be brought closer to the people. We were heartened by the fact that the provision of social services had been delegated to the provinces. In fact, we made a strong recommendation that the process of devolution should not stop at the provinces; it should proceed down to the local level.

While applauding the adoption of the 18th amendment, we worried whether the provinces will have the resources and the expertise to carry out the new functions that had been assigned to them. In the same report, we looked at the award of the 7th National Finance Commission. It was perhaps political expediency that resulted in the adoption of the award before the 18th amendment was incorporated in the Constitution. It would have been prudent to reverse the sequence. Nevertheless, we made a strong case for increasing the capacity of the provinces to raise more resources of their own and, thus, reduce somewhat their dependence on financial flows from the federal government.²

We will provide one more example of a “special subject” covered in the past reports. In one report we wrote what we titled the “Punjab Story.” This was an analysis of how the various districts in the province had performed relative to one another. We concluded that the districts in the south had done less well than those in the central and northern parts of the province. The south was dependent on land-intensive agriculture which, in turn, relied on surface irrigation. The latter had been neglected in terms of the maintenance of the expensive infrastructure that supported it. The central districts had a more diversified economic base. They were close to the provincial capital, that had developed into the country’s educational and cultural center. The northern districts received significant quantities of remittances. These came from two sources: from the workers who had gone to the Middle East in recent years and before that had migrated to Britain. Money was also sent by the military personnel doing active service. These districts had always been the favored recruitment ground for the army.³

The policy conclusion from this analysis was obvious: the provincial government in designing its development policies and in formulating its development plans had to give more attention to the backward areas. While we did not specifically investigate the links between extremism and backwardness, that such an association existed was highly plausible. After all, southern parts of the province had indeed turned into the breeding grounds for extremists.

We have gone in some detail into the “special subjects” covered in some of the reports written in the past since their relevance for the making of public policy choices is as significant today as they were then.

This year, the major theme of our 8th Annual Report is “Technology and Development”, a sector which holds phenomenal potential for spurring socio-economic growth and development. The report provides an objective analysis of the economic performance of the Government and dwells upon the state of play in the ICT sector and its huge potential especially in improving governance and delivery of public services.

Finally, I would also like to thank Dr. Parvez Hasan for the valuable insights he brought to “The State of the Economy” chapter in our annual reports. He has indicated that he would like to pass on the responsibility to a younger economist. This we will do with the beginning of 2016 report. However, Parvez will continue to provide guidance to the Institute in its analytical endeavour.

Shahid Javed Burki

Chairman

The Shahid Javed Burki

Institute of Public Policy at NetSol

The Shahid Javed Burki Institute of Public Policy at NetSol is grateful to the Beaconhouse National University for its financial support for the preparation, publication and dissemination of this Report.

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ACRONYMS

3Es	Economy, Energy and Extremism
ADB	Asian Development Bank
AJK	Azad Jammu Kashmir
ANPR	Automatic Number Plate Recognition
AOS	Accountancy Outsourcing Services
AT&T	American Telephone and Telegraph
BHU	Basic Health Unit
BIPP	Shahid Javed Burki Institute of Public Policy
BISP	Benazir Income Support Program
BOP	Balance of Payments
BoS	Bureau of Statistics
C4I	Command, Control, Communication, Computer and Intelligence Center
CCI	Council of Common Interest
CEO	Chief Executive Officer
CGCC	Center on Global Terrorism Cooperation
CIA	Central Intelligence Agency
CM	Chief Minister
CNIC	Computerized National Identity Card
CPEC	China-Pakistan-Economic Corridor
CPI	Consumer Price Index
D&C	Demand and Collections
DAPRA	Defense Advances Research Projects Agency
DCO	District Coordination Officer
DEWS	Disease Early Warning System
DFID	Department of International Development
DHQ	District Headquarters Hospital
EAC	Economic Advisory Council
ECG	Electrocardiogram
FATA	Federally Administered Tribal Areas
FDI	Foreign Direct Investment
FOC	Fibre Optic Cable
FY	Fiscal Year
GATT	General Agreement on Tariffs and Trade

GB	Gilgit-Baltistan
GDP	Gross Domestic Product
GIS	Geographic Information System
GNI	Gross National Income
GNP	Gross National Product
GoP	Government of Pakistan
GPS	Global Positioning System
GSM	Global System for Mobile
GST	General Sales Tax
HDI	Human Development Index
HEC	Higher Education Commission
HR	Human Resource
IBRD	International Bank for Reconstruction and Development
ICT	Information and Communications Technology
ICT4D	ICT for Development
IDB	Inter-American Development Bank
IIT	Indian Institutes of Technology
IMF	International Monetary Fund
IPP	Institute of Public Policy
IPPs	Independent Power Producers
IT	Information Technology
KP	Khyber Pakhtunkhwa
LDA	Lahore Development Authority
LNG	Liquefied Natural Gas
LRMIS	Land Records Management and Information Systems
LTE	Long-Term Evolution
LUMS	Lahore University of Management Sciences
MCU	Multi-Point Control Unit
MDGs	Millennium Development Goals
MICS	Multiple Indicator Cluster Survey
MIT	Massachusetts Institute of Technology
MMBTU	British Thermal Unit
MNCs	Multinational Corporations
MQM	Muttahida Qaumi Movement
MW	Megawatt

NATO	North Atlantic Treaty Organization
NEPRA	National Electric Power Regulatory Authority
NFC	National Finance Commission
NFCs	Near Filed Communications
NPP	Power Policy
NTC	National Telecommunication Corporation
NUST	National University of Science and Technology
P&D	Planning and Development
PASARC	Pakistan Administrative Service Alumni Research Centre
PASHA	Pakistan Software Houses Association
PATA	Provincially Administered Tribal Areas
PEPCO	Pakistan Electric Power Company
PFC	Provincial Finance Commission
PHED	Public Health Engineering Department
PITB	Punjab Information Technology Board
POS	Point of Sale
PPAs	Power Purchase Agreements
PPP	Purchasing Power Parity
PSEB	Pakistan Software Export Board
PTA	Pakistan Telecommunication Authority
PTCL	Pakistan Telecommunication Company Limited
R&D	Research and Development
REER	Real Effective Exchange Rate
RFID	Radio Frequency ID
RHC	Rural Health Center
RRP	Reading Room Project
SMF	Sealed Maintenance Free
SMS	Short Message Service
SOE	State-Owned Enterprise
SPDC	Social Policy and Development Center
STPs	Software Technology Parks
SWM	Solid Waste Management
THQ	Tehsil Headquarters Hospital
TMA	Tehsil Municipal Administration
TOE	Tons of Oil Equivalent

UAE	United Arab Emirates
UN	United Nation
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nation Development Programme
UNIFEM	United Nations Development Fund for Women
USA	United States of America
USF	Universal Service Fund
VPN	Virtual Private Network
VSATs	Very Small Aperture Terminal
WASA	Water and Sewerage Authority
WBG	World Bank Group
WDI	Word Development Indicators
WEF	World Economic Forum
WTO	World Trade Organization

**Executive
Summary**

**The Main Themes of the
2015 Report**

Executive Summary

The Main Themes of the 2015 Report

The 2015 report comes in three parts. The first part has one chapter that sets the stage for the report, focusing on some of the themes developed in the document. The second part has four chapters. They deal with the state of the economy, the relationship between technology and development, the state of play in the ICT sector and how women are performing in the sector. The third part has two chapters and presents two case studies on the use of technology.

Our preference is that the government should, for the moment, without losing the strategic perspective, focus its attention on a number of priority areas that, in different ways, are hindering the development of economy by having it perform well below its growth potential. A robust long-term strategy can be developed once these problems have begun to be addressed. In fact, our list of priorities is more extensive than the government's "3Es" talked about by the leaders upon taking office. The prime minister and his senior colleagues indicated that upon taking office they will focus on the revival of the *economy*, overcoming serious *energy* shortages and address the problems created by the emergence of *extremism*. We could add some more "Es" to the administration's initial list: *education*, *environment*, *external relations* and *exports*. We discuss these in the 2015 report. We could have added two "Ws" to the list of priorities – improving the management of country's water resources and empowering women and increasing their access to social services. We will turn to these in our future report.

The only one left to be looked into at a later date is the problem of environment. We could have included its discussion in our analysis, but we believe this should be done at a later time when more information becomes available on where the country is at this time, and where it is expected to go in the years to come. The world has begun to worry about the consequences of global warming and its effects on various parts of the planet earth, particularly the fragile eco-systems. There is agreement that South Asia region will be one of the most severely affected. Pakistan is already witnessing the impact of the rapidity and severity of climate change. It has been hit by a number of severe "weather events" – heavy rains followed by prolonged draughts and floods. The government is expected to announce how it will control carbon emissions in the next couple of decades. Such a plan is required before the world leaders meet in Paris in November-December this year for the 21st session of the Conference of the Parties to the UN Framework Convention on Climate Change. The objective of the Paris meeting is to agree on an international plan of action for combating climate change and controlling global warming.

We will begin this Executive Summary with a discussion of the state of the economy and follow it with brief overviews of the other "Es" included in this year's report.

Notwithstanding political challenges faced by the present government, it has survived and seems set to complete its term that will end in mid-2018. The growing consensus within the country about the urgent need of tackling the serious threat from extremists and militants strengthened the hands of the government and enabled the military to launch an effective operation in North Waziristan. Meanwhile, the pockets of terrorism within some parts of the country are no longer being ignored. The Karachi operation by the Rangers is trying, inter alia, to root out militancy in the wings of political parties and, in the process, is exposing widespread corruption in administrative structures. At the same time, the National Accountability Bureau has become much more active in probing and punishing wrong doers.

These are important achievements and are helping to strength the state and the political order. But the battle against terrorism has not been won yet and would require firmly tackling not only militancy but also root cause of terrorism. We have already provided the government with over detailed analysis and recommendations in our recent publications of July 2015: Strategy to Combat Terrorism Including Effective Implementation of National Action Plan.

On the external relations side, ties with China have further deepened as is evidenced by promised large investment in various sectors of Pakistan's economy including especially the China-Pakistan-Economic Corridor (CPEC). Relations with the US remain on firm footing with strong mutual interest in ensuring peace and stability and a peaceful transition under a democratic regime in Afghanistan. Unfortunately, relations with India have deteriorated ever since the assumption of office by the Indian Prime Minister Narendra Modi despite overtures from the Pakistan side.

Pakistan's economy has also shown improvement in some respects during the last two years. Despite a crippling energy crisis and a challenging, though improving, security situation, macroeconomic position improved: fiscal deficit declined moderately, inflationary pressures abated, gross foreign exchange reserves increased sharply, and economic growth revived modestly. The program with the IMF has been largely on track and only small waivers to required policy actions were needed from the IMF Board.

In one respect, 2014-15 was a particularly good year for the economy. Measuring the economy's performance in terms of GNI – a measure of the economy that takes into account net income from abroad and terms of trade changes – shows much greater improvement in the economic situation as compared to GDP and GNP measures. GNI increased at the rate of six percent in 2014-15, which is 1.2 percentage point higher than the rate of increase in GNP due to sharp improvement in the terms of trade and continued strong worker remittances. Thus, it must be emphasized that a substantial part of the improvement in the economic situation is due to external factors, most notably the large decline of at least one-third in international oil prices during 2014-15 and a sharp and unexpected rise of well above 20 per cent in worker remittances over two years to \$18.7 billion in 2014-15.

Serious weaknesses in the economy remained in several areas. The rate of gross fixed capital formation as percentage of GDP remained at 15 percent and is well below the level of a decade ago. Exports fell short of targets and actually declined in 2014-15. Also, net foreign liabilities position of Pakistan worsened from a negative \$ 63.8 billion at end of 2012 to a negative \$ 74.7 billion at the end of 2014, notwithstanding strong growth in foreign exchange reserves. This is resulting in steady rise in net investment income payments. Reduction in fiscal deficit has come at the cost of limiting public development spending. Finally, the credit to private sector adjusted for inflation has been shrinking, the banking system finding the large lending to the government safer and more profitable.

The present government deserves credit for giving priority to economic stabilization, while also outlining policies that will relieve the major constraints on future growth such as speedy privatization of public enterprises and pursuing substantial increase in energy investment to eliminate load shedding in power sector by 2018. The successful implementation of the IMF program so far has increased business confidence at home and abroad.

Still the fact remains that key economic fundamentals – savings and investment, exports, governance, and level of human development – not only remain weak but at best have not shown much improvement over the last several years. Indeed, Pakistan's relative international position in exports is worse than it was in the year 2000, the rates of savings and investment are below the level of 2007-08. It is more difficult to quantify economic governance, but the story lines on education, energy, and taxation given in the report do not inspire confidence that governance has improved in recent years.

These weak fundamentals have held back vigorous growth and fairer distribution of growth benefits in Pakistan for decades, but it is not easy to put the blame on any period or government. The point, however, is that unless there are some breakthroughs in the key constraints on development, the goal of reviving sustained growth to 6-7 percent per annum, paramount for generating sufficient employment, reversing growing poverty, and regaining our position among the dynamic economies in the world, would remain elusive.

A full and frank recognition of our basic problems is crucial both for political leadership and the nation. Without sacrifice and hard work nations cannot advance. With fairly secure political position of the present government, there is a unique opportunity to make tough decisions on enlarging the tax net; instituting austerity in public expenditure; increasing the skills, training, and accountability of public school teachers by devolving authority to local level; involving the civil society in helping redress the large and growing problem of adult literacy; focusing on making exports a significant contributor to growth and development; and improving economic governance by stressing merit, adequate pay of civil servants, and enhancing both their independence of action and accountability.

EXPORTS

Pakistan has missed numerous opportunities to increase the value of exports, in particular those of manufactured goods. Exports were the engine of growth for the global economy as well as those of the more rapidly growing countries of East Asia. As we wrote in our 2011 report, “over decades there has been no clear vision about Pakistan’s economic future, no real commitment to export-oriented growth, and no learning of lessons from what was happening in the outside world. It is worth noting that there has been no significant case of rapid growth in the last half century that did not fully exploit the opportunities offered by growing international trade.”

The biggest failure in exports has been the inability to develop a wide range of exports of manufactured goods other than textiles and clothing – the most dynamic element in international trade. Excluding exports of textiles and clothing, Pakistan’s other manufactured exports were only \$4.4 billion in 2014 having risen from \$0.7 billion in 1990 – a six fold rise. Over the same period, comparable exports from India had expanded eighteen fold to \$183 billion. Vietnam and Turkey made even bigger strides in the field. The worrying thing is that recently Pakistan has lost ground in textiles not only to China but also to India, Turkey, Bangladesh, and the new comer Vietnam.

We also missed the opportunity exploited by other countries when information technology made it possible to split the production system into several components. Various processes were located according to the comparative advantages of different places. These were then linked together by supply chains. This did not happen in the case of Pakistan but could still be done though will require a different orientation of trade policy.

There are those who will point to the slowdown in growth in international trade in the last two years and would argue that days of rapid globalization seem to be over. This is a misguided view. The big wage differences between the rich and poor countries and strikingly different outlook for demographic change between Europe, Russia, Japan, and China on the one hand and South Asia and Sub-Sahara Africa on the other will continue to propel rising international trade triggered by shifting comparative advantage especially in provision of labor intensives goods and services.

How can things be turned around? The first requirement is a strong conviction at all levels of society that Pakistan’s future without strong export expansion will be rather bleak.

The second need is to set up a high level representative Commission to develop an ambitious but feasible export plan for 2015-2025. Such a Commission should make recommendations for modernizing and strengthening textile and clothing exports and expanding both other manufactured and agricultural high value exports. Steps for the induction of direct foreign investment in labour intensive fields especially from countries, notably China where wages and costs have risen, also deserve high priority for the deliberations of the Commission. An urgent need is to make the Export Development Board an active institution, which monitors progress and makes policy adjustments.

In the short-run, improving competitiveness of exports and moderating the demand for imports requires an immediate review and adjustment of exchange rate policy. At the same time, even in the short run, possibilities for increasing export to India and China – countries with which we have a large negative trade balance – must exist and should be seriously explored. Commentators have argued a re-visiting of the free trade agreement with China which is generally believed to be favorably tilted towards Beijing.

ENERGY

We continue to be concerned with the energy situation – another “E” common to the lists of priorities we and the government have drawn up. The government’s National Power Policy (NPP), formulated in 2013, identified four problems that had bedeviled this vital part of the economy. There was a large gap between the demand for electric power and the amount of generation. In 2013, the demand-supply gap was estimated to be between 4,500 and 5,500 MW when the NPP was prepared. This resulted in load shedding that ranged from 8 hours a day in the more favored urban areas to 16 hours in the countryside. The cost for generating power had increased as the country had moved away from hydroelectricity – the cheapest source of power – to more expensive imported fuels. The latter accounted for 44 percent of the total generation in recent years. The transmission and distribution system were old and inefficient. The latter was subject to theft. Inefficiencies in the system meant poor recovery of costs at various points, which had resulted in the periodic appearance of the phenomenon referred to as “circular debt.” This debt continued to place a heavy fiscal burden on the government.

The NPP set the targets of eliminating supply - demand gap by 2017, decreasing costs of generation by at least 15 percent and reducing transmission and distribution losses by one third. More than half way towards the target date, it is clear that the progress towards these has been slow. The target of eliminating load shedding has been moved to 2018 because of delays and problems in completing large power generating projects notably Neelam-Jhelum and Nandipur. Progress in reducing load shedding and decreasing transmission and distribution losses has been limited. According to the national accounts data, electricity generation and distribution and gas distribution did expand by nearly eight percent in the last two years but fell somewhat short of growth in GDP; thus, energy shortages have persisted. Overall transmission and distribution losses remain high though technical losses were reduced from 18.5 percent in 2013-14 to 17.6 percent. The result is that despite significant increases in power tariffs, the system does not cover costs and the problem of arrears leading to circular debt remains. Also, despite large drop in oil prices, budgetary subsidies remain significant.

The attention given by the government to the sector has produced hope: with proper management and planned additions to generation, the country could look forward to the end of load shedding perhaps as soon as 2018. However, four policy areas need special attention.

First, Islamabad needs to formulate a comprehensive energy policy which would broaden the scope of the NPP. Gas should be brought into the policy framework. Mispricing of this precious resource is the main reason for its shortage and for the lack of investor interest in developing new sources of supply.

Second, serious attention needs to be given to distribution and transmission. These systems are old and are also subject to large-scale theft.

Third, implementation has to be improved. A couple of projects on which the present government had placed a great deal of hope in terms of closing the supply-demand gap were poorly implemented resulting in heavy cost escalation.

Fourth, a higher priority needs to be given to the development of hydel resources. It has long been recognized that the extensive Indus River system has the potential to produce large quantities of electricity. However, political considerations have kept the country from moving in that direction.

Most of the government's attention has been focused on increasing supply; serious work is proceeding on a number of large and small projects. However, implementation, as already indicated, has been adversely affected by poor governance. The poor quality of governance on offer is a recurrent theme of this report. The government needs to give serious consideration to overhauling the structure of energy management.

EDUCATION

For a number of reasons, among them the very high rate of population, resource constraints involving competition between defense and development, and last but not the least policy neglect, Pakistan has seriously lagged behind internationally in raising the levels of education and literacy for decades. The awareness has been growing for at least two decades that strong corrective action was needed; despite initiatives such as, Social Action Program in the 1990s, not much progress has been made in reducing the gap with other countries. Lack of basic education and skills is a major hurdle in the way of reviving strong growth.

Potentially, Pakistan's young population is its strongest natural resource. However, as much as a half of the new workers would enter the labor force without adequate basic education in the coming years. Unless the education and skills levels increase significantly beyond present trends, Pakistan would not be able to exploit this natural advantage.

The available data from the World Bank shows that Pakistan lags well behind both India and Bangladesh in key education indicators – notably net primary, lower secondary, higher secondary enrollment rates as well as in adult literacy. The gap is particularly wide at the primary level. What is even more worrying is that even at this level of basic education in Pakistan, there appears to have been some sliding back since 2010.

Last year's report had pointed attention to the neglected area of adult literacy and had estimated that the 50 million or so illiterates probably have an average remaining life expectancy of at least 35-40 years. To make matters worse, large portion of youth – perhaps as many as 35 percent – entering adulthood in the near future would also be illiterate. Thus, this mass of illiterate people will remain a drag on national productivity for a long time unless efforts are made to tackle this mounting problem through developing programs at the local government level by making appeal to all groups in the society, especially involving civil society and local leaders.

A major turnaround of educational attainment will require simultaneous action on several fronts: increasing public spending on education, reversing the almost steady decline in the quality of public education by devolving authority to local governments, tightening accountability mechanism, mobilizing and encouraging high performing civil society and private non-profit educational institutions to expand and lead especially in the new areas of vocational training and adult literacy.

Pakistan's public expenditure on education has never been high but has fallen in recent years to barely two percent of GDP as resource constraints have deepened. Most emerging nations spend between six and eight percent of their GDPs on education, research, and skill development. Promises made by some political parties to double or treble the resources allocated to education in the near future are unrealistic. An increase in moving up the level of public expenditure on education to even 3 percent of GDP over the next three or four years would not be easy, but this goal must be pursued seriously.

While spending on education is inadequate, the money actually spent has not been well used. Public clamour has been both for greater access to education as well as deep concern with the declining quality of public education. The public distrust is reflected in a steady move towards private schools. By now private school enrollments far outnumber public school enrollments not only at the primary level but also at the middle school and secondary levels.

The deteriorating quality of public schools has much to do with weak and over centralized governance as well as absence of effective mechanisms for ensuring accountability and competence of teachers. At the rudimentary level, there are widespread stories about ghost schools and phantom teachers.

EXTREMISM

Extremism and the acts of terrorism it has spawned have taken a heavy economic toll on Pakistan. That said, Pakistan is not an extremist society. Over the years society has become more conservative but conservatism is not extremism. Those who have challenged the state by resorting to violence against it and against those who don't share their values don't constitute a significant proportion of the population. However, even a small number of people can create mayhem when the state is weak as is the case with Pakistan. Strong military even within a weak state can deal with deviant behavior. This is what the military has been able to do in some parts of Pakistan. Its *Zarb-e-Azb* operation in

North Waziristan has achieved the desired results. The sanctuaries built by several terrorist groups have been eliminated. The use of force has worked, but as we will stress a little later, it is not the ultimate solution.

What is important is to recognize the root causes of extremism – identifying the circumstances that have led to its emergence. We suggest that the main reason why extremism has developed as a highly disruptive force is the failure of the political system and economic institutions to accommodate those who occupy society's fringes. Of the several reasons for alienation, four are of particular importance. They are relative economic deprivation, ethnic differences and rivalries, political exclusion, and religious conflicts.

The roller-coaster ride of the economy has left many people behind. Inequality, both regional and inter-personal, has not been addressed by public policy. Timothy Piketty's book, *Capitalism in the 21st Century*, was one of the bestselling books of 2014. In it, the French economist stressed that returns on capital have been traditionally higher than wages. Unless the state intervenes to distribute the incomes from capital to those who live on wages, inequality will continue to increase. This has happened in the case of Pakistan as has been demonstrated in this report's chapter on the state of the economy. Inequality breeds discontent. Those who are upset with their circumstances have made one of two choices: raise their voice or exit from the system. Voice gets heard when it is raised in an institutional setting. This is where inclusive political systems become important safety valves. One of the *dharnas* of the summer of 2014 was an example of the raising of voice. The other aimed to exit from the system by introducing a new one by using revolutionary means.

The second reason for the rise of extremism is ethnicity. Pakistan has been bedeviled by ethnic tensions since its birth. The blood-letting immediately before as well as after the partition of British India generated one of the largest movements in human history. Eight million Muslims moved into Pakistan and were settled within a population that numbered only 24 million. This was the largest concentration of outsiders in any society in history – a fact not often recognized. Millions went to Karachi, the country's capital. Karachi's ethnic mix was changed further with the arrival of millions of refugees from the country's northern areas as well as from Afghanistan. The city would have been able to deal with these developments had a system of representative governance developed. That did not happen, and Karachi once again became one of the more violent cities in the world. Once again the use of force has improved the situation somewhat but that is not the ultimate solution.

Religious intolerance is the third source of extremism. There is serious conflict in the country between two sects of Islam – the Sunnis and the Shiites. Pakistan is the second largest Shia country in the world after Iran. There was tolerance for the differences among the two sects until Wahabism arrived via the Kingdom of Saudi Arabia. Again force is being used to control extremism but this, at best, is a short-term solution.

Fourthly, Pakistan's political landscape has generally been characterized by intermittent army rules and lack of development of pluralist and democratic institutions though since 2008 democratically elected governments are in place. Over the years this has resulted in estrangement, exclusion and alienation of the citizens especially those from the backward and deprived areas of the country. The grievance motivates discord between the alienated citizens and the state accentuates the sense of economic deprivation and foments ethnicity and rivalry as opposed to unity, consensus and harmony. This in turn leads to emergence of extremism and militancy.

The only way to control extremism is to adopt a multi-pronged approach. Some of this was done with the adoption of the National Action Plan. A comprehensive approach would include making the political system inclusive, improving the role of education and its quality in particular the quality of textbooks, rigorously enforcing the many laws on the books, and improving the quality of governance.

SPECIAL SUBJECT FOR THE 2015 REPORT: TECHNOLOGY AND DEVELOPMENT

There is a broad consensus among development thinkers that technological advance plays a major role in promoting economic development and social change. It lifts the economies in rich, emerging, and poor parts of the world on to higher planes of development. For rich countries, it provides new ways of performing essential services. For emerging nations, it helps with their integration into the rapidly changing global production system. The ICT sector has made it possible to split the production process into several parts with lower end manufacturing passed out to emerging economies. Supply chains link these dispersed components. Technology can provide opportunities for improving incomes and quality of life for poor countries and poor regions within countries struggling with backwardness and poverty. Our case study on Baluchistan discusses how technology can be put to use in bringing development and social advance in a backward area.

We have chosen "technology and development" as the special subject for this year's report, following a somewhat different path for incorporating the area of emphasis in the main body of the report. We have worked on the "case study" approach in studying how technology can influence Pakistan's economic development and social progress. The detailed analytical work on the subject was not done in-house; it was carried out, instead, by a technology firm that has become our partner, and by a senior official working in one of Pakistan's more backward provinces – Baluchistan. One of the case studies is that of a relatively more developed district of Punjab province – Sheikhpura. We report on an on-going project being done by the institute in partnership with some other agencies aimed at improved and better governance and delivery of health services through: development and implementation of Information and Communication Technology (ICT) solution which will computerize the inventory management related to medical equipment and medicines, introduce patients tracking and records management system, and establish disease early warning system. The system will also lead to reduction – if possible ultimately elimination – of waste and corruption in this part of the

health system. The case study also recommends adoption of integrated ICT solution in the water and sanitation and solid waste management for improved governance and better service delivery.

Sheikhupura is a fairly densely populated district with a diverse economy. It is also located close to Lahore, the provincial capital. Given the district's proximity, the provincial bureaucracy can keep a close watch on the district administration's performance. It should, therefore, be possible for the government in Lahore to quickly incorporate our findings in the design of the health system and delivery of water and sanitation and solid waste management services for the entire province.

The other case study involves the sparsely populated province of Baluchistan. Not only is the province the poorest in the country, it is also the largest in terms of the area it covers. It accounts for about 50 percent of Pakistan's total area. An entirely different ICT system is required if technology is to be used for providing basic services to the population focusing on tele-health, tele-education crowd sourcing, GIS applications etc.

Technology can also address a number of other problems Pakistan currently faces. It can improve agricultural productivity and productivity of small and medium enterprises that should be developed as supply chains for the international production system. Water, an increasingly scarce resource in the country, can be better utilized in agriculture by the use of technological advances such as drip irrigation. However, for bringing technological advances into the work place, we need to develop the needed human resource. This will require work in a country where the education system as discussed above remains weak. We have proposed a partnership between the public and private sectors that would aim to develop the wide array of needed technical skills. One way of achieving this end would be to create specialized institutions where the government and the private sector work together.

THE FINAL WORD: GOVERNANCE

Throughout this report as in the reports published in the past, we have underscored the need for improving the quality of governance. It will need political will, citizen activism, and institutional development. For the last several decades, the trend has been towards continuous deterioration. There are complex reasons for this. The most important of these was the competition among different groups of people who together make up what is called the "government". While we do not have the space to discuss this matter in detail, it will be useful to recall one landmark in the country's turbulent history. The process began with the circumstances that accompanied the creation of Pakistan as an independent state. Unlike India, Pakistan was born without a functioning government. Everything had to be created anew. A new capital had to be built, new ministries had to be established, a central bank had to be organized. All this and more needed to be done while eight million refugees had to be accommodated within a population of 24 million people. Pakistan managed to create a functioning state but it did not develop. There were number of hiccups that disrupted progress. These included

military takeovers as well as cycles of state expansion and contraction. Nationalization of industry and finance in 1970s was followed by a period of privatization.

Good economic governance must be a key element in a successful growth strategy. Pakistan's efforts, remain at best work in progress and is at worst fumbling, uncoordinated, and unfocused. The problems in the management of the energy sector have been discussed above. The tax machinery does not as yet show the muscle build-up – and perhaps political support that it needs. The progress on privatization of the state enterprises is slow. The ministries are often at loggerheads with each other with no speedy mechanism to resolve disputes. The Finance Minister, clearly the leader of the economic team, is over-burdened with other responsibilities. The Council of Common Interest, a key body for resolving issues between provinces and the Federal Government, meets infrequently and does not have a sorely need independent secretariat. Last but not the least, powers for delivery of social services remain highly centralized at the provincial level and there has not been a meaningful devolution to the local governments.

Without necessarily increasing the role of the state, governance can also be improved significantly through five major steps: (a) The erection of a firewall between executive authority and the accountability mechanisms and strengthening the deterrents to prevent the abuse of power and breaking of the law. It would be fair to say that Pakistan has one of the worst records in punishing wrong doers, whether, politicians, bureaucrats, businessmen, or military leaders. (b) Effective efforts to de-centralize authority to the local government level, initially at least for social services, need to be taken. There is evidence from other countries that locating government closer to the people improves the sense of accountability of those responsible for providing public services. (c) Serious efforts to reform the civil service and restore the independence of public institutions through autonomy, proper selection of top management and professional staff, and adequate pay. (d) Encouragement of the development of civil society institutions at all levels of government. (e) Improving the judicial system. The task at hand is formidable but it must be undertaken with resolve and determination.

PART I

Chapter 1

Setting the Stage

Chapter 1

Setting the Stage*

The focus of this report is on how technology can help Pakistan set itself on a growth path that is high and sustainable well into the future. In this context, this chapter and the one that follows will set the stage for the main theme. In this chapter we will also discuss some of the problems the country faces at this time – perhaps the most delicate time in its history.

Pakistan's turbulent history and extreme unrest in the Muslim world lead to a number of questions about the country's future. These questions are easier to raise but difficult to answer. As we have discussed in several reports in the past, the country was hit repeatedly by a series of crises. The way they were dealt with kept changing the country's political landscape. In Chapter Two of the last year's report, we saw how this landscape looks as the country approaches the end of its seventh decade of independence. It discussed, in some detail, how the leaders in charge of policy making at this time – in particular in Islamabad and the four provincial capitals – are dealing with some of the major crises the country is currently facing. In this chapter, we will ask and try to answer some of the questions about the future.

On a visit to Washington in April 2015 to attend the spring meetings of the International Monetary Fund and the World Bank Group, Finance Minister Ishaq Dar addressed a number of audiences. He stressed in his statements that the worst was over for the Pakistani economy, and the country was slowly returning to what he considered to be the norm. He seemed to imply that by reaching a growth rate of above five percent, the country would have achieved its potential. It might be appropriate for the country's policy makers to aim higher: to adopt the policies that would increase the rate at which the economy should be increasing to 8 percent a year – perhaps even more. This will, however, require a major paradigm shift. It will need focus on factoring in a number of positives in the economic situation on which a growth strategy should be constructed. The Sharif government, in effect, adopted a sequential approach to economic management. It chose to concentrate most of its attention on addressing the 3Es – the three problems it believed the country faced when the new set of rulers assumed power. They were: economic revival, solving the energy problem and dealing with the scourge of extremism. To these three, we will add two more: education and external relations.

The three Es received a great deal of government attention in the first two years of its term. A considerable amount of state's resources were spent on preparing a vision statement. The Planning Commission was funded by the Asian Development Bank to get outside help to prepare a document titled "Vision 2025" that identified the structural problems the country faced in 2014, the year the study was prepared. It listed a long list of actions that needed to be taken to close the various social

*This chapter was contributed by Shahid Javed Burki.

and economic gaps that had developed overtime. But the vision document, launched with much fanfare – the Post Office minted a commemorative stamp to mark the occasion – was silent on the amount of resources that will need to be spent to achieve its many goals. There was no discussion of how the needed resources will be raised. Also absent from the discussion was the institutional requirements for meeting the stated goals. These simultaneous moves – addressing a few priority areas that needed immediate attention and the preparation of a long-term strategy spanning a period of more than a decade – left some confusion about the approach the new government was following.

With this as the background, can we draw the conclusion that Pakistan, in the fall of 2015, was on its way to climb out of the economic rut into which it had fallen since the early years of the 21st century? By the financial year 2012-13, Pakistan had completed almost seven years of sluggish growth. The 2000-15 was the period that saw the lowest rate of growth in GDP in the country's history. In 2013-14, the first year of the administration headed by Prime Minister Nawaz Sharif, the economy grew by 4.1 percent. This slight acceleration was maintained in the year that followed. Does this mean that the way had been prepared by the government for the country to climb onto a higher growth plane? This question received a positive answer from the Economic Advisory Council that met in Islamabad on 21 February, 2015 to review the government's performance. The EAC was made up of the senior non-government economists in Pakistan. Some of them had served in the government in the past. Meeting under the chairmanship of Finance Minister Ishaq Dar, the EAC concluded that a growth rate of five percent a year was within sight – perhaps by the year 2015-16. A broad-based pattern of growth was in place that should ensure that the country will steadily improve its growth performance while, at the same time, addressing the issue of the poor development of its large young human resource.

FIRMING UP THE DATA BASE

Before analyzing Pakistan's current economic difficulties, we will spend a moment discussing the poor quality of data available to the country's policy-makers as well as to those who do research on the state of the economy. The Nobel Prize for Economics in 2015 was awarded to Angus Deaton, a professor at Princeton University, recognizing the importance of data for understanding economic conditions. "His research shows an impressive breadth in its approaches: basic theory; statistical methods for testing theories; in depth knowledge of the quality of existing data; and extensive work on producing new kinds of data", said the Royal Swedish Academy in its citation for the award.¹ Pakistan needs to move quickly to close the information and data gaps that hinder the making of economic and social policy.

Pakistan has not held a population census for seventeen years – the last count was undertaken in 1998, and one was programmed for 2011. It was postponed for the lack of political will. Census would have indicated shifts in population that would have disturbed the established political order.

Pakistan today has a much higher proportion of its population living in urban areas than suggested by the distribution of seats in the federal and provincial legislatures. The over-represented landed community is not prepared to have its presence diluted.

We also have some reservations about the country's national income accounts. The World Bank data, which relies on the statistical information provided by the member countries, shows India's per capita income to be currently 13 percent higher than that of Pakistan (for a detailed discussion see Chapter Two). However, Pakistan does not have the kind of poverty that is visible in India. There, millions of people are homeless, sleeping and defecating out in the open. As a prominent econometrician, who taught at Harvard, used to tell his students, "if you don't trust the numbers, trust your eyes." Even with considerably higher inequality, it does not seem likely that given the visible poverty and crowding in India, its income per head would be so much higher than that of Pakistan. We recommend that a task force of experts should be set up to take a careful look at the national income accounts. The World Bank would be willing to help with such an exercise.

All the growth numbers used above and in Chapter Two are for the formal economy. There are several economists who are of the view that the size of the informal sector is as large as that of the formal part. Much of the activity in the informal part takes place in small and medium enterprises that escape the attention of the data gatherer and that of the tax collector. Goods produced and services provided by the enterprises that operate under the statistical and fiscal radars, do not get recorded in national income accounts. Three examples of the kind of activities being carried out would help to underscore the importance of this part of the economy as well as the contributions they can make to the country's economic future. Women are involved in all three activities.

Tens of thousands of young and well-trained women are providing IT services to their clients living abroad. One IT executive estimates that about a billion dollars of capital flows that are recorded as remittances are in fact payments for the work done by these one-woman unregistered enterprises. Those who are engaged in this work were once employed as workers in large IT firms but left their jobs after getting married. However, they continued to work from home while raising their families.

Private schools, established by women in towns and villages as well as in the peripheries of large cities, are another example of the type of activity that does not receive attention of the authorities. Most of these are modest operations run by one person, the founder, who has received some education and is adding to the family income by providing basic education to children in the neighborhood. The parents, who send their children to these institutions, are not impressed with the type of education on offer in the public sector and are looking for alternatives. The modest institutions in the private sector provide an alternative.

The third type of activity in the unrecorded part of the economy can be loosely described as the "fashion industry." This is made up of small enterprises that are making garments and providing

health and beauty services to the more affluent segments of the society. The entrepreneurs who have established these enterprises are mostly women who belong to the social segment they are serving. As such, they have a good understanding of the market in which they are operating.

These three examples point to the enormous potential of the service sector in contributing to the rate of economic growth as well as defining the economy's future structure. They also underscore the role women can play in moving forward the economy and reshaping it. Should the state play a role in developing these activities or should they be left alone to develop on their own? The weakness of the state suggests that it is better to leave alone these enterprises. That said, it may be of some use to encourage the public educational system at the higher level to train the youth, particularly women, who could become workers as well as entrepreneurs in these kinds of activities.

PAKISTAN'S EDUCATION CRISIS

That education is important for promoting political and economic development and bringing about social progress has long been recognized by academics and development experts. It is, therefore, worrying that Pakistan has lagged behind most Asian countries in bringing education – in particular quality education – to a significant number of its youth. This gap will need to be closed if Pakistan has the ambition to join the ranks of the high-performing Asian nations.

It has many resources on which it could build a better future. These include a large young population that could be turned into an economic asset rather than become a liability for society. But the development of the human resource will require a multi-pronged approach in which universal and better schooling will have to have a high priority. Pakistan has not devoted much attention to clearing the backlog of illiteracy that hangs as a heavy burden on its future. Poor literacy reduces productivity and hence economic growth. It also encourages the illiterate to opt for destructive ideologies.

Without improving the situation of education, the country will continue to wrestle with the inter-twined problems of political backwardness, economic stagnation, and the rise of religious extremism. Education interacts with overall progress in many ways. Some of these are well understood and some are less well explored. One example of the latter is the increase in the level of trust that results from education. As Geoffrey Hosking points out in his book, *Trust: A History*, trust is a vital ingredient in the web of interdependence that constitutes modern living.² Without trust, interactions among individuals remain confined in a narrow space. This creates patron-client relations or ethnic based interactions that remain the foundations on which the Pakistani political system has been built. Lack of trust also keeps economies locked in informal arrangements that hamper modernization.

It is only an educated citizenry that places emphasis on developing participatory and inclusive political institutions. It is only with the presence of inclusive political institutions that societies can hope to achieve sustained economic progress. This is the way causality runs – from education, to increasing

the level of trust, to political development, to economic advance. An argument can, however, be made that it is only after economic development that societies can make political advance. That indeed was the case with several countries of East Asia, but according to my way of thinking, these countries make up the exceptions rather than lay down the rule.

In the context of Pakistan, it is the contribution that Pakistan can make to overcome the scourge of religious extremism that needs to be noted in particular. According to a note prepared by the Center on Global Terrorism Cooperation (CGCC) for a meeting of experts held in December 2013, “tackling violent extremism through education is reflective of broader international shift in terrorism prevention and the need to identify the enabling environment for extremists to disseminate their ideologies and recruit supporters. Such a comprehensive approach is understood by the United Nations Global Terrorism Counter-Terrorism Strategy as well, as the work of the Global Terrorism Forum...”³

Those who study education place emphasis on two of its aspects. They focus on school attendance at various levels of the educational system and on the effort being made to clear the backlog of illiteracy. As shown in Tables 1.1 and 1.2 enrollment rates in Pakistan remain low as are the rates of literacy. There are significant provincial differences. Punjab is way ahead of Baluchistan, especially in terms of closing the gender gap. Underdevelopment of the sector of education is one reason why extremism has thrown deep roots into the soils of the more backward provinces.

Table 1.1
Education: Some Indicators of Progress, 2011-12

Indicators	<i>(percentages)</i>				
	National	Punjab	Sindh	Khyber-Pakhtunkhwa	Baluchistan
Net enrollment rate (5-9 years)	57	64	50	53	39
Male	60	65	53	59	48
Female	54	62	47	48	28
Achievement of MDGs:					
Primary education	0.95	0.89	0.81	0.90	0.58
Secondary		0.85	0.78	0.58	0.37
Youth Literacy		0.88	0.81	0.60	0.45

Source: Government of Pakistan, Pakistan Economic Survey, 2012-13, Islamabad, 2013.

Table 1.2
Literacy Rates in Pakistan

Province	<i>(% of the population)</i>			
	1972	1981	1998	2012
Punjab	20.7	27.4	46.6	71.0
Sindh	30.2	31.5	45.3	69.0
Khyber-Pakhtunkhwa	15.5	16.7	35.4	60.9
Baluchistan	10.1	10.3	26.6	50.0
Federally Administered Tribal Areas		6.4	17.4	22.0

Source: Various issues of Pakistan Economic Survey, annual report issued by the Ministry of Finance, Islamabad.

The number of illiterates in the country increased from 20 million in 1951 to 50 million in 1998, the year the country took the last population census. They probably increased to 55 million by 2014. This two and a half time increase implies a growth rate of 2.7 percent a year in the number of illiterates in the population. This was about the same as the rate of increase in population. This means that since its birth, Pakistan has only been able to keep pace with the large increase in population in terms of providing education. The stock of illiterates has not been reduced.

It is estimated that some 55 million Pakistani citizens of age ten and above cannot read and write while seven million children in the five to nine-year age group do not attend school. There are about 29 million children in this cohort, which means that one fourth of this group do not go to school. All the signatories to the Millennium Development Goals had pledged to have all the children attending school by the year 2015. In Pakistan's case MDG was signed by then President, Pervez Musharraf. The country will miss this particular goal by a wide margin. This is one more indication of the failure of the Pakistani state.

There are other statistics that point in the same direction. Infrastructure is inadequate: only 62 percent of public schools have toilets, and only 39 percent have electricity. The country spends only 2.3 percent of its GDP (in 2012-13) on education but a significant proportion of this is wasted. There are, for instance, 25,000 ghost schools – buildings built with public money but used for “other purposes including cattle pens, criminal gang headquarters, and sanctuaries for drug addicts. Thousands of ghost teachers draw salaries from these schools.”⁴ Textbooks taught in public schools are poorly written, used by poorly trained teachers and include content that often teaches extremist views.

Not unexpectedly, girls suffer more than boys. Of the estimated 154,000 primary schools in 2012-13, a bit more than a third, 55,100 were for girls. But this proportion declines as we move up the educational chain. Of the 42,300 middle schools, half or 21,200, were for girls. Of 30,400 high schools, only 12,600 or about two-fifths were for girls. Of the 18.7 million children in primary schools, girls numbered 7.8 million or 42 percent of the total. However, interestingly the proportion of girls among those receiving education does not decline as we move up the institutional chain; there were 2.7 million girls in middle school or 42.9 percent out of the total of 6.3 million. At the high school level, the proportion of girls was 42 percent – 1.2 million out 2.8 million. At the university level, with 814,000 enrolled girls, the proportion climbed to almost 51 percent.

Notwithstanding the overall poor performance in the field of education, there has been no shortage of good intentions. As countries often do – and Pakistan does this very frequently – governments prepare plans to deal with seemingly intractable problems. They do this to suggest to the citizens that a serious issue is being addressed seriously. The failure to properly educate its large and growing population led to the formulation of many plans that did not get implemented. Keeping with this tradition, Pakistan announced the National Education Policy in 2009. This was done with great

fanfare by the government headed by the Pakistan People's Party, which was into its second year in office. The policy was designed to address the issues of "access, equity and quality of education at all levels." It came with many worthy goals. Free and universal primary education was to be provided by the year 2015; free and universal secondary education was to be given by 2025. Literacy rate was to be increased to 86 percent by 2015. More public money was to be ploughed into the sector of education. By 2015, seven percent of GDP was to be committed to education. Curricula were to be modernized by including English, Urdu and a regional language along with Islamic Studies (for Muslims), science and mathematics as compulsory subjects.

While the government made no effort to achieve any of these goals, it brought some of them into the Constitution and into national laws. In 2010, President Asif Ali Zardari signed the 18th amendment to the Constitution which brought about sweeping changes in the country's basic law. Among the changes introduced was Article 25A according to which "the state shall provide free and compulsory education to all children of the age of five to sixteen years in such manner as determined by law."

There were four significant operational aspects of this amendment: Education was to be free; it was to be compulsory; it was to cover eleven years of the lives of all children; and new sets of laws were to be put on the books to meet this obligation. The pledge was not only to provide primary education but secondary education as well. Two and a half years later, the National Assembly passed the Right to Free and Compulsory Education Bill. The legislation received the unanimous support of the legislature. The bill was moved on November 12 by Yasmeen Rahman, one of the female members of the house, and passed on the same day. It won the support of several other female legislators who spoke from the floor. Women, as I will indicate later, were providing the much needed leadership in the area of education. According to the new law, parents who refused to send their children to school could be fined and imprisoned for three months and employers who hired school-age children faced fines and jail terms up to six months.

Poor quality education was linked with the rise of extremism in the National Action Plan, NAP, formulated in response to the attack by the Taliban on the Army Public School in Peshawar on December 16, 2014. The assault shook the country since its 150 victims were mostly children. All political parties got together and endorsed the 20-point NAP which included educational reform, in particular reforming the madrassas and madrassa education. However, as has been the case with most other reform efforts, the NAP has had little success in improving the quality of education. As Hasan Askari Rizvi wrote in a newspaper article in February 2015, "academic monitoring of religious seminaries has run aground because most madrassa organizations have declared that they would contest the government on madrassa-related affairs. Madrassa organizations identifying with certain religious traditions are more vocal about and most determined to fight the federal government on the proposed madrassa reforms."⁵

OVERCOMING EXTREMISM AND CONTROLLING TERRORISM

There cannot be any doubt that the phenomena of Islamic extremism and associated terrorism must be dealt with not only by the government in office but by the entire citizenry. Sustained economic progress cannot be achieved for as long as extremists and terrorists are able to destabilize the country. It will take a much longer work than a section in an essay to fully comprehend this phenomenon in Pakistan. It has many historical roots. The rise of extremism and terrorism in Pakistan can be attributed to several factors - most of them unique to the country. Four factors have come together to create the situation the government in power at this time is attempting to deal with. To comprehend the full dimension of the problem the country confronts in the summer of 2015 – the time of this writing – we should go into history and understand how the creation of Pakistan in 1947 set into motion a series of developments that were to create the conditions in which extremism could flourish. The second factor was the failure to develop inclusive political and economic institutions that could have accommodated some of the groups who were to use violence as the preferred method to draw attention to their aspirations. The third was the wrenching change introduced by one individual in order to recast the way society thought and worked. The fourth was the arrival of great-power rivalry at the country's borders.

To understand the problem we should look at the various ways in which it has manifested itself. The most noticeable form is the actions of a number of non-state actors who have decided to use violence to create political space for themselves. The group loosely described as the Taliban has a number of objectives; the most radical members of this group want to create an Islamic state in the country that will be governed according to what they see as the dictates of the religion they follow. The Taliban have brought their campaign to Karachi from the Federally Administered Tribal Areas. They have come to Karachi since hundreds of thousands of people from their areas sought refuge in that city. Violence had already established in the city as the vehicle of political expression and economic advance by another group of migrants who had arrived soon after the country gained independence. To be called the muhajirs, this group would not have challenged the political and economic systems had it been accommodated in the institutions of governance. This did not happen because of the inability of the various groups in society to reach a consensus on the best form of governance. The slow development of the institutions of governance is also the main reason why ethnicity remains a source of contention. Further complicating the situation is the outcome of the effort by a military leader who believed he had the mandate to Islamize the Pakistani society.

To begin with, we can trace the rise of extremism to the adoption of the ideology that led to the creation of Pakistan as an independent state. Mohammad Ali Jinnah, the country's founder, campaigned for the creation of Pakistan by adopting what he called the "the two-nation" theory - the notion that those who lived in Britain's India colony did not constitute one nation. The British Indian population was made up of two distinct nationalities, one Hindu and the other Muslim. The two needed political space

of their own which they could identify with in order to make political, economic and social progress. He did not buy what later historians – Sunil Khilnani for instance – were to call the “idea of India.”⁶ This was the belief that a political structure could be created that would be able to accommodate divergent interests.

It did not occur to Jinnah and his political associates that their success in using religion to divide the British Indian polity could lead to “ethnic cleansing.” This term was to gain currency several decades after the partition of British India in 1947. The term was used to describe what followed the collapse of the multi-ethnic and multi-religion state of Yugoslavia that had been held together by force and determination of that country’s Communist leadership. The transfer of population that accompanied the rapid collapse of the two-century long rule by Britain over India created a more Muslim state in Pakistan than was envisaged by its founding father. What is now Pakistan was 67 percent Muslim in 1947; when the ethnic dust had settled down in the late 1940s, Pakistan was 95 percent Muslim. Although what would have happened to Pakistan, in terms of its political and social development, had the transfer of population not occurred is a question that will take us into the realm of “counterfactual history.” However, it could be argued that the country would have experienced less turbulence had the need for providing space to large minorities not been reduced by the country’s sudden and unexpected Muslimization.

The other contributing factor for the rise of extremism was the failure of the Pakistani elite to develop a working and sustainable political order soon after the country came into being. Once again it was the large movement of people that stood in the way. The mass migration into Pakistan in 1947-49 brought 8 million refugees into the new country from British India’s Muslim minority provinces. The refugees were socially, culturally and economically very different from the indigenous population. Those who were Pakistan’s original citizens did not have the political aspirations of those the exchange of population brought in. It was inevitable that the political conflict between the “outsiders” and “insiders” – my terms in my first book on Pakistan – lasted for almost a decade.⁷ Eleven years after independence, the military took power and ruled, off and on, for the next fifty years. General Ayub Khan assumed the mantle of political leadership at the time a number of social scientists had begun to worry about the “softness” of the state. It was seen as an obstacle for the economic development of the newly independent Asian and African nations. The idea of the “soft state” was first proposed by the Nobel Prize winning sociologist-economist, Gunnar Myrdal in his magisterial work, *Asian Drama*.

Ayub Khan as Pakistan’s first military leader set the country on the road to rapid economic development. A number of studies by foreign economists, including the one by Harvard University’s Gustav Papanek, viewed Pakistan as a model of economic development and growth other developing nations would do well to follow.⁸ However, Ayub Khan’s success had one unexpected consequence. It created a mindset among military leaders who followed him that they could rely on their whims and

preferences to lead the nation. His three successors – Yahya Khan, ZiaulHaq and Pervez Musharraf – governed in ways that led to the underdevelopment of the Pakistani state and society.

It was under President ZiaulHaq's eleven-year rule (Ayub Khan also governed for eleven years) that Pakistan was pushed towards the adoption of Islam as the governing ideology. Perhaps what Zia achieved – if that is the right verb to use – is best portrayed in a work of fiction. Mohammed Hanif's *A Case of Exploding Mangoes* succinctly describes how the military president was able to force his personal extremist views on the Pakistani society⁹. In this quest, President Zia was helped by both the Soviet Union and the United States. The former invaded Afghanistan in 1979 to protect the pro-Moscow regime that had been installed in Kabul. The latter elected Pakistan as its partner to defeat the Soviet Union in Afghanistan. The counter attack was launched by several groups of Islamic warriors – the mujahideen – trained in the Islamic seminaries that Saudi Arabia helped to establish in the border areas on the Pakistani side of the border. These were equipped by the United States. The mujahideen were successful and, after a decade-long war, were able to push out the Soviet Union's troops. But the long struggle did not produce an acceptable successor to the Moscow-supported regime. In 1996 a new group, the Taliban, who had not participated in the war against the Soviet Union occupation, took power in Kabul. Its rise was to set the stage for extremism and terrorism in Pakistan. This could have happened because of the Islamization effort launched by President Zia and also because of the slow development of an inclusive political order in the country.

Two years into its current tenure, the government under the control of Prime Minister Nawaz Sharif seems to have made some progress in dealing with terrorism. As has already been mentioned, it had identified extremism as one the three “Es” that were to receive its attention. The other two were energy and the economy. Its initial actions gave the impression that it was lost; the terrorists understood this and went ahead and escalated their assault on the institutions of the state. In just one week in early January 2014 they attacked and killed two persons – a 51-year-old policeman and a 15-year-old boy outside his school. These killings, in different ways, point to some of the elements in the strategy the terrorist groups are pursuing. The first was in the troubled city of Karachi, the second in a district in the troubled province of Khyber-Pakhtunkhawa. The first was meant to intimidate the leadership of the security forces engaged in countering terrorism and extremism. The second was meant to scare the populace, particularly in the less socially and economically developed areas of the country, not to patronize modern educational institutions. The columnist Cyril Almeida called insurgency a war with ourselves. “The stuff that goes boom we have the capacity to take care of. That's the Taliban. But try digging out the trigger. The trigger that is embedded deep in the society.” Force, in other words could possibly be used to subdue those who were disturbing society's peace. It had been used effectively in the past – for instance in the district of Swat when, in the summer of 2009, the army launched an operations that pushed the Taliban out of the area and established the control of the state – but to change society's mindset will need a different approach. “Monsters will be monsters and monstrous

things will always do. But we're not at war with the Taliban; we're at war with ourselves. We just haven't admitted it yet."¹⁰

Adil Najum, another newspaper columnist – an academic who has served as Vice Chancellor of the Lahore University of Management Sciences – was more explicit as to why Pakistan was at war with itself. Education – its poor coverage and poor quality – was one powerful reason why the country had developed such wide differences in the way various segments in society looked at life. "...a thought on what Aitzaz Hasan (the youth killed in KP) was defending, and what his killers sought to attack: schools. Terrorists clearly see schools – and education – as one of the biggest threats to their agenda of extremism hatred. Such a great threat that a child, Malala Yousafzai, had to risk and another, Aitzaz Hasan, had to embrace it. Yet in a strangely perverse way they, the terrorists, may understand the power of education much more than we do. What they seek to destroy so violently, we have done so poorly to build. I wonder what the school in Ibrahimzai that Aitzaz gave his life in defending actually looks and feels like. If it is like so many other schools in so much of the rest of Pakistan, it is likely to be a picture of neglect. It is not just ironic but disgusting to realize that what our enemies choose not to ignore, we continue not to neglect?"¹¹

EXTERNAL AFFAIRS: REPOSITIONING PAKISTAN

Countries define their relations with the outside world to match their strategic interests. This is an obvious statement but it raises an important question: What are a country's strategic interests? Even when the answer is clear, it is not always obvious how these should be aligned with external relations? Biases of the leader who makes policies often contribute significantly to the way the country approaches the world. Pakistan's history has several examples of how the judgements made by one policymaker can – and did – change the course of history. Economic compulsions and personal preferences have also played a big role in the making of Pakistan's external relations.

As has been the case since August 1947, Pakistan has been dependent on outside help to manage and develop its economy. Very little effort was made by the series of administrations that governed from Karachi, the country's first capital, and Islamabad, the current capital to increase the proportion of domestic resources needed by the economy. This problem is discussed at some length in Chapter Two of this report. Until the time the country is able to raise its very low rate of domestic savings, it will have to obtain resources from the outside. To whom should the policymakers turn? That was an important question in 1947 and has been a number of times since then. It remains an important question at this time.

The first generation of Pakistani leaders correctly read the evolving global situation. The Second World War had left the United States the dominant global and economic power. Britain's dominance had come to an end. While it was one of the victors, it did not have the economic wherewithal to continue to lead the world. It was agreed that the job now will have to be done by the United States.

This was recognized by the world leaders, who met in the small hillside resort of Bretton Woods in New Hampshire, United States in 1944. The meeting was called to establish the institutional base for managing the global economy. Although the British economist John Maynard Keynes was a big presence at the meeting, the show was stolen by the United States. Its delegation led the attempt to give the world three institutions to manage the world economy. The International Monetary Fund was created to ensure that the world and its states did not plunge into financial crises as had happened in the period leading up to the Second World War. Keynes had written an influential book arguing that economics and finance were important reasons why the European nations went to war in 1939. The IMF will have the mandate and the resources to prevent that from happening.

The Bretton Woods conferees also agreed to establish the International Bank for Reconstruction and Development (IBRD). The “reconstruction” in the bank’s name referred to the need to help the countries that were ravaged by the six-year long war. The “development” in the title saw that the countries that were likely to emerge from under colonial rule would need financial resources to grow their economies. The United States had never been a fan of colonial rule and was urging Britain and France to give independence to their colonies in Asia and Africa. The IBRD later developed into the World Bank Group. Its success led to the establishment of such regional banks as the Asian Development Bank, the Inter-American Development Bank, the African Development and the Islamic Development Bank.

Those meeting at Bretton Woods would have also liked to create an institution for managing global trade. The conferees soon found out that international trade was a harder nut to crack than providing resources for global financial stability and economic development. It took another fifty years before the World Trade Organization (WTO) could get developed. In the meantime, a body called the General Agreement on Tariffs and Trade (GATT) oversaw the several rounds of global trade negotiations. These rounds brought about significant reductions in the tariffs on trade, in particular among developed nations.

Since the United States provided most of the resources for the IMF, the WBG, and the regional banks (excepting the Islamic Bank), it was a major influence on the shaping of their lending and support policies. Over time, however, the proportion of the “quotas” it held in the IMF and its contribution to the share capital of the WBG and regional development banks declined in order to accommodate the larger heft of the group of countries that came to be called “emerging economies.” According to several of these countries, their political weight in these organizations did not match their economic strength. They thought that Washington should step back a bit more, and the Europeans whose weight in the global institutions did not match their relative decline had to withdraw even more. China agitated the most vigorously for a larger presence in the international bodies.

Its claim for a more meaningful role was not accommodated. It was kept at bay largely because of politics in the United States. In Washington, the attempt made by the Barack Obama administration to increase China's share in these institutions has languished in Congress. The U.S. legislators were not prepared to yield ground to the country that had emerged as the main threat to America's global dominance. According to the IMF, using the Purchasing Power Parity as the methodology, announced that China had become the largest world economy. By the end of 2014, its PPP-based national product was estimated at \$18.96 trillion, 4.6 percent higher than the United States' \$18.12 trillion. This gap was likely to increase to 25.3 percent by 2020. This cataclysmic change occurred while, with President Xi Jinping in charge, the Chinese leadership had become more assertive. How should a country such as Pakistan factor in these big changes in its external affairs? It now has more choices than were available when the United States dominated the global scene.

Until 2001 when Pakistan under President Pervez Musharraf made a hundred and eighty degree turn in its external policies, decision-makers in Islamabad and Rawalpindi had focused on two objectives to shape the country's foreign policy: competing with India and receiving outside help for promoting development. India's approach to Pakistan was read in terms of hostility. In 1949, New Delhi cut-off all trade with Pakistan to punish its neighbor for not agreeing to devalue its currency with respect to the American dollar. This was done by all countries that belonged to the British Commonwealth. Pakistan chose not to follow since it believed that the demand for its major export – raw jute from East Pakistan – was not price elastic. By devaluing its currency, it would have lost foreign exchange earnings. The Indians were not happy with the Pakistani decision.

Pakistan's economic managers have not succeeded in reducing dependence on external capital flows. While the country will continue to receive significant amounts of capital from the multilateral banks and while it will possibly continue to get help from the IMF, it is unlikely that it will receive much financial assistance from the United States, its largest benefactor in the past. This is largely because of a fundamental change in America's strategic interests. Pakistan mattered to Washington when, during the period of President Ayub Khan (1958-1969), it saw Islamabad as a strong link in the chain it had built to hold back the advance of Communism. This was again the motivation during the period of President ZiaulHaq (1977-1988) when, with the invasion of Afghanistan, the Soviet Union arrived right on Pakistan's borders. During the early years of President Pervez Musharraf (1999-2008), the ability of al-Qaeda terrorists to hit two places in America's heartland was enough to persuade Washington that Pakistan was critical for its strategic needs.

The world has changed since then. The Soviet Union has collapsed, the spread of Communism is no longer a threat, and al-Qaeda is no longer a powerful presence in the Pakistan-Afghanistan region. America took its revenge, and Osama bin Laden, the main sponsor of the 9/11 attacks, was killed in 2011. The Islamic State in Iraq and Syria (it could possibly spread to Libya) could threaten America. Washington may get involved in beating it back in these countries. In this significantly changed

geo-political situation, Pakistan is no longer of much strategic significance for the United States. In these altered circumstances, it makes sense for Islamabad to look to China as a source of external finance and Beijing is willing to oblige. During the April 2015 visit of China's President Xi Jinping to Islamabad, Pakistan was promised \$46 billion equivalent of capital, most of it in the form of project assistance.

Nations forge relations seldom for sentimental reasons. They do so to follow for strategic interests. Notwithstanding the hyperbolic pronouncements of the leaders of China and Pakistan about the nature of their relations – they have called these higher than the highest mountains, deeper than the deepest oceans – the two countries have strictly followed their national interests. Pakistan's reasons for drawing close to China are less complex than those of China. For Islamabad, transfer of defense equipment and technology acquired considerable importance after it was subjected to repeated sanctions by the United States. According to the detailed account provided by Feroz Hassan Khan in his book *Eating Grass: Making of the Pakistani Bomb*, it is clear that China's help was critical for the development of nuclear weapons by Pakistan.¹² The need for capital has been added as the motivating factor. Some analysts have suggested that the attempt to balance India's growing military might may be the third reason for Pakistan to get close to China. However, Islamabad is more realistic on how much Beijing can assist in helping it against India. China was of no particular help during Pakistan's two recent wars with India, one in 1965 and the second in 1971. It is unlikely that Beijing will intervene if for some reason there is another conflict involving India and Pakistan.

China has begun to look at Pakistan as an important player in its strategy to create space for itself in the region around its borders. Using its growing economic strength, China is spending more than ever on its military. Navy is receiving special attention; the deep water port at Gwadar, on Pakistan's Baluchistan coastline, could become an important staging area for its rapidly expanding and modernizing submarine fleet. The reason for giving the navy so much attention is to protect some of the sea-lanes that are critical for China to trade with the world. The narrow Strait of Malacca, through which nearly all of its commerce passes, is of great importance as it could be easily blocked during a period of hostility. A strong naval presence in these oceans will serve as deterrence.

The proposed China-Pakistan Economic Corridor, CPEC, will connect the port of Gwadar with the western provinces of China through road, rail and fiber-optic links. The corridor will also provide an opening to China, a large country that is land-locked on three sides. Some of the trade that passes through Malacca could use the CPEC as an alternative route.

China is looking also at the rich energy and mineral resources available to be exploited in Central Asia. A United States investigation, a few years ago, estimated that Afghanistan was sitting atop mineral wealth valued at \$1 trillion. Some of these mineral veins flow into Pakistan's Baluchistan province. The CPEC could be used to transport these minerals, once exploited, as well as oil and gas.

The large investment planned by China in Pakistan could conceivably serve to maintain the country's faltering rate of economic growth. For the last 35 years, the Chinese economy increased at the rate of about 10 percent a year. It is now 32 times larger in size than in 1979 when the economy was opened and the period of high growth began. That expansion was made possible by the export of cheap manufactures to western markets. But cheap labor is no longer available, and the markets in the West are saturated. Investment in the domestic economy has worked to some extent, but even that is getting exhausted. Foreign investment, therefore, becomes an attractive option, and Pakistan provides an attractive opportunity. The Pakistani state could get involved in improving the country's economic future. It could, for instance, turn Pakistan's strategic location into an economic asset. There are four countries that share borders with both China and India – Asia's two giants and rapidly growing and changing economies. Two of these – Nepal and Bhutan – are small. The third, Myanmar, is of medium size but remains politically unsettled. Pakistan is not only large with a population approaching 200 million, it is also politically and economically more developed. By improving relations with India and by investing in developing the needed infrastructure, Pakistan could make use of its extraordinary location to use regional trade as a major driver of growth. Not only that, it could also obtain large amounts of finance by offering its territory for moving goods and commodities among the nations on its borders as well as those not too distant from it.

Some of the needed investments are being planned through the China-Pakistan Economic Corridor (CPEC). As has already been stated that during the April 2015 visit to the country by the Chinese President Xi Jinping, Islamabad was promised investments amounting to \$46 billion, which will contribute to the development of the CPEC. Once completed, this corridor could be linked with India and Afghanistan and through the latter to the landlocked countries in Central Asia. The American pullout from Afghanistan and the election of Ashraf Ghani as president have set the stage for ushering in a new period of economic growth and transformation in this area. China needs to reach the enormous but untapped mineral wealth of Afghanistan, some of which overflows into the Pakistani territory. China also needs the Pakistani and Afghan space to access enormous energy resources of the Middle East and Central Asia. Improved relations with India would mean linking that country with these corridors. The Indians also need to have good access to Central Asian and Middle Eastern energy resources to overcome their deficit of this vital economic input. The CPEC can be a game changer not only for Pakistan but for the entire South Asia and Central Asia region.

The role women can play in increasing economic activity, and the advantage Pakistan can draw upon from its geographic location are not the only "positives" on which a better future can be built. There are several others. These include the sector of agriculture, an active small- and medium-scale manufacturing sector, a large young population and a large diaspora spread across the world. A few words on each of these will be in order at this stage.

Pakistan could do a better job managing its rich agricultural endowment. In the late nineteenth and the early twentieth century, the British began to worry about the recurrent famines in the north-eastern part of their Indian colony. The memory of the 1857 mutiny against their rule was still fresh in their minds. They did not wish to have another cause – repeated famines and associated human toll – to provide another rallying point for the opposition to their colonization. After years of debate in London about the best way to prevent famines, the British administration in India decided to turn the virgin lands of Punjab and Sindh into the granaries of India. Huge investments were made to tap the waters of the Indus River system to irrigate vast tracts of virgin land. An elaborate road and rail transport system was built to carry the food grain surpluses from Punjab and Sindh to the food deficit provinces of Bengal and Bihar. The port at Karachi was also developed to ferry food grains to Calcutta. Thus, Pakistan inherited a rich agricultural sector.

For a couple of years after the partition of British India, Pakistan continued to export its surplus food grain production to India. However, as discussed in an earlier section of this essay, New Delhi imposed a trade embargo on its neighbor. With the loss of this market, and the need to earn the badly needed foreign exchange for development, the first generation of Pakistan's economic managers turned their attention to the non-agricultural parts of the economy. Agriculture was neglected and continues to receive little attention from the policymakers. If this sector was once again to become a major contributor to economic growth, as it was before the country became independent, it will need to be included in the government's priorities. The sector's potential is considerable. Pakistan has the world's largest contiguous irrigated area. The country's cropped area is estimated at 22.75 million hectares. Water reaches land from several different sources. Surface canals irrigate 5.82 million hectares, ground water another 4.20 million hectares. However, the cropping pattern is not optimal given the sector's endowment. The public sector needs to invest more in order to improve the deteriorating irrigation infrastructure, develop science and technology institutions to improve land productivity, provide incentives to the farming community to move to the production of higher value added crops, and improve the marketing of surpluses produced. A reformed agriculture sector could add up to one percentage point to the rate of growth in national income.

The country also needs to rethink its approach to industrialization. With the changes that have occurred in the international production system, Pakistan could enter the supply chains for the large manufacturing sectors in China and India. Some of this has begun to happen; there are manufacturers working in the industrial belt in and around the cities of Lahore, Gujranwala and Sialkot who are supplying parts and components to the automobile industries in Europe. The same could be done for the automobile industries of China and India.

By focusing on education and training, Pakistan could turn its large young population into a significant economic asset rather than having it become a burden. The youth could be deployed in modern services which have large demand in the western markets. The enterprises employing the young in

skill-intensive activities could lead to Pakistan, given the size of the population and its median age, to become a large supplier of services to the western world.

Finally, Pakistan could take advantage of the large diasporas that have been created by its citizens in many parts of the world. While firm informed estimates are not available about the number of people who live in these communities their age structure and skill profiles, their incomes and wealth, and their investment interests, some guesses can be made from what we know about other diasporic communities that have been researched. It appears that some eight million Pakistanis live abroad, mostly in the Middle East, Britain, Canada, the United States and Australia. Their average income per capita is between \$20,000 to \$25,000, which means that they earn between \$160 billion to \$200 billion a year. Some of these communities are old, and some of the older ones have been saving and investing in the countries in which they live. Sizeable economic assets have been created by these people in America, Canada and Britain. Their value may be around half a trillion dollars.

There are several examples of investments expatriates have made in what was once their homeland. One British business house has invested in a cement plant in Chakwal and is the co-owner of a large commercial bank. Several Pakistani physicians have invested in their homeland in hospitals and clinics. There are investments in educational institutions as well. This trickle could become a flood if those Pakistanis living abroad could develop confidence in the economic future of their country. The Chinese and Indian diasporas are playing important roles in the development and economic modernization of the countries of their origin. Those from Pakistan could do the same if the conditions at home provide security to their capital and rates of return on investment that are reasonable and attractive.

What all this implies is that Pakistan has the potential to significantly increase the rate of economic growth in the years ahead if it undertakes a major paradigm shift in economic thinking. It needs to focus on some of the neglected drivers of economic growth. These include its large young population, in particular the contribution women can make to the economy; its proximity to the large Chinese and Indian economies; and its location. Intelligent and imaginative use of these potential assets could produce the rates of growth which would approach those of the fast-growing economies of Asia. It is possible to think and plan for rates of GDP growth around – even beyond – eight percent a year by the end of the decade of 2010s.

ISLAMIC EXTREMISM

The main conclusion reached in this paper is that Pakistan is likely to make steady progress in developing a functioning, integrated and inclusive system which will, in turn, help the country achieve equally steady economic improvement. However, could these positive outcomes be disturbed by developments in distant parts of the Muslim world that could reach Pakistan? Could Pakistan's progress be disturbed by the rise of Islamic extremism in other parts of the world? The New York

Times Ross Douthat summarizes very well the state of play pertaining to the rise of the Islamic State in Iraq and Syria. “The fall of an autocrat leads to foreign occupation and civil war. A revolutionary movement with a messianic vision capitalizes on the chaos to gain power. The revolutionaries reign through terror and the promise of utopia, and inspire copycats around the world. But other nations impose a quarantine, internal rivals regain ground, and despite initial successes the new regime seems unlikely to survive – especially once outside powers, including the United States, join the fight against it.”¹³

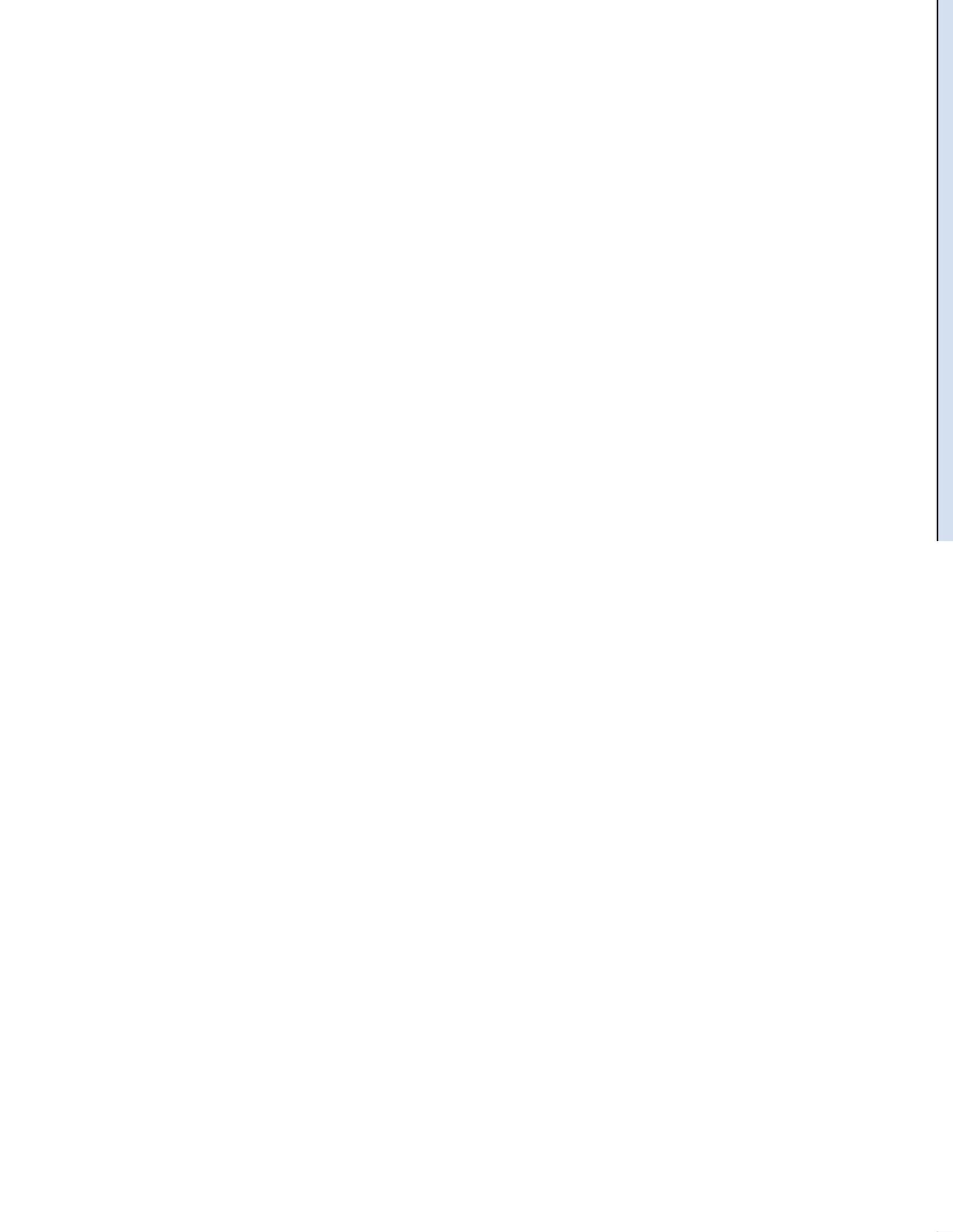
I have suggested that in the end Islamic extremism may find it difficult to establish itself in Pakistan. The reason why that may happen is that the country is making progress in creating political and economic orders that will provide homes to the youth. They have been thoroughly alienated by the Arab world’s elite. It is their alienation that has made the Islamic State resilient. The current state of affairs in the parts of the Arab world most affected by the “Arab Spring of 2011” suggests that it will be some time before these countries reach the stage at which Pakistan had arrived by the middle of 2015, the time of this writing. As Sondos Asem wrote in an article contributed to the op-ed pages of *The Washington Post*, “I belong to a school of moderate mainstream Islam that believes there is no contradiction between Islam and democracy. In fact, Islam stands firmly against injustice, violation of human rights and oppression of women. I have always believed in democracy and peaceful change, and I have defended the human rights of all people. Therefore, I volunteered in Morsi’s campaign as a coordinator to communicate with foreign media, and I was appointed to the same position in the president’s office after he was elected president in a free and fair vote. This was the only time we Egyptians were able to participate in such elections, and it was an incredibly empowering moment.” Following the military coup of July 3, 2013 that brought General Abdul Fateh Sisi to power and incarceration of President Morsi, Ms. Asem left Egypt for Oxford. She was sentenced to death by an Egyptian court on May 16, 2015 along with Morsi and several other supporters. “I am from the generation of young Egyptians – women and men, Christians and atheists – that the regime fears as its No. 1 enemy because we represent the future and a hope for change.”¹⁴

The grievances the youth have against the dominant political players have made the Islamic State movement resilient. According to one assessment, “confounding declaration of the group’s decline, the [recent] twin offensives have become a sudden showcase for the group’s disciplined adherence to its core priorities: always fighting on multiple fronts, wielding atrocities to scare off resistance and, especially, enforcing its caliphate in the Sunni heartland that straddles the Iraq-Syrian border. In doing so, the Islamic State has not only survived setbacks, but also engineered new victories.”¹⁵ However, given the conclusion reached at the end of the sixth session in which I discussed the country’s future, even with all the turmoil in the country, Pakistan seems to be on the way to developing a political order that is representative and inclusive. This will prevent extremism from taking root in the country.

CONCLUSION

Pakistan's economic future will depend also on the progress it makes in developing its political order. For the last several years, it has been moving in the right direction. Unlike most of the Muslim world – unlike also its neighbor India and Bangladesh, once its part – Pakistan has no living overbearing leader who could colonize the state rather than allow institutions to set the rules of the political game. The exception is Muttahida Qaumi Movement's (better known by its acronym, MQM) Altaf Hussain, but even his power appears to be waning. Two of the most revered leaders are long dead. One of them, Muhammad Ali Jinnah, founded the state. The other, Zulfikar Ali Bhutto, attempted to give political space to a number of groups – among them peasants and urban workers who were effectively disenfranchised by the narrow and exclusive political system of the day. The absence of overbearing political personalities means that the development of political institutions could proceed apace and take the country towards a representative and inclusive political order. As economists have now begun to recognize, the presence of such an order is a precondition for obtaining sustainable and high level of economic progress.

PART II



Chapter 2

State of the Economy: Progress and Challenges

Chapter 2

State of the Economy: Progress and Challenges*

Pakistan's economy has shown both considerable resilience and significant improvement in some respects during the last two years. Despite a crippling energy crisis and a challenging, though improving, security situation, macroeconomic position improved notably and economic growth revived moderately. The program with the IMF has been largely on track and only small waivers to required policy actions were needed from the IMF Board.

In one respect, 2014-15 was a particularly good year for the economy. While GDP growth revived further to 4.2 per cent and GNP growth continued to outstrip GDP growth because of continued strong growth in worker remittances, Gross National Income (GNI) – a better measure of national welfare - grew by 6 percent in 2014-15 – the highest level in a decade.^{1,2} (see Table 2.1) The apparent prosperity has thus been real and particularly noticeable because well over 80 percent of the increment in domestic resources in recent years has gone towards increasing consumption.

Table 2.1
Growth Rates of GDP, GNP, and GNI
(Percent per annum at a constant factor cost for 2005/06)

Indicator	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
GDP	5.0	0.4	2.6	3.7	4.4	3.6	4.0	4.2
GNP	5.0	0.9	3.8	4.2	3.8	3.7	4.6	4.8
GNI	1.7	3.3	2.8	3.3	3.5	4.4	5.2	6.0

Source: Annual Report, Various Issues, State Bank of Pakistan.

However, it must be emphasized that a substantial part of the improvement in the economic situation is due to the external factors most notably the large decline of at least one-third in international oil prices during 2014-15 and a sharp and unexpected rise of well above 20 per cent in worker remittances over two years to 18.7 billion in 2014-15. More than half of the worker remittances originate from Saudi Arabia and UAE and much of the increase can be attributed to these two countries.

On an annual basis, Pakistan's oil import bill has come down by roughly 5 billion due to over 40 percent decline in international oil prices between the end of 2014 and middle of 2015. But for the drop in oil prices, the current account balance of payments deficit in 2014-15 would have been at least double the actual amount of 3.2 billion (1.2 % of GDP). The drop in oil prices and higher remittances account are the principal reason why national income growth has touched the highest level of 6 percent. Arguably, without the stimulus provided by the positive external shocks, the GDP growth revival would have been more limited.

*This chapter was contributed by Dr. Parvez Hasan with the assistance of Muhammad Imran.

The remarkable news is that private consumption has grown, even according to official figures, by over 9 percent over the last two years (2013-14 and 2014-15) suggesting a gain in per capita consumption of nearly 6 percent over the period – public consumption grew substantially faster because of higher security spending and sharp increases in the Benazir Income Support Programme (see Table 2.2). The comfortable overall growth in private consumption may partly explain why there have not been more violent protests against acute power shortages and very heavy load shedding.

Table 2.2
Domestic Absorption of Resources

(Rs billion in constant prices of 2005/06)

Indicator	2006/ 07	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15
Consumption	7,499	7,732	7,805	7,951	8,273	8,711	8,975	9,416	9,894
Of which private	(6,650)	(6,892)	(6,859)	(7,010)	(7,332)	(7,701)	(7,863)	(8,286)	(8,585)
Investment, including stocks	1,634	1,700	1,627	1,521	1,419	1,455	1,495	1,559	1,683
Of which gross fixed capital formation	(1,560)	(1,483)	(1,374)	(1,268)	(1,299)	(1,333)	(1,389)	(1,504)	(1,560)
Total	(9,133)	(9,432)	(9,432)	(9,472)	(9,692)	(10,166)	(10,470)	(10,975)	(11,577)

Source: *Pakistan Economic Survey, Various Issues, Ministry of Finance.*

The clear improvement in the macro-economic situation is also evident from at least a moderate reduction in the fiscal deficit over the last two years and a very large addition in foreign exchange reserves from the precariously low level touched in summer of 2013. The official foreign exchange reserves which had declined to a dangerously low level of 6.6 billion at the end of June 2013 steadily increased to 13.5 billion by the end of June 2015 and had risen to 15.2 billion by the end of September 2015.

Equally important, inflationary pressures have abated. The GDP deflator came down to a low of 3.6 per cent in 2014-15, which compares most favorably with the high double digit numbers over the FYs 2008-12. The consumer prices have shown a similar trend showing a modest increase only of 4.5 percent last year.

The present government which has been in power for nearly half its elected term by now, deserves credit for giving priority to economic stabilization, while also outlining policies, that will relieve the major constraints on future growth such as speedy privatization of public enterprises and, pursuing substantial increase in energy investment to eliminate load shedding in the power sector by 2018. The successful implementation of the IMF program so far has increased business confidence at home.

While the general direction of policies especially in terms of privatization initiatives, reduction of power sector subsidies, high priority to energy investments are sound, actual progress in most of these areas has been slow or halting. More generally, it is difficult to say that most economic fundamentals

have improved and revival of strong growth has been assured. The ratio of gross capital formation to GDP estimated at 13.4 percent in 2014-15 remains near the lowest level reached in more than half a century. Both tax revenue ratio and social spending remain struck at low levels. Human development indicators continue to seriously lag behind comparable countries and the quality of public education and public health is reportedly declining. Meanwhile, exports are stagnating and the dependence on imported energy is increasing. It is, thus, not surprising that critics of the state of the economy and government policies abound.³ Economic future is worrying, especially because it is not clear how long and to what extent the windfall gains from lower oil prices will persist. The growing inequality and persistent high levels of poverty remain major concerns.

The challenges for Pakistan to revive sustainable growth to 6-7 percent annually that may generate adequate employment opportunities and reduce poverty remain considerable. However, without high sustained growth, the country cannot even begin to reverse the large and growing gap in per capita income (in purchasing power parity terms) that has developed between Pakistan and other major developing countries during the last quarter century. (see Tables 2.2 and 2.3).

In the remaining part of this chapter, we will first discuss the present state of the economy especially with reference to the implementation of the program with the IMF and then examine and discuss four economic fundamentals that need to be strengthened. The chapter also highlights the key policy and governance improvements that must be made to improve both the trajectory of growth and a fairer sharing of benefits of growth.

Table 2.3
GDP Per Capita Growth Rates
(Percent per annum in purchasing power parity terms in constant 2011 international US)

Country	1990–2014	2008–2014
Bangladesh	3.6	4.7
Brazil	1.7	1.7
China	9.2	8.2
Egypt	2.5	1.3
India	4.9	6.1
Indonesia	3.4	4.3
Malaysia	3.6	2.8
Mexico	1.2	0.7
Nigeria	2.6	3.0
Pakistan	1.9	1.7
Philippines	2.1	3.6
Sri Lanka	4.7	6.4
Thailand	3.3	2.3
Turkey	2.4	2.3
Vietnam	5.5	4.7

Source: World Development Indicators, World Bank. Online version.

Table 2.4
Per Capita GNI in Purchasing Power Parity
(Constant 2011 international US)

Country	1990	2008	2014
Bangladesh	1,301	2,440	3,191
China	1,520	7,924	11,747 ^a
Egypt	5,870	10,055	10,512
India	1,754	3,879	5,497
Indonesia	4,337	7,578	9,788
Malaysia	9,772	19,351	22,762
Nigeria	2,743	4,315	5,166a
Pakistan	3,094	4,270	4,866
Philippines	3,962	6,739	7,915
Sri Lanka	3,316	6,748	9,177a
Thailand	6,263	11,782	13,323
Turkey	10,494	16,264	18,677
Vietnam	1,410	3,965	5,092

Source: World Development Indicators, World Bank. Online version.

^a value for year 2013.

FISCAL POSITION

Reduction of overall fiscal deficits has been one of the key performance criteria under the IMF program and the performance in this regard has been deemed more or less satisfactory though for the 2014-15 target exemption was sought from the IMF Board⁴. As the following table shows the overall fiscal deficit (before grants) which was near the peak of 8 percent of GDP in 2012-13 had been reduced to 5.3 percent of GDP in 2014-15 and is projected to drop to 4.3 5of GDP in 2015-16 (see Table 2.5). The reduction in deficit was due both to reduction expenditures and in improvement in revenues. However, it must be noted that the high budget deficit figure in 2012-13 included the large settlement of entire accumulated circular debt (Rs 480 billion) after the new government assumed office in June 2013. Since then circular debt problem has reemerged. According to the IMF, the circular debt (payables to the power sector entities) stood at Rs 335 billion at the end of June 2015. This suggests that overall reduction in fiscal deficit, allowing for appropriate adjustment for circular debt over the last two years, has been relatively modest but was in economic policy terms, by and large, appropriate in light of stagnant private investment.

It needs to be noted that almost the entire increase in ratio of tax revenues to GDP from 9.9 per cent of GDP in 2012-13 to 11.1 percent of GDP in 2014-15 has come from additional taxation and elimination of tax concessions and exemptions.⁵ Thus tax compliance, enforcement, and broadening the base and outreach of both Sales Tax and Income Tax remain critical issues.

Table 2.5
Fiscal Trends

(As a percentage of GDP)

Indicator	2005/ 06	2006/ 07	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15
Tax revenue	9.8	10.2	10.0	9.2	10.0	9.4	9.9	9.6	10.1	11.0
Total revenue	14.0	14.9	14.3	14.1	14.2	12.5	12.4	13.0	14.3	14.4
Total expenditure	18.2	19.2	21.7	19.3	20.5	19.1	19.1	21.0	19.8	19.7
Current expenditure	14.5	15.8	17.7	15.6	16.3	16.1	15.1	16.0	15.8	16.2
Development expenditure	4.8	4.9	4.0	3.5	4.5	2.8	3.6	3.4	4.5	3.5
Overall deficit	4.2	4.3	7.4	5.2	6.3	6.6	8.5	8.0	5.5	5.3
Revenue deficit	0.5	1.7	3.4	1.5	2.1	3.6	2.7	3.0	1.5	1.8

Source: *Pakistan Fiscal Operations*, various issues, Ministry of Finance.

It is encouraging that, because of reduction of subsidies, the current expenditure has remained fairly stable as a percent of GDP at around 16 percent notwithstanding significant growth in interest payments, defense expenditures and Benazir Income Support. However, because of little improvement in the overall revenue to GDP ratio in 2014-15, the revenue deficit – one of the most inimical features of the fiscal situation – increased from 1.5 percent of GDP in 2013-14 to 1.8 percent of GDP in 2014-15.

Also, on the negative side, the cost of financial improvement has been the relative stagnation in both development and social spending. When this is combined with the failure to tax the elite effectively, one must conclude that fiscal policy is yet to contribute effectively to either strong economic growth or greater equity in the society. This is notwithstanding progress made in elimination of tax concessions and exemptions, moderate reduction in the backlog on GST refund claims and building a monitoring system to track progress and set quarterly objectives on tax policy and administrative initiatives.

BALANCE OF PAYMENTS AND FOREIGN EXCHANGE RESERVES

The foreign exchange reserve position in mid-2013 was precarious. Even though the combined FY12 and FY13 current account balance of payment deficit, after allowing for coalition support payments, at 5.3 billion (1.2 percent of GDP) was relatively moderate, there was a cumulative decline of 8.8 billion in liquid reserves of the State Bank of Pakistan reflecting negative capital outflows, which were principally large repayments to the IMF.⁶ At the end of June 2013 official gross foreign exchange reserves had with the State Bank of Pakistan dropped to a dangerously low level of 6 billion barely enough for 1.4 months of imports (see Table 2.6). As pointed out in the last year's report, the prospect of large payments of nearly 3 billion to the IMF over the 18-month, period from mid-2013 to the end of 2014, was creating uncertainty in the foreign exchange market. The early recourse to the IMF was thus necessary to restore confidence among creditor international financial organizations.

Table 2.6
Major Macroeconomic Indicators

Indicator	2005/ 06	2006/ 07	2007/ 08	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15
GDP growth per annum (%)	5.8	5.5	5.0	0.4	2.6	3.7	4.4	3.6	4.0	4.2
Fiscal deficit (as % of GDP)	4.2	4.3	7.4	5.2	6.3	6.9	8.8	8.3	4.9	5.3
Current account BOP (as % of GDP)	-4.4	-4.8	-8.2	-5.5	-2.2	0.1	-2.1	-1.1	-1.3	-0.8
GDP deflator change (%)	10.5	7.2	12.9	20.7	10.8	19.5	5.7	7.1	6.9	3.6
Consumer price change (%)	7.9	7.8	12	17	10.1	13.7	11.0	7.4	8.6	4.5
Change in net domestic assets of monetary system (%)	12.4	11.3	23.2	12.8	12.7	13.1	20.2	20.8	9.1	11.8
M2 change (%)	14.9	19.3	15.3	9.6	12.5	15.9	14.4	15.9	12.5	13.2
Foreign exchange reserves (US million, end of FY)										
Total	13,122	17456	11,510	12,036	16,750	18,244	15,289	11,020	14,141	18,706
with SBP	10,765	13,345	8,577	9,118	12,958	14,784	10,803	6,008	9,097	13,532
Gross total investment (as % of GDP)	19.3	18.8	19.2	17.5	15.8	14.1	15.1	15.0	15.0	15.1
Gross national savings (as % of GDP)	15.2	14.0	11.0	12.0	13.6	14.2	13.0	13.9	13.7	14.5
Ratios of investment and savings are in current prices: gross capital formation (excluding inventories) as a % of GDP in 2005/06 prices										
	16.6	16.6	17.8	16.5	15.0	13.5	13.3	13.1	13.1	13.4

Source: Annual Report, Monetary Policy Information Compendium July 2015 of State Bank of Pakistan. Pakistan Economic Survey, Pakistan Fiscal Operation of Ministry of Finance. Eight Review of Pakistani Economy, September 2015, IMF.

According to the IMF definition⁷, net reserves were negative to the tune of 2.5 billion in mid-2013. Buildup of official reserves was, therefore, an important objective of the program agreed with the IMF: initial IMF performance criteria required attainment of positive net reserves of 2.5 billion by the end of June 2014. It is to the credit of the government that it recognized early the confidence building importance of strong foreign exchange reserve position and pursued the periodical goals set by the IMF most seriously and has regularly exceeded them. The gross foreign exchange reserves had risen to over 13.5 billion by the end of June 2015 (equal to 3.4 months of imports) and IMF net reserves target of 6.75 billion was exceeded by a considerable margin.

What are the factors that have contributed to an impressive growth in reserves? Certainly the sharp drop in oil import bill of 3.2 billion in 2014-15 helped by reducing the current account bop deficit to only 0.5 per cent of GDP. Also, Nawaz Sharif Government moved aggressively fairly early to mobilize external resources. It raised 2 billion through Euro Bonds in April—admittedly at a rather high interest

rate; ten-year bond would earn an interest rate of 8.25 per cent per annum compared with the US ten-year treasury bill rate of around 2 percent per annum. It mobilized large sums of money from international financial institutions especially the World Bank. Another 1 billion was raised through Sukuk Bonds. A Saudi grant of 1.5 billion has also helped. All in all, net capital inflows during FYs 14 and 15 have amounted to about 15 billion compared to a meagre 2.2 billion in the previous two years. The net inflow of 1 billion from IMF in the two years compared to net repayment to IMF of 3.7 billion in the previous two years has added to the comfortable liquidity position.

Some underlying trends in the current account balance of payments are, however, worrying. As mentioned above, exports are stagnating and have fallen far short of IMF projections made in September 2013. To an extent, the leveling of exports has been compensated by a significant rise in worker remittances. On the other hand, net income payments have risen strongly from 3.7 billion in 2012-13 to 4.5 billion in 2014-15, substantially more than projected earlier. The rise in net income payments is hardly surprising because it is directly related to the increase in net foreign liabilities position of Pakistan which worsened from a negative 63.8 billion at the end of 2012 to a negative 74.7 billion at the end of 2014, notwithstanding strong growth in foreign exchange reserves. The following table compares developments in merchandise exports, worker remittances and net investment income payments in recent years with IMF projections made in the summer of 2013 (see Table 2.7).

	Actual 2012-13	IMF Projection 2013-14	IMF Projection 2014-15	Actual 2013-14	Actual 2014-15
Merchandise Exports	24.8	27.6	29.1	25.1	24.4
Worker Remittances	13.9	14.2	15.0	15.8	17.9
Net Investment Income	-3.7	-3.2	-3.2	-3.9	-4.5

Source: IMF

The country clearly needs to strengthen to its capacity to service its foreign debt and other foreign exchange obligations. It should not automatically assume either a continuing strong growth in worker remittances or an indefinite period of low oil prices. It also needs to be noted that the effective withdrawal of NATO forces from Afghanistan is a clear negative for Pakistan's external payments situation, the large spending by coalition forces had a clear spillover effect on Pakistan's foreign exchange earnings.

A strong expansion of exports has, thus, become even more urgent to provide a cushion against negative external shocks. Unfortunately, the competitiveness of Pakistan's exports is suffering because a significant appreciation of the real effective exchange which, at the same time, has cheapened all imports including oil imports unduly. IMF had assumed a depreciation of the real exchange rate during the course of 2013-14, but in fact the rate appreciated sharply. Between the end

of 2013 and the end of June 2015, real effective exchange (REER) had appreciated by over 20 per cent seriously hurting Pakistan's competitiveness and encouraging imports.⁸ Despite its concerns, the IMF has not made a major issue of the exchange rate policy. The June 2015 review has only a cryptic sentence, "Staff noted that further accumulation of (foreign exchange) could also help arrest the recent upward trend in the REER, which was inconsistent with fundamentals, although the Staff also agreed with the authorities that a range of other issues would need to be addressed to more fundamentally address competitiveness issues (including electricity shortages, security issues and the business environment)" (IMF, 2015).

Because of recent global developments, (including the small devaluation of Chinese currency Yuan), the currencies of key developing countries have shown a notable decline in relation to the US dollar, which has gained strength because of relative robustness of the US economy. It is instructive to compare the change in nominal exchange rate of Pakistan Rupee with the currencies of some other developing countries, vis a vis US dollar in the last nine months.

The Table 2.8 below shows that rupee has depreciated in relation to the US by about 4 percent since the end of 2014. However, all other currencies (including Indian Rupee), with the small exception of Chinese Yuan, have depreciated to a greater extent and a few have lost their value in relation to the US within a range of 15-30. Thus it is not surprising that in terms of REER, Pakistani Rupee has appreciated very substantially since mid-2013, and it is seriously hurting competitiveness.

Table 2.8
Exchange Rates v/s US

Currency	End December, 2014	September, 24, 2015
Chinese Yuan	6.2	6.4
Indian Rupee	63.3	66.2
Indonesian Rupiah	12405.7	14627.5
Malaysian Ringgit	3.5	4.4
Mexican Peso	14.7	17.1
Pakistani Rupee	100.6	104.4
Philippines Peso	44.7	46.9
Sri Lankan Rupee	131.2	140.5
South Korean Won	1097.3	1192.1
Taiwanese New Dollar	31.7	33.0
Thai Bhat	32.9	38.2
Turkish Lira	2.32	3.0
Euro	0.826	0.895

Source: World Bank Database, World Bank.

INFLATION AND MONETARY POLICY

An important and encouraging feature of the economic situation was the sharp drop in the rate of inflation in 2014-15: real GDP deflator and consumer prices both showed a modest increase of 7.8 and 4.5 percent – a record low level in fifteen years. The sharp drop in the international oil prices, and a downward trend in the world commodity prices was a major factor in the reduced inflationary pressures though the reduction in the rate of monetary expansion also contributed to the result. Broad money expansion, which had averaged 15 percent per annum during the three years FYs 2011 to 2013, came down to a little over 12 percent per annum in the last two years. This was despite the fact that net foreign assets that had registered a decline in Pakistan Rupee in terms of over Rs 500 billion over the two years FYs (2012 and 2013) – thus offsetting a part of domestic credit creation of nearly Rs 1875 billion – increased by nearly Rs 700 billion over last two fiscal years (FYs 2014 and 2015). This was mainly a reflection of a sharp drop in the rate of domestic credit creation from 45 percent in the two years (FYs 2012 and 2013) to 21 percent in the two years (FYs 2014 and 2015).

The recent fall in the rate of domestic credit creation was the result of both a sharp moderation in government net borrowing from the banking system and relatively slow growth in credit to the private sector. Indeed, private sector credit has grown slowly since 2009-10. The increase in private sector credit growth over the last five years has averaged less than 6 percent per annum while GDP in nominal terms has expanded at an average annual rate of 13 percent. Thus in real terms private credit declined by 13 percent over this period in contrast to the growth of over 20 percent in GDP. The decline in real credit appears to be related to stagnation in domestic investment levels as well as the high level of government borrowing from the banking system, which far outstrips the level of private sector credit. Even though the growth in new government borrowing has come down in recent years; many commercial banks still find lending to government as a safer and more profitable alternative. The decline in private sector credit should be a cause of concern and an integrated effort to revive both investment and credit should priority of economic policy. The sharp decline in the rate of inflation should encourage a further reduction in interest rates.

ENERGY SECTOR: ISSUES OF POLICIES AND POLICY IMPLEMENTATION

Pakistan is now in the eighth year of energy crisis. Relentless load-shedding in the power sector remains a significant constraint on economic growth and continues to cause wide spread hardship among consumers.

- The National Power Policy (NPP), formulated by the new government in 2013 identified four major problems in the power sector:
- A yawning supply-demand gap of up to 4,500 – 5,500MW leading to load-shedding of 12-16 hours across the country.
- Highly expensive generation of electricity (~Rs 12 / unit) due to an increased dependence on expensive thermal fuel sources (44% of total generation).

- A terribly inefficient power transmission and distribution system that currently records losses of 23-25% due to poor infrastructure, mismanagement, and theft of electricity.
- Inefficiencies, theft, and high cost of generation are resulting in debilitating levels of subsidies and circular debt.

NPP Set the Following Targets:

- Decrease supply demand gap from 4500 - 5000MW today to 0 by 2017
- Decrease cost of generation from 12c / unit today to ~10c / unit by 2017
- Decrease transmission and distribution losses from ~23-25% to ~16% by 2017
- Increase collection from ~85% to 95% by 2017.
- Improve governance by reducing the decision making and processing time at the Ministry, related departments and regulators

Half way towards the target date, it is clear that the progress towards reducing load shedding and decreasing transmission and distribution losses has been limited. Load shedding again reached the peak of 55 percent in the summer of 2015 and the target of eliminating load shedding has been moved to 2018. According to the national accounts data, electricity generation and distribution and gas distribution did expand by nearly eight percent in the last two years but fell somewhat short of growth in GDP; thus, energy shortages have persisted.

Overall transmission and distribution losses remain high though technical losses were reduced from 18.5 per cent in 2013-14 to 17.6 percent. The result is that despite significant increases in power tariffs the system does not cover costs and the problem of arrears leading to circular debt remains. Also, despite large drop in oil prices, budgetary subsidies remain significant.⁹

Governance and finance problems have greatly affected the progress of completion of electricity generation projects notably Nandipur Thermal Project¹⁰ with a capacity of 425MW and the large hydro Neelum Jhelum Project with a capacity of 969MW. The cost overruns have been huge and the delays have been seriously compounded by reported corruption and mismanagement.

The original cost of Nandipur Power Project was estimated at Rs 23 billion (74 million) but had escalated to Rs 57 billion and reportedly may have reached Rs 84 billion. The project has had problems due to mismanagement, design issues and inappropriate fuel.¹¹ It has become recently operational.

Neelum Jhelum Hydro Project was started in 2008. Under the previous administration the project cost had increased from 1.8 billion to 2.7 billion but reportedly has now increased to 4.2 billion. Earlier, the project was expected to be completed by October 2015 but now the deadline has been revised to the end of November 2016. The worrying point is the project has not yet achieved financial

closure. There appears to be a total financial gap of Rs 200 billion of which roughly one-fifth or 43 million is in foreign exchange. Of more concern is the recent statement attributed to the Minister of Petroleum and Natural Resources that because of the cost overruns this hydro project is costlier than gas- powered production and over 20 years even nuclear is better.¹²

Serious implementation problems have also plagued the induction of imported LNG. Even though the terminal for LNG gas imports was completed more or less on time and the first shipment of 147000 cubic feet of gas from Qatar arrived in March 2015, there continue to be hurdles in the utilization of LNG because agreements on prices and financial commitments with the various energy entities were not completed in time. The Ministry of Petroleum and Ministry of Power seem to be at loggerheads and the Finance Ministry is not willing to underwrite long term financial commitments. Because the LNG is being imported on a spot prices basis and without a long term contract, a few energy entities notably Sui Northern and Sui Southern have refused to accept the gas with open ended financial commitment – a couple of chief executives preferred to resign rather than accepting the government's open ended terms.

Because the import cost of LNG, including transportation, general sales tax, and utility losses presently at around 11.50 per million British thermal units (BMMBTU), is a lot higher than the cost of domestic gas of around 4 per MMBTU, users accustomed to domestic gas are reluctant to shift source of supply. Domestic gas pricing thus remains a major issue, and perhaps a logical step, is to develop a weighted average formula. In any case, the price, quantity and expiration date of agreements are issues yet to be sorted out.

OUTLOOK FOR POWER GENERATION

Apart from implementation and governance problems related to the ongoing projects, there have been quite significant shifts in the strategy. The initial plan for large imported coal based Gaddani project in Karachi appears to have been essentially shelved. Similarly plans for a large number of coal projects in Punjab have been scaled back. Much more emphasis is being placed on imported gas. These decisions, though correct, have slowed the speed of overall rate of expansion of power generation.

Still, though load shedding is likely to persist for a few more years, the prospects of eliminating power shortages and having reasonably comfortable supplies of power over the next decade, appear good provided financing constraints do not develop and implementation plans proceed smoothly.

Among hydro-electric projects, apart from Neelum- Jhelum, completion of Tarbela IV with the capacity of 1411MW is expected by June 2017. Feasibility of Tarbela V Extension, with roughly 1400MW capacity is nearly complete and project if started could be completed in three to four years.

Work has also begun on a large run of the river power station at Dasu on the Indus River. This Dam, that will support a 4320MW hydro-electric station, will be built in two 2160MW stages. The first stage will cost US 4.3 billion and could be completed by 2022. The World Bank has approved 700 million for the project. As reported by the press, additional funding is being provided by the Industrial and Commercial Bank of China (US1.5 billion), Deutsche Bank (US1 billion) and the Aga Khan Development Network (US500 million).

Among notable coal projects already under construction are 600MW Jamshoro Coal Power project financed partly by IDB and ADB with a total cost of 1.5 billion, 1320MW Port Qasim Coal Project a joint venture of China's Power China and Qatar's Al-Mirqab Group, and Punjab's first coal project at Sahiwal, also with 1320MW capacity. In addition, plans for a large 1320MW Thar coal project are also fairly advanced.

Five Regasified Liquefied Natural Gas(RLNG)- projects are also planned of which the contract of one at Jhang, with 100MW capacity, has been awarded to a consortium comprising Power Construction Corporation of China and Al-Qavi, which was declared the lowest bidder for Rs 82 billion on August 2015.

Finally, Chashma 3 and 4 nuclear power plants with a total capacity of 600MW, situated at Mianwali Nuclear Complex, are expected to be completed within the next two years. There are also plans to add two nuclear power stations each with a capacity of 1100MW in the near future.

Meanwhile, plans for importing 1000MW energy to Pakistan from Tajikstan and other central Asian countries under CASA 1000 project are proceeding with the help of World Bank financing. The project is scheduled to be completed by the middle of 2017 but delays are likely to occur.

The above discussion suggests that the pipeline for new power generation projects is quite rich and the availability of adequate electric power over the next decade should not pose a serious problem provided financing and implementation issues are handled carefully and in a timely fashion.

However, there is an urgent need for developing a framework of demand and supply of electricity for the next two decades in order to determine the relative priorities, finance requirements, and appropriate phasing of various projects under construction or planned. The Rupee requirements for the public sector energy projects are likely to be huge and care needs to be taken that, at the margin, energy needs do not unduly squeeze other development programs. The huge reliance on imported energy and large foreign funding for energy projects especially from China, will inevitably place a heavy burden on the balance of payments just as the induction of IPPs into the power sector a couple of decades ago has had serious consequences for our foreign exchange position. The macro-economic scenarios must be developed and tested on various alternative content and speed of energy sector investments. This requires, above all, strong co-ordination and informed decision making arrangements. Such mechanisms do not exist at present.

With proper management, the sharp increase in power generation and availability during 2018 -25 will be assured. This will be in sharp contrast to the horrendous problems caused by extensive load shedding for nearly a decade. However, this welcome prospect should not obscure a number of critical issues that remain in the energy sector and have either not been tackled resolutely or have not yet been appreciated sufficiently. Some of these were discussed in last year's report in the chapter titled "The Energy Crisis: Dimensions, Roots, and Major Policy Shifts Required."

In the light of recent and prospective developments four policy areas need special attention.

First, the experience during the last year has again highlighted the need of a comprehensive energy policy which broadens the National Power Policy to include the issues of gas production, import, allocation and prices. A root cause of Pakistan's energy problem has been mispricing of gas and excessive implicit subsidy and priority for the use of gas in the household sector. As the State Bank of Pakistan's Annual Report 2012-13 pointed out, this led to waste, over consumption and under production. According to SBP, in 2011-12 household consumed 5.4 million tons of oil equivalent (TOE). This was 72 percent higher than the amount of energy that the households consumed in the same year.

Now that LNG is being imported at a multiple of the cost of domestic gas, the issues of appropriate gas pricing cannot be avoided and this can only be done in the context of a comprehensive energy strategy.

Secondly, the cost of electricity will not come down and the burden of direct or indirect subsidies on the budget will remain high if the efficiencies in transmission and distribution do not improve, and technical line losses as well as theft remain high. Sadly, progress towards improving internal efficiency of distribution companies and their eventual privatization has been slow. These processes need to be speeded up.

Third, the need for close and effective monitoring of implementation of both projects and policies is most urgently needed. Ideally, there should be a Ministry of Energy which helps to formulate and implement an overall energy policy. If for political reasons it is not possible to create an energy ministry, a cabinet committee, supported by independent high level staff in the Prime Minister's Secretariat, should be established to monitor and oversee the implementation of overall energy policy.

Fourth, there is not much awareness either at the policy level or the national level, that most of the policy initiatives taken so far will further increase Pakistan's import dependence on energy. Imports of LNG, coal, electricity from Central Asia, and foreign investment from China and other countries in energy projects will greatly enlarge foreign exchange bill and increase the burden on balance of payments especially if exports do not revive strongly. It will be good to recall the significant foreign exchange costs that are still being incurred for the large investment made by IPPs a generation ago. In the short- run not much can be done to reduce energy dependence except to redouble efforts

to expand exports. However, the concern is that at present there are no firm plans for a large hydro-electric dam like Bhasha Daimer Dam that will begin to provide large amount of water and power at low cost in twelve to fifteen years once started in earnest. If the immediate energy sector needs and the ambitious plans for China Pakistan Economic Corridor (CPEC) squeeze out finances for Bhasha – as it could happen – Pakistan’s dependence on imported energy will continue to grow even beyond a decade. We are basing this conclusion on the fact that CPEC package of assistance from China totaling an overall investment of 45 billion over a period till 2030 does not explicitly mention Basha’s development. While energy has been allocated 33.8 billion and transport infrastructure 10.6 billion, most of the expenditure in the next three years will probably be concentrated on infrastructure projects because they are expected to be completed by 2017-18. See the cautionary note in Box 2.1 from IMF September 2015 Paper P.7. highlighting some risks and macro-financial implications of CPEC.

Basha is important, indeed critical, not only for hydro power but for mitigating the water shortages that are developing.¹³

Box 2.1
Macro-Financial Implications of the China–Pakistan Economic Corridor (CPEC)

The China-Pakistan Economic Corridor (CPEC) will initially connect Western China (Kashgar) with the south of Pakistan (the port of Gwadar) through a series of infrastructure and energy projects. The initial prioritized pipeline of investments under CPEC envisages an overall investment of US\$45 billion in energy (US\$33.8 billion) and transport infrastructure (US\$10.6 billion). The CPEC, as it develops, would cover the period until 2030 and will be reviewed as it progresses for investments beyond 2030. All transport infrastructure projects are expected to be completed by 2017–18. Priority projects in the energy sector, which will create Independent Power Producers (IPPs), are scheduled to add about 10 GW of capacity by 2017–18 (by 2020 for hydro projects) while a further set of actively promoted projects is planned to add another 6.5 GW of capacity in due course.

Financing modalities for energy and infrastructure projects differ. Transport infrastructure projects will exclusively be financed by government-to-government longer-term loans on concessional terms. They will be executed within the overall envelope of the public sector development program. Energy-related projects will be FDI, financed by commercial loans from Chinese financial institutions to Chinese investors, who, in collaboration with Pakistani partners, will undertake construction of all projects. The government of Pakistan will guarantee IPPs’ energy sales through Power Purchase Agreements (PPAs) at pre-determined tariffs by NEPRA. Final implementation of all projects will be contracted to Chinese suppliers who will import the necessary machinery as well as part of the manpower and raw materials.

CPEC has the potential to raise productivity and growth as long as the projects are well-managed and potential risks are mitigated. Any demand-driven economic expansion as a result of project implementation is expected to be limited as increased investment may initially be offset by a significant increase in imports as Chinese contractors are expected to import a large share of the required machinery and raw materials. However, supply-side effects facilitated by higher power generation capacity (including through FDI) and better infrastructure, will be beneficial for economic growth in the medium term. To reap the full benefits, risks will need to be well-managed. This requires sound practices in the evaluation, prioritization, and implementation of public investment projects, along with strong procurement and public financial management systems. PPAs need to be agreed in a way that mitigates potential fiscal risks, and to prioritize infrastructure project execution such that they remain within an overall fiscal envelope aimed at gradual debt reduction.

DISTRIBUTION OF GROWTH BENEFITS

Historically, Pakistan has had less skewed income distribution and lower incidence of poverty than many countries including notably China, India, and Bangladesh. The following Table 2.9 provides information on some selected variables such as income shares of households and poverty incidence, according to PPP data on two measures of poverty internationally compared by the World Bank.

Indicator	Bangladesh 2010	China 2010	India 2011	Pakistan 2010	Philippines 2012
Income share held by highest 20%	41.4	47.1	44.2	39.5	49.6
Income share held by third 20%	16.0	15.3	15.2	16.5	13.8
Income share held by lowest 10%	3.9	1.7	3.5	4.2	2.5
Poverty headcount ratio at national poverty lines (% of population)	31.5	-	21.9	-	25.2
Poverty headcount ratio at 1.90 a day (2011 PPP) (% of population)	43.7	11.2	21.3	8.3	13.1
Poverty headcount ratio at 3.10 a day (2011 PPP) (% of population)	77.6	27.2	58.0	45.0	37.6

Source: World Development Indicators, World Bank. Online version.

The figures in the above table suggest that at least till a few years ago, Pakistan's income distribution was more equal and its poverty incidence lower than some key comparable countries. However, the high growth rates attained by India and China in the last five years would suggest that at least the poverty incidence has declined significantly in these two countries.

Data on recent income distribution trends in Pakistan is not available but partial data on returns to capital and labor and relative low taxation of high income households confirm the general impression that income distribution has worsened, especially as economic growth has slowed down. The continued spectacular gains in the real estate and stock market have largely benefitted the well to do while real wages have tended to decline since 2008 as growth slowed down sharply.

Limited nominal wage rate data for major cities is available from Pakistan Bureau of Statistics. Table 2.10 presents this data for the period since 2000 adjusted for constant 2007-8 prices. The data shows that real wages for unskilled labor had a substantial gain of 50 percent over 2003-08, then declined over 2008-11, had recovered most, but not all, of the loss by 2013-14. The real wages of carpenters

and masons have followed roughly the same pattern except that their wages remain well below the peak in 2007-2008. It should be noted that real wages in Karachi have remained depressed since 2010 and are currently below the level of a decade ago presumably because of unsettled security situation and slow growth in the city's economy.

Table 2.10
Real Wages at Constant Prices of 2007-08

(Rupees per day)

	1999/2000	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	ACGR (%)
Carpenter																
Islamabad	381	375	362	391	486	547	570	617	630	543	506	469	477	516	527	2.4
Karachi	509	486	480	517	495	505	509	529	604	521	467	432	431	401	418	-1.4
Lahore	457	438	423	410	424	444	457	456	553	458	453	417	420	391	412	-0.7
Peshawar	348	375	362	352	374	376	390	441	512	435	389	347	374	382	391	0.8
Quetta	435	417	403	391	411	376	507	588	630	521	506	472	461	516	475	0.6
Mason (Raj)																
Islamabad	381	375	362	391	486	547	570	617	630	543	506	468	477	516	527	2.4
Karachi	509	486	480	472	495	479	509	529	656	565	506	452	492	458	454	-0.8
Lahore	457	438	423	410	475	520	531	577	585	484	458	422	424	395	436	-0.3
Peshawar	348	375	362	352	411	444	412	529	525	442	447	395	451	487	475	2.2
Quetta	435	417	403	391	411	376	507	529	630	521	583	558	554	630	580	2.1
Labor (Unskilled)																
Islamabad	209	200	193	203	239	273	317	323	315	282	272	265	277	301	316	3.0
Karachi	303	294	293	286	314	314	348	353	367	326	292	280	308	286	280	-0.6
Lahore	252	242	234	227	250	273	301	294	315	261	292	266	292	272	316	1.6
Peshawar	139	150	145	141	199	205	222	235	245	239	233	211	246	267	255	4.4
Quetta	174	167	185	174	224	253	317	353	315	261	272	272	261	315	290	3.7
Average of the Cities																
Carpenter	426	420	406	412	438	450	487	526	586	496	464	428	432	441	445	0.3
Mason (Raj)	426	420	406	403	455	473	506	556	605	511	500	459	480	497	495	1.1
Labor (Unskilled)	216	212	210	206	245	264	301	312	311	274	272	259	277	288	292	2.2

Source: Calculated using numbers of Pakistan Bureau of Statistics.

Note that the nominal wages are converted to real wages using the Consumer Price Index at 2007-08 prices.

It would, thus, not be surprising if poverty incidence has risen in recent years. Indeed the estimates of poverty incidence prepared by Social Policy and Development Centre show a significant increase in the incidence of poverty between 2004-05 and 2011-12.¹⁴

LOOKING AHEAD

The above discussion clearly brings out that while economy has improved in some respects, the need for reviving sustained growth to 6-7 percent per annum remains paramount to generate sufficient employment, reverse growing poverty and to regain our position among the dynamic economies in the world. The present government fully realizes this need, and under Pakistan Vision-2025, has set very ambitious goals for economic growth, exports, savings and investment, taxation, human development and governance. The Vision aims that economy will grow by 8 percent per annum

over 2018-2025 and exports will increase from the current US 25 million to 150 billion by 2025. It is estimated that to accomplish these targets, tax to GDP ratio (at present 11 percent of GDP) will have to rise to 16-18 percent of GDP by 2025, and the investment rate (presently around 15 percent) increased to a range of 22-25 percent of GDP financed from domestic savings of 18-21 percent of GDP and a robust inflow of foreign savings of 3-4 percent per annum.

It is evident that these goals while worth pursuing are extremely ambitious. The main problem is that neither the government nor the general public realizes that even approximating the achievement of most of these goals require political will and national effort that has been missing in the past. A major break with the past path and pattern of growth is needed but requires, first of all, a frank recognition that economic fundamentals in Pakistan remain weak.

No doubt, the economic situation has improved in several aspects compared with the dismal record of 2008-13 when GDP growth (a little over 3 percent per annum) was the slowest for any five-year period during the last half century. It is worth stressing, however, that the poor economic performance during these five years was the result not only of poor governance, especially increased corruption, but also of structural weaknesses in the economy that have persisted for decades; chief among them have been inability to expand tax to GDP ratio, a low domestic savings rate, a rent seeking culture that pervades an otherwise vibrant private sector, neglect of export opportunities and last but not least a steady decline in institutional capacity.

Unfortunately, the above mentioned economic fundamentals, including the serious lags in human development, have shown little improvement over decades and remain the basic cause of our relative backwardness. It is still not clear whether the present government fully appreciates the immensity of the task involved in making Pakistan Vision-2025 even a near reality.

FOUR WEAK ECONOMIC FUNDAMENTALS

In the remaining part of the chapter, we will attempt to outline the weaknesses in four economic fundamentals, exports, savings and investment, human development and governance that have continued to impede economic and social progress in Pakistan over long period. The purpose is not so much to dwell on policies that can ensure progress - that have been the subject of several past reports- -but principally to highlight how much ground we have lost in relation to comparators and how much recovery we need to make. To recognize where we are and how we got there should be an important first step in pursuing far more ambitious but necessary goals for the future.

Exports: A Critical Issue

A persistent and major theme in all our previous reports (starting in 2008) has been the urgent need to strongly expand country's exports. It has been frequently pointed out that during the last half century Pakistan has missed numerous opportunities to expand exports especially manufactured

goods exports that have been the strong engine of growth in the global economy.¹⁵ “Over decades there has been no clear vision about Pakistan’s economic future, no real commitment to export – oriented growth, and no learning of lessons from what was happening in the outside world. It is worth noting that there has been no significant case of rapid growth in the last half century that did not fully exploit the opportunities offered by growing international trade.”¹⁷

Table 2.11 shows that manufactured exports from sixteen major countries, outside USA, Canada, Europe and Japan, expanded from 393 billion in 1990 to 5,021 billion in 2014 and their collective share in world manufactured exports increased sharply from 16.5 per cent to 41 percent over the period.

	Exports (US Billion)				Market Share (%)				ACGR (%)
	1990	2000	2010	2014	1990	2000	2010	2014	
Bangladesh	1.2	5.9	17.9	28.1	0.05	0.13	0.18	0.23	14.0
Brazil	16.1	31.7	70.4	74.9	0.67	0.67	0.70	0.61	6.6
China	44.3	219.9	1,476.5	2,201.6	1.85	4.69	14.78	17.98	17.7
Hong Kong	75.6	192.5	373.2	454.4	3.16	4.10	3.73	3.71	7.8
India	12.5	32.9	138.0	200.4	0.52	0.70	1.38	1.64	12.2
Indonesia	9.0	36.9	58.4	71.0	0.38	0.79	0.58	0.58	9.0
Korea	60.6	154.9	411.5	494.7	2.53	3.30	4.12	4.04	9.1
Malaysia	15.8	78.9	133.2	144.2	0.66	1.68	1.33	1.18	9.6
Mexico	25.3	138.6	222.3	309.1	1.06	2.96	2.23	2.52	11.0
Pakistan	4.4	7.6	15.9	18.5	0.18	0.16	0.16	0.15	6.2
Philippines	5.6	34.8	43.8	48.6	0.23	0.74	0.44	0.40	9.4
Singapore	37.5	117.7	254.2	290.7	1.57	2.51	2.54	2.37	8.9
Taiwan	62.1	141.4	244.8	283.0	2.60	3.02	2.45	2.31	6.5
Thailand	14.6	51.7	141.5	170.0	0.61	1.10	1.42	1.39	10.8
Turkey	8.8	22.3	88.5	121.0	0.37	0.48	0.89	0.99	11.6
Vietnam	-	6.2	46.2	111.1	-	0.13	0.46	0.91	22.9
Total of the above Countries	393	1,274	3,736	5,021	16.5	27.2	37.4	41.0	11.2
World Exports	2,391	4,690	9,992	12,243	100.0	100.0	100.0	100.0	7.0

Source: WTO statistical tables, WTO. Online version.

The rise in manufactured goods exports from China has been phenomenal; they rose from 44 billion to 2,201 billion and their share in the world manufactured goods exports rose from 1.9 percent in 1990 to an astounding 18 percent in 2014. However, the share of the other countries also rose from less than 15 percent to 23 percent over the period. Pakistan’s share actually fell from 0.18 percent in 1990 to 0.15 percent over the period. In sharp contrast, India’s share in the world manufactured exports increased from 0.5 percent in 1990 to 1.6 percent in 2014.

The biggest failure in exports has been the inability to develop a wide range of exports of manufactured goods other than textiles and clothing – the most dynamic element in the international trade. Excluding exports of textiles and clothing, Pakistan’s other manufactured exports were only 4.4 billion in 2014 having risen from 0.7 billion in 1990 – a six-fold rise. Over the same period, countries listed in Table 2.11 expanded their manufactured exports (excluding textiles and clothing) sixteen fold to 4500 billion. Meanwhile, comparable exports from India had expanded eighteen fold to 183 billion. Vietnam and Turkey made even bigger strides in the field.

Table 2.12
World Textile Exports and Major Developing Countries’ Market Share

	Exports (US Billion)				Market Share (%)				ACGR (%)
	1990	2000	2010	2014	1990	2000	2010	2014	
Bangladesh	0.3	0.4	1.3	2.4	0.33	0.25	0.50	0.75	8.4
Brazil	0.8	0.9	1.1	0.9	0.74	0.58	0.43	0.28	0.6
China	7.2	16.1	76.9	111.7	6.92	10.42	30.45	35.55	12.1
Hong Kong	8.2	13.4	11.3	9.8	7.87	8.68	4.48	3.12	0.7
India	2.2	5.6	12.8	18.3	2.09	3.61	5.08	5.84	9.3
Indonesia	1.2	3.5	4.1	4.7	1.19	2.26	1.64	1.50	5.7
Korea	6.1	12.7	11.0	11.9	5.82	8.21	4.34	3.79	2.8
Malaysia	0.3	1.3	1.7	1.9	0.33	0.82	0.66	0.60	7.4
Mexico	0.7	2.6	1.9	2.5	0.68	1.66	0.76	0.81	5.5
Pakistan	2.7	4.5	7.8	9.1	2.55	2.93	3.11	2.89	5.2
Philippines	0.1	0.3	0.2	0.3	0.13	0.19	0.07	0.08	2.7
Singapore	0.9	0.9	0.8	0.9	0.87	0.59	0.32	0.28	-0.1
Taiwan	1.0	1.0	1.2	1.4	0.97	0.63	0.47	0.44	1.3
Thailand	0.9	2.0	3.8	3.9	0.89	1.26	1.49	1.24	6.2
Turkey	1.4	3.7	9.0	12.5	1.38	2.37	3.55	3.99	9.4
Vietnam	-	0.3	3.1	5.3	-	0.19	1.21	1.67	22.7
Total of the above Countries	34	69	148	197	32.8	44.7	58.6	62.8	7.6
World Exports	104	155	252	314	100.0	100.0	100.0	100.0	4.7

Source: WTO statistical tables, WTO. UNCTAD Database. Online version.

Pakistan’s stagnant- and nearly declining- share in the world manufactured exports is the result of many factors noted above. Lack of diversification of Pakistan’s manufactured exports, and continued heavy dependent on textiles exports¹⁹, which have grown more slowly in the world trade, is often rightly mentioned as a factor that has hampered Pakistan’s export expansion. Pakistan has badly failed in exploiting its export industries that existed in Sialkot and Gujranwala even at partition and failing to enter new fields such as electronics and information technology.

The interesting point is that Pakistan has not been able to exploit opportunities offered by major shifts in the international textile trade caused by slowing down of exports of textiles from developed

countries over the last quarter century. Table 2.13 suggests that there has been a sharp drop in the share of the developed countries notably USA, Canada European countries and Japan in the world textile exports over the last quarter century. During this period the real growth in textiles exports from Korea and Hong Kong also appears to have been negative, and their market shares also declined. Most of this market share has been captured by China. Pakistan has lost ground in textiles not only to China but also to India, Turkey, Bangladesh, and the new comer Vietnam. This is on top of having missed almost all opportunities for developing other manufacturing exports over the last three decades.

Table 2.13
World Clothing Exports and Major Developing Countries' Market Share

	Exports (US Billion)				Market Share (%)				ACGR (%)
	1990	2000	2010	2014	1990	2000	2010	2014	
Bangladesh	0.6	5.1	14.9	24.6	0.59	2.56	4.19	5.09	16.4
Brazil	0.2	0.3	0.2	0.2	0.23	0.14	0.04	0.03	-1.8
China	9.7	36.1	129.8	186.6	8.94	18.22	36.62	38.61	13.1
Hong Kong	15.4	24.2	24.0	20.5	14.25	12.23	6.78	4.24	1.2
India	2.5	6.0	11.2	17.7	2.34	3.01	3.17	3.67	8.5
Indonesia	1.6	4.7	6.8	7.7	1.52	2.39	1.92	1.59	6.6
Korea	7.9	5.0	1.6	2.2	7.29	2.54	0.45	0.47	-5.1
Malaysia	1.3	2.3	3.9	4.8	1.22	1.14	1.09	0.99	5.5
Mexico	0.6	8.6	4.4	4.6	0.54	4.36	1.23	0.96	9.0
Pakistan	1.0	2.1	3.9	5.0	0.94	1.08	1.11	1.03	6.9
Philippines	1.7	2.5	1.8	1.8	1.60	1.28	0.50	0.38	0.3
Singapore	1.6	1.8	1.1	1.3	1.47	0.92	0.30	0.28	-0.7
Taiwan	15.1	14.9	10.7	11.4	13.97	7.53	3.02	2.36	-1.2
Thailand	2.8	3.8	4.3	4.1	2.61	1.90	1.21	0.85	1.6
Turkey	3.3	6.5	12.8	16.7	3.08	3.30	3.60	3.45	6.9
Vietnam	-	1.8	10.4	19.5	-	0.92	2.93	4.04	18.5
Total of the above Countries	66	126	242	329	60.6	63.5	68.2	68.0	7.0
World Exports	108	198	354	483	100.0	100.0	100.0	100.0	6.4

Source: WTO statistical tables, WTO. UNCTAD Database. Online versions.

Clothing exports from Pakistan have expanded more strongly than textile exports; however, in their rate of expansion, Pakistan has lagged far behind not only China but also Vietnam, Bangladesh, Mexico and India.

There appears to be a belated recognition in policy circles that a strong expansion in exports is critical for achieving high sustained economic growth. As mentioned earlier, Pakistan's Vision 2025 aims for an increase in exports from the current 25 billion to 150 billion by 2025. This seems like an unrealistic target. However, Pakistan should strive strongly for quadrupling exports to 100 billion

over the next decade. Even this will require a real average annual growth rate of 12-13 percent. The urgent need is to develop a strategy and a plan to achieve a lofty export goal which at present does not exist.

Table 2.14
World Textile & Clothing Exports and Major Developing Countries' Market Share

	Exports (US Billion)				Market Share (%)				ACGR (%)
	1990	2000	2010	2014	1990	2000	2010	2014	
Bangladesh	1.0	5.5	16.1	26.9	0.46	1.55	2.66	3.38	14.8
Brazil	1.0	1.2	1.2	1.0	0.48	0.33	0.21	0.13	0.1
China	16.9	52.2	206.7	298.3	7.95	14.80	34.05	37.41	12.7
Hong Kong	23.6	37.7	35.4	30.3	11.12	10.68	5.83	3.80	1.0
India	4.7	11.6	24.1	36.1	2.22	3.28	3.96	4.53	8.9
Indonesia	2.9	8.2	11.0	12.4	1.36	2.34	1.81	1.55	6.3
Korea	14.0	17.7	12.6	14.2	6.57	5.03	2.07	1.78	0.1
Malaysia	1.7	3.5	5.6	6.7	0.78	1.00	0.91	0.84	6.0
Mexico	1.3	11.2	6.3	7.2	0.61	3.18	1.04	0.90	7.4
Pakistan	3.7	6.7	11.8	14.1	1.73	1.89	1.94	1.76	5.8
Philippines	1.9	2.8	1.9	2.1	0.88	0.80	0.32	0.26	0.5
Singapore	2.5	2.7	1.9	2.2	1.17	0.77	0.31	0.28	-0.5
Taiwan	16.1	15.9	11.9	12.8	7.59	4.50	1.96	1.60	-1.0
Thailand	3.7	5.7	8.1	8.0	1.76	1.62	1.33	1.01	3.2
Turkey	4.8	10.2	21.7	29.2	2.25	2.89	3.58	3.66	7.8
Vietnam	-	2.1	13.5	24.8	-	0.60	2.22	3.11	19.2
Total of the above Countries	100	195	390	526	46.9	55.3	64.2	66.0	7.2
World Exports	212	353	607	797	100.0	100.0	100.0	100.0	5.7

Source: WTO statistical tables, WTO. UNCTAD Database. Online versions.

The first requirement is a strong conviction at all levels of the society that Pakistan's future without strong export expansion will be rather bleak. There are those that will point to the slowdown in growth in the international trade in the last two years and would argue that days of rapid globalization seem to be over. This is a misguided view. The big wage differences between the rich and poor countries and strikingly different outlook for demographic change between Europe, Russia, Japan and China on the one hand and South Asia and Sub - Sahara Africa on the other will continue to propel rising international trade triggered by shifting comparative advantage especially in provision of labor intensive goods and services.

The second need is to set up a high level representative commission to develop an ambitious but feasible export plan for 2015-2025. Such a commission should make recommendation both for modernizing and strengthening textile and clothing exports and expanding both other manufactured and agricultural high value exports. Steps for induction of direct foreign investment in labor intensive

fields especially from countries, notably China, where wages and costs have risen also deserve high priority for the commission. An urgent need is to make Export Development Board an active institution, which monitors progress and makes policy adjustments.

In the short-run, improving competitiveness of exports and moderating the demand for imports requires an immediate review and adjustment of exchange rate policy. At the same time, even in the short run, possibilities for increasing export to India and China – countries with which we have a large negative trade balance must exist and should be seriously explored. Commentators have argued a re-visiting of the free trade agreement with China, which is generally believed to be favorably tilted towards China.¹⁸

Low Savings and Investment

Persistent low level of savings and investment has been and threatens to become even more of a key constraint on growth. In Pakistan's history, there have been only three short boom periods for investment-1960-65, 1990-93, and 2004-8 – when investment in current prices briefly exceeded 20 percent of GDP. All these periods were either exceptional or somewhat illusory and, did not provide the basis of sustaining the momentum. The peak of investment in 1964-65, under President Ayub Khan, partly reflecting large investments under Indus Basin Treaty, was financed to an extraordinary extent of 40 percent by external inflows. In early 1990's private investment was greatly stimulated by Prime Minister Nawaz Sharif opening up almost all areas of economic activity to the private sector. Under President Pervez Musharraf, there was a strong revival in investment especially during 2003-08 when gross investment in current prices again reached nearly 20 percent. However, real investment grew only moderately faster than GDP because a good part of investment growth reflected a faster growth in the prices of domestic and imported investment goods such as steel, cement and machinery.²⁰

While investment over long periods has not shown any clear upward trend for several decades, the national savings performance has been even more dismal. If it had not been for the availability of sizable external resources from foreign aid, Pakistan would not have attained the average growth of close to 5 percent over the fifty years 1960-2010.

Unfortunately, investment picture has worsened and national savings rate has stagnated since 2008. Total investment dropped from 19 percent of GDP in 2007-08 to 14.1 percent in 2011-12 and had recovered only to 15.1 percent in 2014-15. According to rough calculation, in order to attain a growth rate of around 7 percent per annum over the next decade, investment should rise at least 22 percent of GDP by 2025 implying real growth of 12 percent per annum over the period. This will require vigorous investment growth in both private and public sectors. Even assuming that external resources in the range of 3-4 percent of GDP would be available, national marginal saving rate over the next decade will have to be nearly 25 percent of national income as against 15 percent over the past several decades (see Table 2.15).

Table 2.15
Trends in Savings, Consumption, and Investment
(As a percentage of GDP)

Year	Public Savings	Private Savings	National Savings	Consumption			Gross Fixed Capital Formation	Total Investment
				Private	Public	Total		
1959-60	-	-	7.5	82.2	10.3	92.5	10.0	-
1964-65	-	-	12.8	76.3	10.9	87.2	21.5	-
1969-70	-	-	13.1	76.8	10.1	86.9	14.3	17.1
1984-85	0.4	12.5	12.9	81.6	12.1	93.7	16.5	-
1989-90	2.8	11.4	14.2	71.4	15.1	86.5	17.3	18.3
1999-2000	0.1	15.9	15.8	75.2	8.7	83.9	16.0	17.9
2004-05	3.5	13.8	17.4	76.4	7.8	84.2	17.7	19.1
2007-08	-1.8	15.2	13.4	76.5	12.5	89.0	17.6	19.2
2009-10	2.2	9.8	13.6	76.6	10.3	86.9	14.2	15.8
2010-11	-0.1	9.7	14.2	78.0	10.0	88.0	12.5	14.1
2011-12	2.1	7.8	13.0	79.1	10.4	89.5	13.5	15.1
2012-13	1.1	8.7	13.9	77.4	10.9	88.3	13.4	15.0
2013-14	1.3	8.0	13.7	77.9	10.6	88.5	13.4	15.0
2014-15	0.6	8.4	14.5	76.4	11.7	88.1	13.5	15.1

Note: The figures for 1960–70 (national savings and gross fixed capital formation) are the author's own estimates.

Source: State Bank of Pakistan, Pakistan Economic Survey and World Bank.

Desirable though these targets are, they cannot possibly be met without a major transformation of national attitudes towards consumption and sacrifices for the sake of future wellbeing. Political leadership needs to grasp this essential fact and needs to set an example of simple living while exhorting the public for restraints in consumption.

It has also been pointed out that the level of savings in a society also depends partly on public's confidence in the future of the country. Improving security situation, more effective rule of law and better relations with the neighbors especially Afghanistan and India would greatly strengthen faith in Pakistan's future, reduce defence spending and certainly reduce the outflow of savings abroad.

On an operational level, the first target must be to eliminate the government's negative savings and in time attain positive government savings so as to partly fund rising public development expenditure. Pakistan- Vision 2025 suggested the target of raising the tax to GDP ratio from 11 per cent of GDP to 16-18 percent by 2025. This deserves a very high priority. It will not only improve government finances, expand social spending, and infrastructure investment but also help moderate the growing disparity in incomes in the country.

Institutionalized avenues of savings through private pension annuities will also help. The biggest challenge is to bring about change in attitudes towards relatively wasteful consumption spending while strengthening the attractiveness of investment choices and safety of saving options.

The international context for Pakistan's savings and investment picture is also relevant for gearing up the national effort. Pakistan's Gross Fixed Capital Formation rates as a percentage of GDP are compared with a few key countries for selected years since 2000 in the following Table 2.16. Data clearly shows that fixed investment rates have been much lower than not only that of China and India but also Bangladesh. Also, Pakistan is the only country in this group where fixed capital formation rate has fallen since 2000. Pakistan and Bangladesh are the only two countries with substantial reliance on foreign savings; China, has had a surplus of savings and has been largely self-sufficient, though it must be added the domestic savings figures for Pakistan and Bangladesh do not include worker remittances that boost the national saving rate significantly.

Table 2.16
Gross Fixed Capital Formation and Gross Domestic Savings as % of GDP
(Gross Domestic Savings are given in parenthesis)

Country	2000	2005	2010	2014
Bangladesh	24 (19)	26 (20)	26 (20)	29 (23)
China	34 (37)	40 (46)	45 (50)	-
Indonesia	20 (33)	24 (29)	31 (32)	33 (31)
India	23 (23)	30 (32)	31 (32)	29 (29)
Pakistan	16 (16)	17 (14)	14 (10)	12 (8)
Lower Middle income Countries	21 (23)	25 (25)	26 (26)	26 (24)

Source: World Development Indicators, Online, World Bank

Continued Lags in Human Development

For a number of reasons, among them the very high rate of population, resource constraints involving competition between defence and development and policy neglect, Pakistan has seriously lagged behind internationally in raising the levels of education and literacy for decades. The awareness has been growing for at least two decades that a strong correcting action was needed but despite initiatives such as failed Social Action Program in the 1990s, not much progress has been made in reducing the gap with the other countries.

Lack of basic education and skills is a major hurdle in the way of reviving growth.²¹ Pakistan is fortunate in having a young population and favorable demographics because large parts of the world including China, Japan, Europe and Russia face the prospect of declining working age populations in coming decades – only South Asia and Africa would be the main source of labor force growth in the world in the next quarter century or so. Fifty-five percent of the Pakistan's population is below the age of 25 and 33 percent below the age of 14. Therefore, the working age population is expected to rise sharply both in absolute numbers and as a percentage of total population in the next few decades. Potentially, Pakistan's young population is its strongest natural resource. However, unless the education and skills levels increase significantly and the present trends, in which as much as a half of the new workers would enter the labor force without adequate basic education in the coming years, are reversed quickly, Pakistan's would not be able to exploit this natural advantage.

The available data from the World Bank shows that Pakistan lags well behind both India and Bangladesh in key education indicators: notably net primary, lower secondary, higher secondary enrollment rates as well as in adult literacy. The gap is particularly large at the primary level. Even more worrying is that at this level of basic education in Pakistan there appears to have been some sliding back since 2010. WB data indicates that adjusted net enrollment rate at the primary level which stood at 74 percent in 2010 had moved down to 72 percent in the three years (see Table 2.17). Pakistan data sources, using slightly different definition of net enrollment showed a drop from 64 percent in 2012-13 to 62 percent in 2013-14.

Table 2.17
School Enrolments as % of Age Group/Adult Literacy Rate

Enrollment Rate/Literacy Rate	India 2011	Bangladesh 2012	Pakistan 2010	Pakistan 2011	Pakistan 2012	Pakistan 2013
Adjusted Net Primary	99	96 (2010)	74	72	72	72
Adjusted Net Lower Secondary	66	65	NA	43	46	49
Adjusted Net Higher Secondary	NA	35	NA	28	29	30
Adult Literacy Rate	69	60 (2013)	50 (2005)	55	55	55
Adult Illiterates in Millions	262	44	49	50	51	50

Source: World Development Indicators, Online, World Bank

Depending on the definition of net enrollment, either one out of three or one out of four children at the primary school age is not in school. This and the fact that all primary school children do not finish school means that even though adult literacy rate is increasing moderately, the number of adult illiterates is also growing. The rate of adult literacy in Pakistan improved from 50 percent in 2005 to 55 percent in 2010 and had improved to 57 percent by 2013. However, the number of adult illiterates had grown from 49 million to 50 million by 2013 (see Table 2.18).

The last year's report had pointed attention to the neglected area of adult literacy and had estimated that 50 million or so illiterates probably have an average remaining life expectancy of at least 35-40 years. To make matters worse, a large portion of youth – perhaps as many as 35 percent – entering adulthood in the near future would also be illiterate. Thus this mass of illiterate people will remain a drag on national productivity for a long time unless efforts are made to tackle this mounting problem through developing programs at the local government level by making an appeal to all groups in the society especially involving civil society and local leaders.

Table 2.18
Gross and Net Enrolments Rate at the Primary Level in Private and Public Schools
(Aged 5-9, million numbers)

Year	Gross Enrolment Rate		
	Male	Female	Total
2001-02	10.9	7.3	18.0
Government	8.3	5.3	13.5
Private	2.6	1.9	4.5
2005-06	12.5	9.7	22.2
Government	8.1	6.3	14.5
Private	4.4	3.4	7.6
2007-08	13.1	9.9	23.1
Government	8.4	6.4	14.7
Private	4.7	3.5	8.4
2011-12	13.7	10.6	24.5
Government	8.3	6.7	15.1
Private	5.3	4.0	9.4
2013-14	14.3	10.5	24.8
Government	8.5	6.5	14.9
Private	5.8	4.0	9.9

Source: BIPP's calculations using numbers from *Pakistan Economic Survey, Labor Force Statistics, and Pakistan Social and Living Standards Measurement Survey (PSLM)*, various issues.

A higher level of human development and greater labor skills development can contribute significantly to restoring total factor productivity, which as pointed out in the last year's report had declined sharply between 1980 and 2010.²² Important drivers of growth such as increased value added in and greater diversification of exports, more effective use of inputs notably water, fertilizer and seeds would all benefit from a more educated and skilled labor force. Higher education is also needed to avail of new technologies and developing research capabilities. As discussed elsewhere in this report, the potential contribution of Information Communication Technology (ICT) to improving productivity across a variety of economic fields especially services is enormous.

A major turnaround educational attainment will require simultaneous action on several fronts, increasing public spending on education, reversing the almost steady decline in the quality of public education by devolving authority to local governments and tightening accountability mechanism, mobilizing and encouraging high performing civil society and private non-profit educational institutions to expand and lead especially in the new areas of vocational training and adult literacy

Pakistan's public expenditure on education has never been high and has further fallen in recent years to barely 2-percent of GDP as resource constraints have deepened. Promises made by some political parties to double or treble the resources allocated to education in the near future are unrealistic. An increase in moving up the level of public expenditure on education to even 3 percent

of GDP over the next 3 or 4 years would not be easy; however, this goal must be pursued seriously. Any public expenditure increases, while at the same time seeking the necessary elimination of the budget revenue deficit, will not be possible without raising the tax to GDP ratio significantly. This basic improvement in finances remains a pre-condition for public expenditure to play the necessary role in reviving growth and furthering human development.

While spending on education is inadequate, the money actually spent has not been well used. Public clamor has been both for greater access to education as well as a deep concern for the declining quality of public education. The public distrust is reflected in a steady move towards private schools. Even at the primary school level, almost entire increase in enrolment since 2005-06 has been concentrated in private schools (see Table 2.18).

The deteriorating quality of public schools has much to do with weak and over centralized governance as well as absence of effective mechanisms for ensuring accountability and competence of teachers. At the rudimentary level, there are widespread stories about ghost schools and phantom teachers. More basically, the governance structure for social services including health and educations remains highly centralized. The 18th amendment, passed in 2010, devolved a great deal of authority to provinces notably in education. The 7th NFC award greatly strengthened the financial transfers to the provinces from the divisible pool. The transfer of resources and authority to the provinces has not been accompanied, however, by the needed devolution to the districts and the local governments. Indeed, there has been reversal of local government authority provided under the 2000 devolution by President Musharraf – an example is the Local Bodies Act 2013 passed by Punjab Government. The basic political reason is that elected representatives to the national and provincial assembly feel that greater delegation to the local level will undermine their influence. IPP (now BIPP) has strongly supported de-centralization from provincial to local governments ever since its first report in 2008, while realizing that “true tests of success will be free and fair elections and a broad – basing of political representation so that state capture by local elites is reduced” (IPP, 2008).

Pakistan is simply too large a country to be effectively governed mainly at federal and provincial levels. The increasing need for mobilizing leadership and resources and greater inter-action with the dynamic civil society also argue for moving the government closer to the people.

Poor Economic Governance

It is widely recognized that the Pakistani state – by which we mean the numerous institutions that support the working of the government and guide the interaction of the citizenry with them – has weakened over time. This weakening was the result of many factors, most notably the political roller-coaster ride Pakistan has been on ever since it became an independent state 65 years ago. With frequent changes in the political order, the state’s institutional structure did not have the time to develop. But there is now hope for the political order to develop towards a genuinely representative system of government.

Notwithstanding political challenges to the present government, it has survived and seems set to complete its term that will end in mid-2018. The growing consensus within the country about the urgent need for tackling the serious threat from extremists and militants strengthened the hands of the government, and enabled the military to launch an effective operation in North Waziristan. Meanwhile, the pockets of terrorism within some parts of the country are no longer being ignored. The Karachi operation by the Rangers is trying to root out militancy and in the process is exposing widespread corruption in administrative structures. At the same time, the National Accountability Bureau has become much more active in probing and punishing wrong doers.

These are important achievements and are helping to strengthen the state and the political order. However, good economic governance, which must be a key element in a successful growth strategy, remains at best a work in progress and is at worst fumbling, uncoordinated and un-focused. The problems in the management of the energy sector have been discussed above. The tax machinery does not as yet show the muscle buildup – and perhaps political support that it needs. The progress on privatization of state enterprises is slow. The ministries are often at loggerheads with each other with no – speedy mechanism to resolve dispute. The Finance Minister, clearly the leader of the economic team, is over-burdened with other responsibilities. The Council of Common interest, a key body for resolving issues between provinces and the Federal Government, meets infrequently and does not have a sorely needed independent secretariat. Last but not least, powers for delivery of social services remain highly centralized at the provincial level and there has not been meaningful devolution to the local governments.

Without necessarily increasing the role of the state, governance can be improved significantly through five major steps. (a) The erection of a firewall between executive authority and the accountability mechanisms and strengthening the deterrents to prevent the abuse of power and breaking of the law. It would be fair to say that Pakistan has one of worst records in punishing wrong doers, whether politicians, bureaucrats, businessmen, or military leaders. (b) Effective efforts to de-centralize authority to the local government level, initially at least for social services, need to be made. There is evidence from other countries that locating government closer to the people improves the sense of accountability of those responsible for providing public services. (c) Serious efforts should be made to reform the civil service and restore the independence of public institutions through autonomy, proper selection of top management and professional staff, and adequate pay. (d) Encouragement should be provided for the development of civil society institutions at all levels of government. (e) Improvement of the judicial system should be ensured.

There is an intellectual vacuum in Pakistan on economic matters, which hurts informed public debate and limits the impact of what would be a more balanced and less biased media reach. The level and quality of academic research and economic literacy is low. This is partly because Pakistan has relied for long periods on analysis done by international financial institutions notably the World Bank and the IMF. Many of the domestic policy institutes remain dependent on foreign funding.

Major organs of the state require more intellectual backup and analysis. As mentioned above, the Council of Common Interest (CCI) has become critically important for resolving disputes among provinces and between the provinces and center, especially now that the provinces are in the forefront of development activity. CCI should be supported by a permanent secretariat which should facilitate conflict resolution. This function should be distinct from the functions of policy analysis and coordination that must be performed by Planning Commission and planning departments of the provincial governments.

The above measures will help improve the quality of economic management in the formulation and implementation of public policies both at the federal and provincial level. Formal plans have had very limited success in Pakistan because implementation and monitoring of plans were neglected and with changing circumstances macro-economic frameworks were not revised quickly enough. Going forward, there has to be much greater policy coordination across ministries and between federal and provincial governments. In this as well as in effective monitoring and impact evaluation, the planning agencies must play a central role.

CONCLUSION

In light of the above discussion, it appears that raising the level of economic growth to a sustained 6-7 percent annually in the near term would be a daunting task and would require a strong political will, sharp expansion of investment rate, major policy improvements, and effective implementation in a number of areas notably exports, taxation, education and governance.

The latest IMF paper presented to their Board in September, projects a GDP growth rate of 5.2 percent per annum for all three years from 2017-18 to 2019-20. According to Staff Estimates even this improvement would require notable acceleration in investment, strong improvement in tax revenues and at least moderate export growth.

Chapter 3

Technology and Development

Chapter 3

Technology and Development*

The influence of technology on economic progress is the result of several factors. Some of the impacts occur directly. As discussed later, economists have found a way of introducing technology into their growth functions. Economic development and growth are also influenced by demography, trade, and global warming; technology influences all three.

It is the tremendous advance in medical science and practice that resulted in increasing life expectancy around the world and in significantly reducing infant and child mortality. The result was a population explosion, the subject of considerable inquiry in the second half of the twentieth century. Developments in technology also profoundly influenced the composition and direction of international trade. Information technology made it possible to divide the production processes in several parts, locating them according to comparative advantage offered by different locations. This led to “parts and components” to become the most important contributor to growth in the world commerce. In addition to affecting the demography and trade, technology brought about visible environmental degradation. It was caused by advances in technology bringing in new sources of energy that depended on fossil fuels. These emitted the amounts of carbon into the atmosphere that raised global temperatures. Technology now promises to deal with the problem of excessive presence of carbon dioxide in the upper layers of the atmosphere by making it possible to obtain energy from non-polluting renewable resources.

There is a broad consensus among development thinkers that technological advance plays a major role in promoting economic development and social change. It lifts the economies in rich, emerging, and poor parts of the world on to higher planes of development. For rich countries, it provides new ways for performing essential services. The work being done for producing robots is an example of how the service sector may get transformed in these countries. For emerging nations it helps with their integration into the rapidly changing global production system. The ICT sector has made it possible to split the production process into several components with lower end of manufacturing passed on to emerging economies. Apple’s iPad, for instance, is designed in the United States and assembled in China from dozens of parts manufactured in East Asian countries. For poor countries, still struggling with backwardness and poverty, technology can provide opportunities for improving incomes and quality of life. South Asia benefitted enormously from the development of high-yielding seed varieties. Technology is being used to transfer incomes to the needy, who can access it by using mobile phones. How should technology be used to promote development? Providing answers to this question is the subject of this chapter.

*This chapter was contributed by Shahid Javed Burki

This chapter will examine various aspects of the relationship between economic growth and development in the developing world. I will discuss briefly how technological development came to be recognized as a variable in the growth function. Using the work done at the World Bank, we will go on to highlight the various aspects of technological change that need to be kept in mind by policymakers in the developing world. I will argue that while private capital and private enterprise are becoming increasingly important in producing new technologies, the state in the developing world must remain the dominant player. I will explore the consequences of big money in rich countries chasing big ideas, and why this will produce technological change that may not help the developing world. In fact, the result may be the widening of inequality between developed and developing parts of the world. How developing countries are using technologies to make economic progress and also alleviate poverty and reduce the income gap is another area of interest for this report.

ECONOMIC THEORY CATCHES UP WITH THE REAL WORLD

Understanding the process of development has come a long way since the early 1950s, when most of Asia and Africa emerged from under the colonial rule. The main worry some sixty or so years ago was that the new states did not have enough savings to finance development. The newly born states had a great deal of catching-up to do. The colonial powers had mostly exploited them; they did not develop them. Some modern-day historians have attempted to rewrite history, focusing on the good work some of the colonial masters did in the countries over which they ruled. Niall Ferguson, for instance, in some of his works argued that Britain left a rich legacy in the Indian Subcontinent on which the successor states could have built a good future.¹ There is some substance in this argument. India, for instance, built a robust and viable political system basing it on the infrastructure left by the British in the Subcontinent. But there were a number of negative consequences in the equation. Ferguson's case is a benign interpretation of colonial history, which is largely rejected by academics and policy analysts from the former colonies. The negative case goes beyond exploitation of India's riches and includes the harm done to the colony's technological advance. While the British did bring in new technologies as the steam engine, the railways, and surface irrigation, the "what if" question remains. Was colonial control necessary for India's technological advance? Would that not have happened if India had remained independent? Even some historians from the West agree that the colonial rule was good for those who ruled by the use of force, not for those over whom they ruled.

The Europeans who colonized much of Asia and Africa had little interest in developing the areas they controlled – certainly not in bringing the technologies they had put to use in their countries. A persuasive case has been made by Sven Beckert in his recent book, *Empire of Cotton*, that the colonizers were mostly interested in the transfer of income and wealth from the places they dominated to those from which they came. One result of this approach was the destruction of the textile industry in South Asia and its replacement by the mills in Lancashire. This structural change increased the demand for cotton, which could not be met by the land on which the fiber was traditionally grown.

This could have happened if new production technologies had been deployed in the cotton-growing areas in British India. Instead, new land found in America was turned to the cultivation of cotton, which could only become economically viable if cheap – preferably free –labor could be found. The system of slavery did precisely that.² In India, the destruction of the textile spinning and weaving cottage industry was a serious technological set back.

Once the old colonies became free, their people and those who led them aspired for better lives approaching those in the countries that were once their masters. But accelerating economic growth meant making large investments and that needed finance which the new nations did not have. Ways had to be found to bridge this gap and this led to the creation of a number of development banks such as the World Bank Group and its sister organizations, the regional banks. Most developed countries also established their aid programs mostly to retain influence and access to the markets in the lands they had once governed. This approach worked to some extent and the “developing countries” became “emerging nations.” W. Arthur Lewis, the first person to be awarded the Nobel Prize in the fast developing discipline of development economics, suggested that the movement of mostly unskilled and poorly paid workers from the countryside, where they worked mostly in agriculture, to towns and cities and into jobs in the manufacturing sector resulted in increasing the pace of economic growth as well as personal incomes. Growth and incomes would increase even more if workers were provided with capital (tools and machines) to work with.³ Following Lewi’s insights, economists believed that growth could be explained by a simple production function that had two variables: labor and capital. Combine the two in appropriate ways and growth would result, they maintained. Technology did not figure directly in this calculus.

It was the work of a number of economists, led by MIT’s Robert Solow, who identified technology as an important determinant of growth and development. Able to explain only about two fifths of economic growth in terms of the deployment of labor and capital by constructing a two-variable production function, Solow kept what he called the “X factor” outside the function as an exogenous variable. The rest, in Solow’s words, was the residual in the growth equation. The MIT economist went on to win the Nobel Prize in economics for this work and left his fellow academics with an intriguing question: How to define the “Solow residual?”

Some of the early work done on understanding what went into the Solow residual led to the identification of not just labor but “human capital” as a factor of production. What mattered was not only the application of human labor into the production process but the quality of that labor. Among the many who worked in this challenging area were several economists from Chicago University, some of whom also went on to be awarded Nobel Prizes for their work. The concept of human capital is a complex one and is still evolving. Human capital is now seen as a collection of many resources – all the knowledge, talents, skills, abilities, experience, intelligence, training, judgment, and wisdom

possessed individually and collectively. Some of these attributes are inherited, some cultivated. For the latter technology plays an important part as does the state. *Human capital* is the total capacity of people representing a form of wealth that can be used to achieve individual or collective goals. The best known application of human capital is by the economists Gary Becker and Jacob Miner. The former's book, *Human Capital*, became a standard work in this area.⁴ In his view, human capital is similar to physical means of production. One can invest in human capital via education, training, and health.

The Chicago school of economists and others postulated that economic growth is very closely related to the cognitive skills of the population, especially the workforce. A significant advance in growth theory was made by Paul Romer, then at Stanford University. He published a paper in 1998, in which he suggested that technology and the quality of human capital were as important as labor and capital for explaining growth. His thinking changed the way economists and other development thinkers looked at growth. Better-educated and trained workers would contribute more to output than those who were poorly educated and poorly trained. Education, in other words, began to enter the equation as a major determinant. Adding education and, therefore, knowledge reduced the part of growth that could not be explained.

This was an important conclusion as academics and policy analysts attempted to understand what produced the economic miracles in a number of East Asian countries – in particular in two land-scarce economies, Hong Kong and Singapore. Education was a key ingredient in their success but not just improving literacy. Before their transition from developing to developed economies, their school enrollment rates had been much higher than those of other developing nations. But they had also emphasized advanced scientific and technical education – as measured by the higher ratios of students in technical fields – thus increasing their capacity to import and absorb sophisticated technologies. Looking beyond the East Asian miracle economies, other growth accounting studies examined larger samples of countries. Even when human capital was accounted for, the unexplained part of growth still remained high. It is now evident that education without openness to innovation and knowledge will not lead to economic progress. The people of the former Soviet Union like the people of East Asia were highly educated, with nearly 100 percent literacy, but Moscow placed severe restrictions on foreign investment, foreign collaboration, and innovation. Its work force did not adapt and change as new information became available elsewhere in the world. Its economy suffered and did not grow and modernize.

Crucial importance is now given to the production of new technologies and improvement in human capital. This is where the state enters – and, in fact, entered – the picture. By investing in the development of new technologies and improving the quality of human capital, the state could increase the rate of economic growth. In both the old and the new world, large investments were

made in promoting education in technology. When India's Prime Minister Jawaharlal Nehru was offered technical assistance by the United States for promoting development, he asked for the establishment of MIT-like institutions in his country. This led to the creation of the chain of institutions of technology that contributed enormously to the development of the country's IT sector.

Now some six decades later, the emerging world faces a different gap – the gap in technological development. I will turn to this subject in a later section. In the section that follows I will discuss how the findings about the contribution technological development can make to economic progress should be operationalized. Much of this work was done at the World Bank, the premier development institution of our times.

MAIN ELEMENTS IN THE USE OF TECHNOLOGY FOR DEVELOPMENT

The World Bank, where a great deal of analytical work gets done on explaining the various aspects of the process of development, has some useful insights on the subject of the nexus between technological development and economic advance. Much of the work the Bank does is published in the form of the World Development Report written every year. Each year, the Bank selects one area for deep analysis. In 1998/99 it chose knowledge as its subject and titled its report, *Knowledge for Development*.⁵ The report emphasized that knowledge, not capital, is the key to sustained economic growth and improvement in human well-being. That the World Bank would give greater attention to knowledge than to capital was itself interesting since the institution's *raison d'être* was the provision of capital to the developing world. The World Bank report distinguished between two sorts of knowledge: knowledge about technology or simply know-how and knowledge about attributes, processes, and institutions. It focused on the unequal distribution in know-how across and within countries and the difficulties posed by having incomplete knowledge of attributes. The first was called "knowledge gaps"; the second "information problems".

Some other factors not immediately associated with knowledge certainly add to economic progress as well. Some path-breaking work, done by such economists as Douglas North, shows that the quality of institutions and economic policies explain a significant part of the differences in growth among countries. Well-designed institutions and well-considered policies foster the creation, accumulation and distribution of knowledge.

Poor countries and poor people differ from rich nations and rich people not only because they have less capital, but also because they have less knowledge and poor institutional development. Knowledge is almost always costly to create, and that is why much of it is created in industrial countries. This is one reason why the state that has more resources needs to step in. Even in rich nations, some of the more important technological advances were made by the government providing finance and guidance. The Internet was developed by the Department of Defense in the United States. Some of the more significant advances in aviation technologies were made by such large firms as Boeing,

Lockheed, Martin, and Airbus under government contracts to develop new generations of bombers, fighters and refueling platforms. The mapping of human genes in the Genome Project was made possible by government finance. However, government financing of path-breaking technologies was not confined to rich nations.

The “green revolution” technologies that saved South Asia from developing large food shortages were developed by government-funded institutions in Mexico and the Philippines – high-yielding wheat varieties in the former and high-yielding rice seeds in the latter. Even when new seed varieties became available, it needed government intervention to spread their use. But why was government needed to spread the green revolution technology? Why couldn't it be done by private enterprise? The answer is that the knowledge embodied in the seed of new plant varieties is not easily appropriated by any breeder, seed company, farmer or even a country acting on its own. The varieties most suitable for transfer to developing countries, once transferred, could be easily reproduced. That meant no repeat business for seed developers, and not enough profit for the private sector to make the effort of spreading the technology worthwhile for itself. In other words, improved seeds, like many other research outputs, have many of the characteristics of a “public good.” If governments do not get involved, the impact of technological advance would be very limited.

A public good is one whose full benefits, in the form of profits, cannot be captured by its creator but instead spread out to society at large. As the World Bank put it in its above-cited report “Because private entrepreneurs have diminished incentives to provide such goods, the tradition of entrusting public entities for providing them is long. Indeed, it is widely recognized in many fields that, without some collective action, there will be far too little research into developing new knowledge.”

There are three critical steps that developing countries must take to broaden their base of knowledge. In all three, there are serious gaps in their abilities and those of the developed parts of the world. The first involves tapping and adapting knowledge that already exists. There are several ways of doing this. Knowledge can be acquired by encouraging foreign enterprises to invest in the domestic economy. The large investments made by American and European firms in India's IT sector have helped that country to become an “outsourcing” powerhouse. However, the Indian government's reluctance to open the retail sector to foreign investment has kept that sector relatively under-developed.

The second involves absorbing knowledge. This requires universal basic education; creating opportunities for lifelong learning; and supporting tertiary education, especially in science and engineering. India is a good example of the role played by the state. The country's famed institutes of technology, the IITs, were the result of a government initiative. The third area of considerable importance for the developing world is the need for communicating knowledge, ensuring the poor of access. Once again India is a good example. It has pioneered the use of technology for reaching

the poor – in this case poor farmers. Programs have been developed that the farmers can use to get information on mobile phones about the prices of their products. In this way they reduce, if not totally eliminate, the middle man from the marketing process. Kenya is a pioneer in another area – the use of mobile phones for banking. In Pakistan, under the on-going Benazir Income Support Program (BISP), poor women are provided income support by having them access their accounts by using mobile phones. Various studies done by sociologists have shown that increasing women's incomes in poor households leads to better care for children than directing additional incomes to go to men.

Three considerations argue for deeper understanding of the relationship between knowledge and development – not just economic growth but also political development and modernization of society. First, the world is becoming ever more integrated and countries have little leverage on global trends, nor can they isolate themselves for long. International trade has grown steadily from 24 percent of world GDP in 1960 to one-half of the global product in the 2010s. Multinational Corporations (MNCs) today dominate the global economic landscape – a third of the world trade is now between the MNCs or their subsidiaries. A significant proportion of MNC trade is in knowledge-intensive products. Second, high-technology output has an increasing share of global product in 2012. There are now in the developed world more workers employed in knowledge-intensive industries than in making physical goods. Third, information technology is expanding at a phenomenal rate. Today one country's advantage over others, in many lines of production and trade, can no longer be viewed in terms of such relatively unchanging tangible factors as labor, land, and natural resources. If that were the case, it would be hard to explain the extraordinary performance of Hong Kong and Singapore. Once knowledge and the potential to improve it is taken into account, dynamic comparative advantage – the relative advantage that countries can create for themselves – is what matters and will determine how well the countries will do.

We will conclude the discussion this far by re-emphasizing the points already made. Technology is an important determinant of economic growth and social development. To take full advantage of technological developments, the state must ensure that the citizenry is well educated, and there are institutions that can spread technological knowhow. However, since much of the technological developments take place in developed countries and within those countries by the work done by multinational corporations, it is necessary for developing nations to get better integrated in the global economic system. This will require more trade directed at the developed world and allowing and encouraging more investment by the latter in poor economies. However, there are some worrying developments in rich nations that will not be of much help to emerging nations. The state in the emerging world, therefore, needs to get directly involved in developing technologies for domestic use. Their needs are different from those in rich nations.

BIG MONEY CHASING BIG IDEAS TO SATISFY PERSONAL INTERESTS

The nature of technological advance as well as those who are involved in the beginning decades of the 21st century are very different from those who were behind the Industrial Revolution of the 18th century. The earlier successes with far-reaching economic, social, and political consequences resulted from private initiative. If the state was involved at all, its participation was incidental. The steam engine that resulted in the development of railways, for instance, came about from the activities of private entrepreneurs. As discussed by David McCullough in his book, *The Wright Brothers*, the first flying machine, which was to eventually establish and revolutionize the aviation industry, was the consequence of the passion and obsession of two individuals.⁶ *The brothers'* story is made compelling by the industriousness, creative intelligence, and indomitable patience of two hardworking Ohioan boys who were able to solve the puzzle of the science of bird-wing and insect-wing design. The state did not get involved; it only got engaged once the systems of transportation that resulted from these privately-led initiatives needed to be regulated for public safety and for the development of the infrastructure necessary for turning these innovations into large transportation systems.

Those early pioneers were responsible for creating the line of products that had profound impact on human life. Most early advances applied well known and established scientific thought to produce goods such as automobiles, aero planes, telephones, and computers. Electricity became the driving force behind economic development once ways were found for generating large amounts of it, harnessing it, and transporting it.

Now in the 21st century technological advance is entering a new phase of development which has two distinct elements. The current technological advances are creating new theories and understandings from the process of applications. Also, the new pioneers are different from those who were responsible for the previous sets of innovations. They are impatient to bring about change.

There is some worry that this research is proceeding without checks and balances. Once, two-thirds of scientific and medical research in the United States was funded by the federal government, beholden to the public good. Now, two-thirds is funded by private industry, a growing share by billionaires – accountable to no one other than themselves, their whims, and their aspirations. They are impatient with the pace of innovation. By 2016, the richest one percent of the world's population is predicted to control more than 50 percent of the world's wealth, according to a new Oxfam report released at the World Economic Forum in Davos, Switzerland in January 2015. Nearly 130 billionaires have signed the "Giving Pledge" organized by Bill Gates, the world's richest man whose net worth estimated at \$79.2 billion. This pledge is to give away at least half of their wealth, estimated at \$700 billion. Nineteen tech entrepreneurs, with net worth of about \$245 billion, have signed the pledge; most of them are putting their money into health-care and medical research. On the other hand, since 2010, financing of the United States National Institute of Health has been cut by about \$3.6 billion – or 11 percent – after adjusting for inflation, leaving thousands of projects unfunded or underfunded.

The focus of private capital is limited to the areas in which they have personal interest or the interest of the communities to which they belong. Life sciences is one of those areas. To take a couple of examples Peter Thiel, who first founded and then sold PayPal at a considerable profit for himself and his cofounders and also for their financiers, used a significant part of the capital gained to invest in other parts of the sector of technology. He is not alone in this. Other titans who created Google, Facebook, eBay, Napster and Netscape are using their billions of accumulated wealth to “write the nation’s science agenda and transform biomedical research. Their objective is to use the tools of technology – the chips, software programs, algorithms and big data they used in creating an information revolution – to understand and upgrade the most complicated machinery in existence: the human body.”⁷

The projects funded by them have one thing in common: putting big data to yield new understandings about the way the human body works. When many entrepreneurs look at the health care system, they see the data of billions of people collected through blood tests, online profiles, food purchases, and fitness trackers. According to Laura Arrillaga-Andreesen, the wife of Internet pioneer Marc Andreessen, who teaches a class on strategic giving at Stanford University “when that data can be accessed, mined and utilized for good in an instantaneous manner that would be shattering in a positive way.” An important aspect of this approach of developing new technologies – the use of “big data” – is that most developed countries and societies have a distinct advantage over those less developed. The penetration of computers, smart phones, the Internet – and now the accumulation of data and information in various “cloud systems” – have created an asset that can and will make enormously important contribution to technological development.

But it would be wrong to conclude that the state in rich nations has opted out of doing – or helping to do – cutting edge research. Some of the recent research on Alzheimer has been funded by the US Department of Defense. Brain implants have been developed and are being tested to restore short-term memory. The Defense Advances Research Projects Agency (DAPRA), responsible for this work, is mandated to respond to perceived threats the United States faces. As discussed at some length by Annie Jacobsen in *The Pentagon’s Brain*, the agency’s involvement has led to some remarkable technological breakthroughs such as the Global Positioning System (GPS). It is now deeply involved in developing and testing implantable wireless “neuroprosthetics” as a way of overcoming amnesia.⁸

Some serious concerns have been raised about working to extend life expectancy significantly from the level reached in 2015. “I think that research into life extension is going to end up being a social disaster,” says Francis Fukuyama, the renowned sociologist. “Extending the average human life span is a great example of something that is individually desirable by almost everyone but collectively not a good thing. For evolutionary reasons there is good reason why we die when we do.”⁹ A lot of private wealth, therefore, is being committed to develop technologies that may not produce public

good. However, there are other areas in which private money would be enormously helpful. Energy is an important example of such an area.

Energy is attracting a considerable amount of private investment. For instance, in the words of Clive Cookson of the *Financial Times* “the inventors believe they are on the verge of what they call the ‘Wright brothers’ moment for nuclear fusion power”. If they are right, the potential for cleaner, more efficient energy is immense. They believe that they will be able to tap fusion for generating electricity within a decade. This is the process that powers the sun and stars. In late June 2015, in an interview with the *Financial Times*, Bill Gates said he plans to double his personal investment in green technology from nuclear and wind to batteries and synthetic photosynthesis to \$2bn over the next five years. He called for a tripling of public support for research in renewables from the present \$6bn a year worldwide. Gates’ favorite is a “fast reactor” loaded with depleted nuclear waste at the beginning of its life which then breeds and burns its own fuel over a period of decades. Other innovative low-carbon energy projects are also poised to take off. Some sound super-speculative, like tapping the winds of the jet-stream which blows at 200 kph at a height of 10 km. Some are more mainstream, like building better batteries to power electric cars and store the power generated by intermittent sources of supply such as solar parks. Some have a romantic ring, like artificial leaves to collect carbon missions.¹⁰ Most of these ideas have come from the private sector, and almost all of them are being promoted by private money. This approach gives the developed world tremendous edge over those nations that do not have public or private funds needed for this kind of research and development.

There is one other disadvantage the developing world faces in catching up with those that are relatively developed. Some of them have caught up with the large and more advanced economies; that has happened mostly because they, such as China, have large populations. But they continue to be handicapped. For instance, much of the research around the world is done by large privately owned corporations, and most of these are in the developed parts of the world. By themselves, multinational corporations MNCs account for a quarter of global GDP – \$16 trillion in 2010 – and well over \$1 trillion of yearly investment. McKinsey, the consulting firm, has estimated that MNCs account for 74 percent of private-sector research and development spending. And the biggest 700 MNCs – just one percent of the world’s total of 70,000 – make up one-half of global research-and-development spending and two-thirds of the research-and-development (R&D) spending in the private sector. The developing world, in other words, is not playing on a level playing field in the area of technology and its influence on economic progress. How can this problem be addressed is a question that needs to be answered by those responsible for the making of public policy choices.

STRATEGIES FOR RELYING ON TECHNOLOGY FOR ACHIEVING APPROPRIATE CHANGE

With technological advance destined to play an enormously important role shaping the globe's future, are there particular approaches and strategies that need to be adopted by policymakers in different parts of the world? This question has one set of answers for the parts of the world that are economically well developed and another set for those that are emerging and developing. In this context three related issues are particularly important: what should be the role of the state in developing, adopting, and regulating new technologies; to what extent should research and development aim to produce technologies that are suited for different environments; and to what extent should the developing world rely on the technically more developed parts of the world for obtaining the needed technologies.

The role of the state is particularly important in improving the technological base of emerging economies. The easier part of the growth process in the emerging world has been achieved. This involved the movement of hundreds of millions of workers from low-productivity jobs in the countryside to the relatively more productive ones in towns and cities. Now that about one-half of some five billion people in these countries live in urban settlements, they need to be engaged in more productive activities. This is where the state enters the picture. The governments need to recognize that technological growth will need to play a critical role in this phase of their development, and for that to happen the state's involvement is critical. Unfortunately most of those who currently hold the reins of political power are inclined to push the state back in order to create greater space for private enterprise. Taken to an extreme, this will give rise to highly distorted patterns of growth as the private sector is unlikely to invest in developing technologies needed by nations at this stage in their development.

If the acquisition, absorption, and communication of knowledge and technology are critical for this phase of economic development, the state has to be actively involved. But its involvement has to be judicious and not aimed at reducing the space available to private enterprise. In the 1950s and 1960s a number of developing countries used government instruments and institutions to develop their economies. This approach retarded progress, and it came to be understood that the state's role had to be recalibrated. It was appropriate at one point to bring down the state from the "commanding heights of the economy" – Lenin's phrase made popular by Jawaharlal Nehru, India's first prime minister – and this was done most aggressively in South Asia in the early 1990s. Both India and Pakistan adopted policies to bring in private enterprise as a partner in development. The state's role as the owner of economic assets was misplaced. It needed to climb down and it did. Slowly, the two countries have sold the assets the state was poor at managing. But as was to be expected, private entrepreneurs are motivated by personal gain not by producing public goods. The latter needs the involvement of the state, and that is the case in particular in technological development.

Cutting-edge technology work gets done in the developed world – in particular in the United States – in four places: in government departments and agencies, in corporate headquarters and their affiliates, in universities, and in special purpose enterprises mostly run by the private sector. Each of the four made important contributions to technological development. The Internet was developed by the United States Department of Defense to facilitate communication among its many parts, some separated by long distances. Much of the earlier advances in communication technologies came from the research arms of large corporations that had the financial means to finance such operations. The fixed-line telephone system was developed largely by the Bell Laboratories attached with the US firm American Telephone and Telegraph, AT&T. The Silicon Valley was founded by graduates of Stanford University who were later joined by those who attended (but did not graduate) from east coast universities such as Harvard and MIT. The Genome came from a relatively small research outfit located near Washington that received funding from the National Institute of Health.

The place in the emerging world that comes closest to the Silicon Valley is Bangalore in south India. But the Indian city has gained prominence not because of a close association with the academia, the finance sector, or established industries. It owes its existence and reputation to the clustering together of a number of large IT companies in the area. Most of these firms built lucrative businesses based on out-sourcing. India has many world-class institutes of technology, but most of the better known ones are in places some distance from Bangalore. Hyderabad, again in a southern Indian state, has turned the Bangalore model upside down. It now houses a world-class institute of management, whose founding and development was largely financed by the rich Indian diaspora in the United States. The institute has begun to attract private enterprise to the city as was done by towns such as San Jose in Silicon Valley. Unlike Bangalore in Hyderabad, an institution of advanced management learning came first to be followed later by a number of IT firms.

That the world leaders realize Silicon Valley's importance is one reason why a wave of foreign dignitaries have added the Valley to their traditional U.S. tours. Heads of state from Japan and Brazil visited it in early 2015 following earlier trips by the leaders of Ireland, Russia and Malaysia. A report in *The New York Times* focused on the visit by the Indian Prime Minister Narendra Modi in mid-October and dwelt on prominence of the Indian diaspora in several types of IT operations. It quoted Venky Ganesan, the head of a venture capital firm as "Silicon Valley is, in some ways, more important than New York and the financial sector, or Washington DC and the political world. World leaders see clearly that when it comes to just about any sector, Silicon Valley is eating them up." It's not just the world leaders who are interested in the Valley. In March 2015, ambassadors from 35 countries – including Kazakhstan, Gabon, and Paraguay – "toured the region to soak up lessons on how technology might contribute to their economies."

For the emerging world to climb on to a higher growth plane, for it introduce more technologically-intensive products in international trade, for it to reduce the still significant levels of poverty, and

for it to narrow the growing regional and interpersonal income inequality, the state will have to get deeply engaged. It needs to occupy itself in promoting the adaption for its purpose existing technologies, developing its own, and communicating all these to all segments of the population. These important tasks should not – in fact, must not – be left to the private sector. The developing world needs to formulate carefully thought out policies aimed at technological advance. That was done with considerable success by China at the end of the 1990s when it invested heavily in building two dozen technology parks around the country. The state concentrated in providing these places the infrastructure they needed, leaving to public and private sector enterprises the choice of the areas in which they wanted to concentrate. That strategy paid-off; China now has some of the more advanced technology firms in the world. Most emerging economies have left the task to those who happened to hold the reins of power at any given time.

India is an interesting example of an emerging nation with strong links with the Silicon Valley. Nehru, as already mentioned, had the United States help set up the first few IITs in the country; now Prime Minister Narendra Modi is letting his personal interest pave the way for his country's technological progress. Prime Minister Nehru's initiative led to the training of thousands of engineers – many more than the slow growing Indian economy at that time could absorb. Thousands went abroad, mostly to the United States. Decades later, tens of thousands of Silicon Valley workers are of Indian descent; American Indians make up an outsize proportion of the tech force in the United States. At Google, Asians including Indians account for 30 percent of employees. Nearly 16 per cent of tech startups have Indian founders.¹¹ Some Indian "techies" have risen to the top of the management ladder. The chief executives of Google (Sundar Pichai) and Microsoft (Satya Nadella) are of Indian origin. The Indians now own and manage a number of large Venture Capital enterprises operating in Silicon Valley. They are now eager to give something back to their country of origin. The prime minister is an avid user of social media, and he made use of his familiarity of the media during a stopover in Silicon Valley on his way to New York to attend the meeting of the United Nations' General Assembly. He was well received by the IT tycoons. "In this digital age, we have an opportunity to transform the lives of people in ways that were hard to imagine just a couple of decades ago," Modi said in San Jose on September 26, 2015 in a dinner time speech to about 500 technology leaders, including the chief executives of Microsoft, Google, Adobe and Uber. He was promised several large investments. Google agreed to provide free public Wi-Fi in hundreds of Indian railroad stations, which are major transit and social hubs for their communities. Microsoft would help India bring wireless Internet to its 500,000 villages. Qualcomm, a chip maker with thousands of employees in India, promised \$150 million to finance Indian startups.¹²

TECHNOLOGY AND DEVELOPMENT : PAKISTAN'S LOST OPPORTUNITIES

As discussed in Chapter Two of the report, while the economy is in a much better shape today than it was in June 2013 when the present government took hold of the reins of power, it still has some

distance to go. Much remains to be done before the country realizes its enormous growth potential and moves out of its current economic stupor. We are of the view that Pakistan, with the right set of policies, could attain a sustainable rate of growth of around eight percent a year, reaching that goal in about five years. At least three things must happen: good leadership must be in place, sound policies must be adopted and full use of new technologies that have become available must be made. The first two are obvious; the third is less so.

The beginning of the 21st century has seen the development of a number of technologies that, when fully applied, will change how people relate with one another, how they work, how production processes are organized, and how nations trade among themselves. The first of these four elements of technological change has had many consequences, some of them political.

In the last few years the development of social media brought about a number of political revolutions. One of those, entirely unanticipated, was the ability of the young to get organized and challenge the state if what the state was doing was not to the youth's liking. This was the main reason why the Arab youth was able to topple four long-enduring authoritarian regimes. Four governments fell in quick succession, but it was only in one of them – Tunisia – the result was what the young people wanted. The Tunisian democracy project, inspired by the country's youth, was recognized when four persons who played prominent roles in it were rewarded the 2015 Nobel Peace Prize. In the remaining three – Egypt, Libya, and Yemen – there is an on-going struggle between those who want to change the established order, and those who prefer the status quo. In Syria, the fifth Arab country in turmoil, the result is a bloody civil war that has lasted for four years with no end in sight. The Middle East is in great turmoil as we write this report. This upheaval would not have come about without the aid of information and communication technology. Some comfort can be drawn from our belief that once the dust settles down, we will see a more representative political structure, and a more inclusive economic system take root in the region.

Technology's impact on the place of work will be as profound as its effect on the conduct of politics. This, for the moment, is more apparent in developed countries, but it will also begin to impact the developing world. In industrial countries the working class is going through another revolution, the third since the Industrial Revolution. The first followed the advent of the Industrial Revolution; the second was the result of the introduction of standardization of the products being manufactured and the use of the conveyor belt for assembling the final product. Adam Smith, the father of modern economics, had pointed to the role of the production process for producing large efficiencies and increasing the competitiveness of those systems that adopted it. It was the application of technology that brought about this change.

Harnessing of energy embedded in fossil fuels, such as coal and oil, released millions of workers from the drudgery of farm work. Muscle-power was replaced by machine-power. Those not needed on the

farms moved from agriculture to industry, from low-productivity to high productivity jobs. This not only increased their incomes but also pushed the economy to a higher growth trajectory. That, this would usher in a process of sustained economic development was first suggested by W. Arthur Lewis, who won the first Nobel Prize in development economics. In his view, growth would be sustained for as long as surplus labor was available in the countryside.

It was technology once again that brought the next big change in the use of labor, the third in our list of worker-displacing innovations. The rapid development of communication technology made information flow instantaneous and over long distances. In the words of Thomas Friedman, an American journalist, the “world became flat.”¹³ He was referring to the flow of information that made it possible for economic entities in developed countries, such as those in the United States and Europe, to get simple work to be done by the reasonably trained and English-knowing workers in countries with low wages. This led to the birth of what came to be known as the “outsourcing industry.” Large firms in America located activities such as accounting, account-keeping, para-legal work, transcription of medical reports prepared by examining doctors etc. to India, the Philippines, and other labor-surplus countries. Pakistan missed out of this opportunity largely because of security reasons. As the country came into the grip of violence originated by extremist forces, the United States and some European nations put Pakistan under “travel advisories.” These increased the cost of travel as most insurance companies began to charge heavy premiums for covering the risk of travel to the country. With this additional cost, Pakistan lost the wage-arbitrage incentive that brought work to many other developing countries.

Other than reducing costs, outsourcing also saved time. India and other destinations could do the work when its originators were asleep. When they awoke they found the completed assignments waiting for them in their computers. Out-sourcing displaced low-level white-collar workers in the industrial world. Those who lost jobs were in large numbers. Some of the displaced workers were able to upscale the level of their skills; those who could not began to swell the ranks of the unemployed. Application of information technology caused another type of worker to lose jobs in the United States and Europe. This occurred since information technology made it possible to relocate physical work to the places where low-wage workers could do the assembly of parts and components manufactured elsewhere. The splitting of work was used to manufacture a vast range of products from men’s shirts to computers. A shirt designed by a fashion house in Italy was made from a fabric woven in China from yarn imported from Pakistan. The fabric was taken to Hong Kong where it was cut, sewn and packed and sent to men’s stores in the United States. The most notable example of this type of split-production were the iPhones and iPads made by the Seattle-based Apple in the United States. These products were designed by the company in the United States and assembled in a vast Taiwan-owned factory located in South China. Parts and components were made in a number of countries mostly in East Asia. The advantages to firm profits and the time taken to produce and

redesign products were identified by Steve Jobs, the founder of Apple, why his company was able to march ahead of several of his competitors.¹⁴

These changes in the way products were manufactured had immensely significant impact on the composition and direction of world trade. For decades, trade expanded at rates higher than those of the increase in global output. The share of trade in output increased, and the world became increasingly integrated.

Pakistan missed most of the opportunities created by rapid technological change. There were two important reasons for Pakistan's loss: poor leadership in economic matters and the increasing insecurity in the country. The time has come for the country to make up on the time lost, but that will require a well thought-out growth policy that places heavy emphasis on the use of technology. We will return to this subject later

Before Pakistan develops a strategy for marrying technology to the process of economic development in other parts of the developing world, it would be useful to gain some insights into how "technology clusters" have developed. India offers a good case to study.

Could the Hyderabad model be replicated in Pakistan? The answer is most certainly yes. There are three cities in the country that have the makings of vibrant centers of technology. Lahore and Islamabad have several universities and learning centers many of which specialize in science and technology. Two of these are in the private sector – Lahore University of Management Sciences – known by its acronym, LUMS. The second, Lahore School of Economics, while still focused on social sciences, has the capacity and business model to develop beyond that and move into science and engineering. Lahore already has a cluster of privately owned and managed IT businesses. The landscape has been dominated by one large company, Netsol. It is located prominently on Lahore Ring Road and employs more than a thousand engineers, many of them women. Islamabad also has a cluster of universities that are already feeding the city's fledgling IT industry. Most of the Islamabad-based enterprises are small with less than a hundred employees. The National University of Science and Technology, NUST, was founded by the army when it decided to bunch into one entity its many science and technology institutions. The Ghulam Ishaq Kahn Institute of Engineering Sciences and Technologies is located at Topi, on the banks of Tarbela Lake. It has a strong faculty and a fairly large student body. Islamabad has one advantage over Lahore; it is only a stone's throw away from the three military headquarters, two of which (the Air Force and the Navy) are in the capital city while the third (the army) is in Rawalpindi. At some stage, the military is likely to increase its use of technology for its command and control operations. Karachi, a city much larger than either Lahore or Islamabad, could also develop into a center of technology. It is already the center of the country's finance and commerce operations and has the headquarters of several large private firms. It is the lack of security that is holding back the city.

It is worth noting that no one from amongst Pakistan's senior leaders has visited Silicon Valley in California, which has risen into a center not only of American but also of global economic power and is a well-recognized hotbed of technology. Why has the Pakistani leadership stayed away?

It could be for one of two reasons: The leaders have yet to realize the significance of technology for the rapid economic development and social improvement of their country, or they believe that this task is better left to private enterprise. They are wrong on both scores. They must recognize that technological development requires the active involvement of the state.

Pakistan spent a fair amount of time and resources to write the Vision 2025 Statement, which laid down a string of targets the government pledged to meet in a number of areas. Recognizing that the government writing the statement had only until May 2018 until it went back to renew its mandate with the electorate, it promised only to begin the process of promised change. It did not – it could not – promise that the objectives it had identified will be achieved by 2025. That notwithstanding, the use of technology for reviving the economy and achieving high levels of growth and development was not very well explored. In this report we suggest five areas of focus for the government. A high-powered commission with membership drawn from among the experts in the areas to be explored should be set up to make recommendations to the government in these areas.

The country has a history borrowed from the British to entrust the framing of policies aimed at major innovations to commissions. One good example of these is the series Royal Famine Commissions that deliberated the approach to preventing recurrent famines in the food-deficit areas of the large Indian colony. It was one of the Royal Commissions that led to the conclusion that the best way to approach the problem was to turn the vast virgin tracts of land in the provinces of Punjab and Sindh to produce food grain. This was to be done by tapping the waters of the Indus River system for irrigation. It is of some relevance for today's Pakistan that when London took the decision to bring surface irrigation to Punjab, it did not have the expertise to dam rivers and have water flow into irrigation channels. For this job, London turned to Canada, another British colony, where such engineering expertise was available. For getting technology to come to the aid of economic development and modernization, the country will need to obtain foreign expertise.

Among the five areas we have identified for government's deliberations are two sectors that need help from technology to reach a higher level of development. These are agriculture and small scale industry.

While technology was deployed to develop surface irrigation, not much attention was paid to the pricing of water and its efficient use. In fact, the two are related. London's main concern was to produce as quickly as possible the grains it needed to adequately feed the people in the colony's eastern provinces. That objective was quickly achieved. The second major technological change in agriculture came a century later when the government headed by President Muhammad Ayub

Khan adopted a set of policies that led to the adoption of high yielding rice and wheat seeds. This too produced quick results. Within a short period, Pakistan once again attained self-sufficiency. The country now faces another challenge: growing water scarcity. Once again, technology will have to provide the solution. That climate change will bring about water scarcity in Pakistan is by now a well-recognized fact. The consequences of what is in store for the country have been studied by agencies such as the World Bank. The conclusion is clear: Pakistan and the country's people will need to learn how to conserve water. It does not need fancy economics to recognize that scarcity must result in increase in price. This has to be applied to water, in particular the water used for growing crops. Once, the price reflects the scarcity of the substance, the farming community will turn to drip-irrigation technologies. This is a method that saves water and fertilizer by allowing water to drip slowly either to the roots of the plants or directly on to the root zone. In sophisticated systems, such as those developed in Israel, the system's various parts – network of valves, pipes, tubing and emitters – are controlled electronically. This is done by specially written computer programs.¹⁵

Because of the way the water is applied in a drip system, liquid fertilizer is mixed with water. The process is called “fertigation.” Pesticides can be similarly delivered. Fertilizer savings of up to 95 percent have been reported by several research institutions. They also report very large increases in productivity. Some institutions have seen doubling of output with only 10 percent of water being used. There are other advantages. For instance, field-leveling is not needed – a highly recommended method for saving water when it flows on the fields through open channels. This was needed to save water loss through evaporation. Soil erosion is also reduced. Since a well-designed system is not as energy intensive as tube-wells, for instance, there will also be significant energy savings. In other words, technology and economics come together to produce astounding results.

CONCLUSION

Technological developments could make very important contribution to advancing the Pakistani economy; reducing poverty; narrowing the income gap among people as well as among regions; and linking the country with the rest of the world. However, for technology to play its role, the state will have to get actively involved and work with the private sector in a number of areas. The state must invest in education and training. It should also put in place a policy framework that encourages private entrepreneurs to invest in research and development.

Chapter 4

The State of Play in the ICT Sector in Pakistan

Chapter 4

The State of Play in the ICT Sector in Pakistan*

It wasn't until late 1980s that computing started getting registered as an important business tool in Pakistan. It was still seen as an expensive investment with unclear benefits and returns to human enterprise. However, it survived the general apathy among businesses and academia, and late 90s onward, experienced significant growth and uptake. Even though a lack of appreciation of its role and importance to growth, productivity, and social uplift continues to this day, Pakistan's ICT sector has flourished enough to become a promising new global hub of technology. Its performance still pales in comparison to regional giants, India and China, but the industry has taken on a flavor of its own and has picked up promising momentum. It is fast emerging as a key economic sector, employing a growing number of professionals across a great variety of organizations in both the public and private sectors. Increasingly, it is not only meeting local technology and automation requirements, but also contributing to export of ICT based solutions and services, resulting in significant economic and social impact. However, it still has a long way to go before it can become a thriving industry making a major contribution to the economic growth and social development in the country. It continues to face challenges at various levels, mostly due to two reasons: one, a lack of government attention to its potential as an export focused industry as well as an enabler of development and change, and two, a difficult business environment that is not conducive to greater investment in the sector, as in other sectors, and hampers both profitability and international growth. This chapter will discuss the factors contributing to the gradual emergence of Pakistan's IT industry, and how they have worked in spite of little policy support and policymakers' apparent disregard for ICT's potential to contribute significantly to wider economic and social benefits. The potential for further growth and the factors impeding it will be presented. The contribution, both current and potential, of the ICT sector shall be elaborated to highlight the ways in which it can lead to greater employment and income generation and help reduce income disparities. ICT is less dependent on physical infrastructure investment, and this chapter will discuss some of the ways in which it can work faster than other interventions to address some of the country's most persistent socio-economic challenges. Based on these insights, the chapter will conclude with a discussion of missed opportunities and the possible way forward.

THE ICT REVOLUTION: AN ENGINE OF ECONOMIC DEVELOPMENT

ICT's contribution to socio-economic change has been a subject of research and keen debate. While few would contest its transformative potential, most of the discussion focuses on the variety of ways in which it brings change in both business and social spheres. One of the hallmarks of the developed countries is the extent of ICT based connectedness in their socio-economic spheres. Technology is

*This chapter was contributed by Umar Zafar.

even seen as capable of providing a means for developing countries to break-out of the cycle of low economic growth and under-development. It is, therefore, not surprising to see many developing countries paying attention to developing their ICT infrastructures, even at the cost of having to divert funds away from other development areas. India and China were quick to realize the importance of what at that time was a futuristic area of computing. However, their investment in developing connectivity and encouraging IT literacy among their population, paid great dividends as the global need for IT outsourcing took off. They saw the successful emergence of giant IT businesses on the back of a fast growing global demand for IT services. Today, they are not only home to some of the largest IT companies in the world but have been able to achieve extensive automation in key domestic sectors, such as agriculture, education, health and citizen-centric government services.

The impact of ICT can be studied against several dimensions, such as in the context of poverty alleviation, employment generation, and liberation from the shackles of structural bottlenecks that constrain social and economic mobility, access to opportunities, innovation, productivity, and increased engagement of the populace. A well formulated approach to growth of ICT, backed by the required policy support and commitment, is a potential game changer for any economy. In fact, many planners are alive to the idea of jump starting economic growth or breaking out of persistent stagflation through sustained investments in ICT.

The idea of investing in ICT may also appear attractive to planners and policy makers because it seems less dependent on resource endowments of the economy or some sort of comparative advantage. In that sense, it appears to offer a level playing field to nations, where they can build a sustainable technology ecosystem through policy driven investments in skills, infrastructure, and connectivity.

PAKISTAN: AN EMERGING ICT HUB

Pakistan has a relatively short ICT history. It is both surprising and distressing that, unlike India and China, its government never put great emphasis on promoting ICT as a foundation for rapid economic development. Government's priorities remained attached to traditional sectors such as agriculture, farming, textiles, and other small and large industries, but it never seemed to attach much importance to developing a globally competitive ICT industry.

It is equally surprising to see how well the ICT sector has done in spite of government apathy. This reflects both the exceptional acumen and innovativeness of Pakistan's IT entrepreneurs and the great potential for ICT led growth in a country with a growing pool of IT graduates. Spurred mostly by the trailblazers, who had witnessed India's phenomenal rise as a global ICT provider and the profound growth in productivity in the developed countries, initial investments came in the late 1980s through private sector efforts to leverage the power of computing. However, the business case was still unclear, and so the investments were both tentative and incremental. A conservative outlook in the private sector was more than matched by the lackadaisical public policy view of the

role of technology in modernizing the socio-economic settings of the country. It is, therefore, quite phenomenal what the industry has achieved since, regularly appearing at the forefront of global rankings of ICT destinations. The gradual build-up of ICT solutions and services, IT exports, and IT manpower has resulted in a soft and promising face of the country's erratic economy, dogged by years of political instability and militancy.

Previous attempts to estimate the size of Pakistan's IT industry had placed it at around US\$12 billion in 2010, with a huge portion attributed to export of software solutions and services (Khan, 2010). Several multinational ICT firms now have their global development centers in the country, which is also home to a growing number of technology based startups making their mark at the international level.

The Pakistan Software Export Board (PSEB) was set up in 1995 by the Government of Pakistan, recognizing the need to support the country's tottering software development industry. Since then, it has set up 12 Software Technology Parks (STPs) in various cities with the explicit objective of providing "a stable and reliable ICT infrastructure and other allied services to IT and ITES companies" in the country (PESB, 2015). These parks now house several IT companies that are operating on a global scale to generate significant export revenues.

INVESTMENTS IN TELECOMMUNICATION INDUSTRY

With a total population of over 188 million in 2015 (Trading Economics, 2015), it is indeed remarkable to see the cellular growth mirror this expansion. Foreign Direct Investment in Communication for the financial year 2014 improved significantly from the past year. This increase is essentially attributed to the growth of investment in the telecommunication sector. The successful transition of the telecommunication industry's negative net foreign direct investment to positive FDI had a strong impact on the overall information and communication technology FDI. The Telecommunications net FDI in financial year 2013 was reported at \$408 million whereas it increased to \$903 million in financial year 2014. (see Table 4.1).

Table 4.1
Foreign Direct Investment in Telecom

(US\$ in million)

	2009/10	2010/11	2011/12	2012/13	2013/14
FDI in Telecom	374	79	(361)	(408)	(903)
Total FDI	2,199	1,574	821	1,576	2,641
FDI in Telecom Sector as a % of Total FDI	17	5	(44)	(26)	34

Source: PTA (2014) Annual Report 2014. Pakistan Telecommunication Authority. Retrieved from <http://www.pta.gov.pk/annual-reports/ptaannrep2013-14.pdf>

TELECOMMUNICATION HEALTH INDICATORS

The telecommunication sector in Pakistan has seen a sharp growth, spurred by an effective telecommunication policy to promote competition in the sector. Telecom revenues during FY 2013-14

crossed a whopping Rs. 465 billion (see Table 4.2), which was a 6 percent increase from FY 2012-13 when the revenues posted amounted to Rs 439 billion (PTA, 2014). The telecommunication industry has been able to achieve these numbers amidst testing times in the market with low tariffs, pulling in more subscribers by offering novel telecom packages. The overall tele-density now stands at around 79.6 percent (see Table 4.3), which is quite impressive from a developing country perspective (PTA, 2014). Furthermore, the sector's contribution to the National Exchequer through taxes stood at Rs 243 billion in 2013-14 (PTA, 2014) (see Table 4.4).

Table 4.2
Telecom Revenues

(rupees in million)

Year	Telecom Revenues (Rs. Million)
2009/10	344,212
2010/11	367,327
2011/12	409,245
2012/13	439,521
2013/14	465,547

Source: PTA (2014) Annual Report 2014. Pakistan Telecommunication Authority. Retrieved from <http://www.pta.gov.pk/annual-reports/ptaannrep2013-14.pdf>

Table 4.3
Annual Cellular Tele-Density

Year	Mobile Tele-density (%)
2008/09	58.20
2009/10	60.40
2010/11	64.80
2011/12	68.40
2012/13	71.70
2013/14	76.50

Source: PTA (2014) Annual Report 2014. Pakistan Telecommunication Authority. Retrieved from <http://www.pta.gov.pk/annual-reports/ptaannrep2013-14.pdf>

Table 4.4
Telecom Contribution to Exchequer

(Rs in billion)

Period	Total
2007/08	111.63
2008/09	112.00
2009/10	109.05
2010/11	116.97
2011/12	133.41
2012/13	124.53
2013/14	243.84

Source: PTA (2014) Annual Report 2014. Pakistan Telecommunication Authority. Retrieved from <http://www.pta.gov.pk/annual-reports/ptaannrep2013-14.pdf>

THE GAPS IN PAKISTAN'S NETWORK READINESS

The ICT, both as an industrial sector and as an enabler of socio-economic development, is dependent on the extent of 'connectedness' or 'network-readiness' of the economy. Pakistan currently ranks 112th out of 144 countries in the World Economic Forums' Network Readiness Index (World Economic Forum, 2015 see Table 4.5). In fact, it has experienced a slight decline in the rankings over the years, not because there has been no progress but because other countries have been progressing much faster in building more connected economies. The index comprises four key sub-indices that together assess the environmental (political, regulatory, business, innovation), general readiness (infrastructure, affordability, and skills), usage (individual, business, government), and impact (economic, social) aspects of network readiness. Out of these, Pakistan is best placed in terms of affordability parameters, given the low cost of availability of IT talent. In terms of environmental factors, it lags behind considerably.

Table 4.5
Network Readiness Index: Pakistan

Network Readiness Index	Rank	Value (1-7)
2015 (143)	112	3.3
2014 (148)	111	3.3
2013 (144)	105	3.3
A. Environment sub index	117	3.4
1st pillar: Political and regulatory environment	121	3.0
2nd pillar: Business and innovation environment	97	3.9
B. Readiness sub index	109	3.6
3rd pillar: Infrastructure	119	2.5
4th pillar: Affordability	49	5.7
5th pillar: Skills	133	2.6
C. Usage sub index	118	2.9
6th pillar: Individual usage	123	2.0
7th pillar: Business usage	94	3.4
8th pillar: Government usage	110	3.3
D. Impact sub index	105	3.1
9th pillar: Economic impacts	102	2.9
10th pillar: Social impacts	108	3.4

Source: World Economic Forum.(2015). Pakistan network readiness index.World Economic Forum Report. Retrieved from<http://reports.weforum.org/global-information-technology-report-2015/economies/#indexId=NRI&economy=PAK>

Environmental Challenges

In spite of strong fundamentals supporting the growth of ICT in Pakistan, the sector's lackluster performance seems to be primarily due to a host of environmental issues that have dogged the economy for long. The country's checkered political history has thwarted not only the general investment outlook but also hampered policy development around key issues, including the country's

technology posture. The uncertainty created by political upheavals was further exacerbated by years of terrorism that struck main cities. It brought business sentiments and investments to a sharp decline, depriving ICT of the much needed boost. Even though lately Pakistan's global investment ratings have steadily improved, global investors are still cautious and watchful. The country's attractiveness should improve if the government can continue to make sustained improvements in the security and economic environment.

The following factors can be seen as constituting environmental challenges to the growth of ICT:

Low Government Policy Priority to ICT

Pakistani policy makers have not been able to demonstrate the priority that needs to be accorded to the ICT sector to adequately leverage its potential both as an economic sector and as an enabler of socio-economic development. Various policy documents over the years show the government reiterating its support to ICT led growth while failing dramatically in undertaking much in a planned and determined manner. Consequently, the government's efforts toward automation have at best been patchy and poorly managed and at worst an outright waste of funds as it has mostly failed to make a meaningful contribution to the sector's growth.

This low priority sets back the growth of ICT in two important ways: one, it reduces the uptake and use of ICT in the economy and two, it denies opportunities to the ICT businesses to provide automation solutions to the government, which could have provided the much needed fillip to the sector.

Regulatory Inadequacy and Shortcomings

Another way in which the government has not demonstrated foresight in promoting the growth of ICT in the economy is by not undertaking the required legislation to legitimize digital activities, such as e-commerce, digital signatures, online privacy, etc., and to provide protection against fraud and cybercrime. The developed nations and most of the emerging markets have realized the importance of cyber laws and intellectual property rights. The absence of such regulation not only hampers innovation in the ICT sector but also denies an environment of trust that is needed to promote use of ICT services.

Inability of the Government to Draw Greater Benefits Through Automation

The foremost sign of reluctance of the Pakistani government to support and incentivize the information and communication technology is the fact that they themselves are lagging behind in adopting ICT tools into their operations. The government's approach toward automation has been tardy and impulsive. As a result, it has not been able to obtain wider benefits of an integrated and coherent automation drive, which should ideally be linked to a digital agenda for automation and citizen-centric e-governance.

There are ample socio-economic initiatives that are in dire need of information and communication technology support. However, the government has ostensibly been slow in undertaking initiatives for

e-education, e-agriculture, and e-health that could have transformed the provision of basic human services in the country.

Low Quality ICT Education

In the absence of a clear policy to promote ICT education in the country, the development of ICT is still inadequate even for a modestly growing sector. Many universities and institutes offer ICT based education and training but are not able to fully cater to the requirements of a growing industry, both in terms of quantity and quality of the IT professionals they are producing. ICT curricula are largely outdated and need much modernization to develop professionals well-versed in new technological concepts. More specialized programs may need to evolve to correspond with the growing diversity of technological themes within the ICT industry.

ICT Use Challenges

While the above mentioned environmental factors explain the underdevelopment on the supply side of ICT, other aspects pertaining to low use of ICT relate to the inhibited demand. These include the following:

The Digital Divide

A vast majority of Pakistan's population does not have access to modern information and communication technology. There is a need for investment in the development of ICT infrastructure in urban and rural areas. A vast segment of the population, mostly in rural areas, is unable to access ICT due to a variety of reasons, such as unavailability of ICT infrastructure, unfamiliarity with the use of ICT, unaffordability of ICT services, and lack of access to ICT hardware. According to the Euro Monitor International, a London-based market intelligence and consulting firm, Pakistan's household possession of digital equipment is highly skewed towards the 10 percent households with the highest disposable income (Business Recorder, 2015). Even neighboring India, with similar cultural and household patterns, has reportedly better access to ICT hardware.

Content Barriers

A vital part of engaging the local population is through creating meaningful content in a language that the majority can understand. However, in case of ICT, most of the relevant data available is not in a language that a vast majority of the population can understand. Combined with low levels of literacy, unavailability of usable content in local languages has discouraged people from putting ICT to advanced use.

Slow Introduction of ICT Based Services

The introduction of ICT based services in Pakistan, including government services, has been slow thus further limiting the impact of ICT. There is also a need to raise awareness and market these services, based on the needs of the common man, in order to increase adoption of ICT. Companies

like Telenor have successfully launched branchless banking service and have now developed the first end-to-end Online Payment Solution for different payment options. However, there is still huge untapped potential in a range of sectors such as agriculture, retail, trade, health and civic services, which could transform the opportunities and outcomes for the country and its population.

THE PROMISE OF PAKISTAN'S ICT

In spite of a discernable growth in the ICT sector in Pakistan, there is still a huge opportunity for it to expand both as an industry and as the country's socio-economic development enabler. As a sector, it has failed to capitalize adequately on its significant cost advantage over other global ICT destinations. Pakistani IT companies have not demonstrated the commercial alacrity of their Indian and Chinese counterparts to tap into the huge global demand for ICT, even though in recent times several success stories have emerged in the form of Pakistani startups leveraging technology to create innovative business models. Pakistan's share of the global ICT industry still pales in comparison to that of India and China. Several other countries such as Vietnam and Philippines have shown much faster growth rates. Even Pakistan's domestic industry and society remain largely devoid of ICT use, except for very basic purposes, such as Internet browsing or email. However, this has not just been a failure of the industry. The government has not been able to garner much policy support toward automation and digitization of either the government functions or the larger society. As a result, the ICT sector for years has continued to languish with low growth and poor margins making survival a challenge for the increasing number of ICT businesses. However, policy makers are now coming alive to the need for strategic and sustained investment in technology to breakout of the low growth, high inflation situation, which the economy has witnessed in recent years. Pakistan, a country of around 188 million people (Trading Economics, 2015), stands to gain from structural improvements in the economy and a growing technology footprint. It is already well placed and, with the investments in the telecommunication infrastructure and the recent advent of 3G and 4G technology, the use of ICT is set to experience an exponential growth.

A Global Low Cost IT Destination

Pakistan is fast emerging as a global low cost IT destination, owing to a developing ICT industry and a steadily growing pool of IT professionals. With improving business conditions, Pakistan is well set to attract global attention as a financially viable center for software development as well as IT enabled services delivery.

Technology-based Innovation and Entrepreneurship

Software companies in Pakistan have made various breakthrough innovations across domains such as finance, healthcare, and mobile apps. There is immense growth potential in Pakistan's IT industry. The sudden growth in the number of technology incubation centers in Pakistan will further promote innovation and entrepreneurship. The country has already seen a number of technology based start-

ups launch their ICT offerings through incubators in the public and private space. These include Plan9, LUMS Center for Entrepreneurship and Nest I/O. Some of these ventures are focused on Western markets, while others are contributing to change in the domestic arena.

The Shift in The Governance Paradigm: Automation, Efficiency, Effectiveness

Pakistan's government is moving towards automation as they are adopting ICT tools into their operations. This is targeted towards increasing efficiency and effectiveness of their operations. Recently the Prime Minister directed the ministries and departments to take proactive measures for timely implementation of ICT projects so as to enable the government to achieve the envisaged objectives of good governance, improved emergency response, and high quality technical and ICT education.

A Large Population Under Served by the Physical Infrastructure

There is a massive untapped potential for ICT services in Pakistan as a vast majority does not have access to modern information and communication technology. There can be a surge in ICT services if the government develops ICT infrastructure in areas that have been underserved. ICT can also play a vital role in bridging the gap between the services industry and the masses. Taking the example of the banking industry, where a large segment of the population has not been penetrated, only 8.7 percent of adults in Pakistan have bank accounts (Tribune, 2015). However, there is tremendous potential for branchless banking as currently around 136 million people have subscription to a cellular mobile network (CIA, 2015). Companies like Telenor have realized this potential, and their branchless banking services, such as Easy Paisa, have been well received. Education, agriculture and healthcare are three other sectors where the physical infrastructure challenges can be circumvented through investments in ICT.

Mobile Use and New Opportunities

During the last 10 years, mobile phone ownership has grown astoundingly in Pakistan with more than half of the adult population having access to a cellphone (CIA, 2015). The Annual Cellular Mobile Tele-Density stood at 76.50 percent in 2014 (Table 5.3) with its increasing share of 96.1 percent in total tele-density (PTA, 2014). The number of 3G/4G subscriptions is also seeing continuous growth as telecom companies added 2.22 million 3G/4G subscribers during September 2015 to take the total count of 3G/4G users to 18.04 million, up from 15.76 million just a month ago (Attaa, 2015). The launch of 3G/4G technology has also changed the trend of mobile use as more people are using mobile data. As a result IT companies are focusing more on developing mobile applications, using advanced mobile features, such as location based services, to create value for their users.

WHAT LIES AHEAD

Pakistan's ICT industry is growing in stature and optimism. The recent spate of startups and business incubators suggest that the country may be witnessing the beginning of a new era of ICT

led innovation and business growth. The challenges and the promises of the industry aside, there are some visible aspects of this development that are worth mentioning:

1. Pakistani ICT professionals are now showing a clear preference for applying their ICT skills to new ideas and ventures. Not only have a number of such ideas been launched by young and aspiring entrepreneurs, many are now working with smaller software companies run by young entrepreneurs. These startups have a strong entrepreneurial approach based on innovation and fast learning, to tailor their offerings and businesses to deliver better value.
2. Instead of following an established model, many of these technology startups have shown great propensity to embark on original ideas, thereby creating a new space for themselves. No denying that often such ideas are inspired by what is already being done in other parts of the world, but it is still courageous on their part to introduce domestically ideas for which there is no existing market. In doing so, they are showing great tenacity and perseverance besides skill and innovation.
3. There is a large number of IT professionals providing freelance services to international customers mostly in North America. This has been possible through websites offering freelance work such as oDesk. Pakistan has one of the largest and perhaps fastest growing communities of freelance IT professionals, who are winning international respect for the quality of their work.
4. The ICT industry as a whole is becoming more self-aware and self-organized as is evident from the active role of PASHA, the industry association, and various other forums through which the representatives of the industry are taking up key policy related issues.
5. The public sector seems to be coming alive to the opportunity of tapping ICT for greater effectiveness and efficiency, though the impact in terms of improved governance is not quite evident as yet. In Punjab, the Punjab IT Board (PITB) is actively engaged in automation and digitization to assist the administrative efforts in the province. It has also developed various mechanisms to engage technology stakeholders from the private sector for the purpose of greater public private partnership.
6. The larger software and technology companies in the country are beginning to build on their earlier success to further develop their global footprint. Companies like NetSol now have a strong international presence through several global offices and a large and growing customer base of leading foreign multinational businesses.
7. These established 'software houses' are not only scaling up rapidly, as is evident from the growing demand for IT professionals in the country, but are also fast adopting international best practices to improve their management of the human resource as well as business processes.

8. The larger software companies are also entering into partnerships or joint ventures with foreign companies to either expand their geographic footprint or to open up new business areas. These companies are helping not only to expand the ICT industry's footprint but also to promote a positive image of a country long shackled by political and security challenges.
9. It is also striking how the Pakistani ICT industry seems to be evolving differently from neighboring India, which is one of the world's largest ICT destinations. The Indian ICT has developed largely around global outsourcing of IT and IT enabled services. These typically constitute the least knowledge intensive of various ICT business categories, and while the country's ICT industry has grown rapidly through the provision of these services, it has not shown great diversification into more innovative and knowledge intensive areas. Pakistani ICT, on the other hand, seems to be less focused on IT outsourcing and more on providing business domain focused ICT solutions. In such cases, innovation and the knowledge component are much bigger, as seems to characterize Pakistan's ICT businesses.

These characteristics of the Pakistani ICT highlight the innovation and tenacity of the private sector firms and professionals in making their mark internationally. Indeed, veterans of the industry appear to be disdainful of any suggestions for government intervention to help the industry, as long as it can ensure a conducive business environment and address the political and security challenges. It, therefore, requires some consideration to identify a role for the government in shaping an industry that appears to be dynamic and increasingly self-assured.

The example of India and the emergence of its globally dominant ICT industry may be considered relevant. Given the stark comparison made above between some characteristics of the Indian and Pakistani industries, a comparative study may require careful interpretation, but still one can attempt to draw some generalizations. There is some debate even regarding India on whether its ICT industry has been better off with or without strong government intervention (Lin, 2012). Starting in the 1970s the Indian government extended various incentives and fiscal measures in support of the ICT industry through liberalization and export promotion. Numerous IT parks were built and state-of-the-art communication infrastructure was provided. However, there are many who contest the government's contribution by suggesting that one, such measures came only after the private sector had already taken the lead and paved way for the decades of growth that followed, and two, the government interventions worked to create the wrong kind of incentives (Chandrasekhar). They argue that such interventions may at least partly explain why the Indian ICT industry in spite of its size, has not been able to diversify more, and why the benefits of such growth have not spread to others, beyond those immediately linked to it.

It is, therefore, not surprising to witness similar skepticism in Pakistan for the government's role in developing the ICT industry. However, one can still identify several areas of relevance to ICT in which

only the government can act. These include not only the general areas of ensuring a conducive business environment and addressing security challenges, that are relevant to all economic activity, but also some ICT specific interventions such as developing the government's own digital agenda, introducing a broad e-government program, developing modern ICT parks, providing fiscal incentives to support the country's ICT exports, and promoting ICT education in the country.

CONCLUSION

The ICT industry in Pakistan is poised well for taking the country forward on the path of development. The potential for putting ICT to use and thereby realizing dividends across a wide range of economic and human development indices is huge. Opportunities of automation are abundant too as the country can embark on a journey of establishing itself as a leading low cost IT destination, while becoming a digitally connected economy. Many of the challenges of an inadequate physical infrastructure can be sidestepped by tapping into ICTs capacity to connect a far greater proportion of the country's population, leading to greater financial inclusion and citizen engagement. In order to achieve this, however, Pakistan needs a well formulate digital vision and roadmap. Without due policy focus and commitment, the transformative potential of ICT can hardly be realized. Sustained investments would be needed on both the supply sides through digital infrastructure, technology parks, and bandwidth as well as on the demand side by enabling business and citizen-centric ICT services that engage large segments of the society, while addressing the issues of the digital divide and content barriers. Only in this way can the country truly make the transition to a knowledge economy.

Chapter 5

Women and Information and Communication Technology

Chapter 5

Women and Information and Communication Technology*

While ICT is generally viewed as a great enabler of technological and economic change, its potential for driving socio-economic change and development appears even more dramatic when studied in the context of less empowered sections of the society. This is because it is less encumbered by the peculiar challenges posed by both physical attributes and social structures. It is for this reason that ICT appears more attractive to segments of population that are otherwise disadvantaged in terms of access to resources and opportunities. Not only is it more affordable in terms of adoption than other more capital intensive industries, it is also more flexible in terms of the uses that it can be put to. In this sense, it is a great leveller when it comes to meeting the socio-economic needs of less empowered and underprivileged sections. Women and ICT has been a subject of much interest among development experts for this very reason. Given the immense challenges pertaining to empowerment of women, ICT is well placed as a powerful tool for opening them to new opportunities to overcome the challenges that suppress their independence and choice. This chapter will offer a perspective on how ICT can impact the lives of women in Pakistan. With the help of a few examples, we will discuss how it can help them overcome some of the barriers to becoming more productive members of their households and the society. In doing so we will endeavor to highlight how women can employ ICT to gain economic, social and political empowerment.

LABOUR PARTICIPATION AND THE GENDER GAP

According to the Global Gender Gap Report published by the World Economic Forum (see Table 5.1 and Table 5.2), Pakistan is at the bottom of the rankings for gender equality as measured in terms of health, education, economy, and politics. Although compared to previous years, improvements have been seen in most areas; however, there still remains a gender gap. This is clearly seen through the wide disparity in literacy rates among males and females, with the female literacy rate being only 47 percent while the male literacy rate standing at 70 percent in 2014 (Haq, 2015). Furthermore, there is a huge gap in labor participation in Pakistan as out of a total labor force estimated to be around 63 million in 2015, only 23 percent is represented by females which equals only 14.52 million of the total labor force. (Pakistan Annual Plan, 2015) There are a range of socio-economic factors that explain this, but as a result, the female population remains bound, economically, and socially. While a range of interventions centered on skilling up women and extending resources to them are variously considered, ICT is seen to offer a significant opportunity for extending their horizon of socio-economic possibilities. By familiarizing themselves with the use of computers, women can explore several ways to financial and social mobility, while raising their economic and political participation.

*This chapter was contributed by Umar Zafar.

Table 5.1
Recent Trends in Gender Gap Index of Pakistan

OVERALL	Rank	Score	Economic Participation		Educational Attainment		Health and Survival		Political Empowerment	
			Rank	Score	Rank	Score	Rank	Score	Rank	Score
2014 (out of 142 countries)	141	0.552	141	0.309	132	0.805	119	0.967	85	0.127
2013 (out of 136 countries)	135	0.546	135	0.311	129	0.768	124	0.956	64	0.149
2012 (out of 135 countries)	134	0.548	134	0.310	129	0.762	123	0.956	52	0.164
2011 (out of 135 countries)	133	0.558	134	0.345	127	0.778	123	0.956	54	0.155
2010 (out of 134 countries)	132	0.546	133	0.306	127	0.770	122	0.956	52	0.155
2009 (out of 134 countries)	132	0.546	132	0.340	128	0.747	128	0.950	55	0.146
2008 (out of 130 countries)	127	0.555	128	0.372	123	0.751	123	0.950	50	0.146
2007 (out of 128 countries)	126	0.551	126	0.372	123	0.734	121	0.950	43	0.148
2006 (out of 115 countries)	112	0.543	112	0.369	110	0.706	112	0.951	37	0.148

Source: World Economic Forum, (2014) The Global Gender Gap Report 2014. World Economic Forum. Available Online at: <http://reports.weforum.org/global-gender-gap-report-2014/>

Table 5.2
Gender Gap Index

	Rank	Score	Sample Average	Female	Male	Female-to-Male Ratio
ECONOMIC PARTICIPATION AND OPPORTUNITY	141	0.309	0.596			
Labour force participation	137	0.30	0.67	25	86	0.30
Wage equality for similar work (survey)	111	0.55	0.61	—	—	0.55
Estimated earned income (PPPUS\$)	136	0.18	0.53	1,342	7,367	0.18
Legislators, senior officials and managers	124	0.03	0.27	3	97	0.03
Professional and technical workers	119	0.28	0.65	22	78	0.28
EDUCATIONAL ATTAINMENT	132	0.805	0.935			
Literacy rate	129	0.63	0.87	42	67	0.63
Enrolment in primary education	131	0.87	0.94	67	77	0.87
Enrolment in secondary education	119	0.74	0.62	31	41	0.74
Enrolment in tertiary education	103	0.95	0.88	9	10	0.95
HEALTH AND SURVIVAL	119	0.967	0.960			
Sex ratio at birth (female/male)	1	0.94	0.92	—	—	0.95
Healthy life expectancy	128	1.02	1.04	57	56	1.02
POLITICAL EMPOWERMENT	85	0.127	0.214			
Women in parliament	71	0.26	0.25	21	79	0.26
Women in ministerial positions	138	0.00	0.20	0	100	0.00
Years with female head of state (last 50)	23	0.10	0.20	5	45	0.10

Source: World Economic Forum, (2014) The Global Gender Gap Report 2014. World Economic Forum. Available Online at: <http://reports.weforum.org/global-gender-gap-report-2014/>

INFORMATION TECHNOLOGY AND WOMEN EMPOWERMENT

Key development institutions such as the World Bank, the United Nation Development Program (UNDP), and the United Nations Development Fund for Women (UNIFEM) believe that ICT represents a remarkable empowering instrument when deployed and used appropriately (Rabaya, 2010). ICT can be a powerful tool for women to overcome discrimination, achieve full equality and enjoy greater participation and decision making toward a more favorable position in the society. Furthermore, according to Sharma (2001), in developing countries, where marginalization of women may be the greatest, ICT can provide a great opportunity to enhance their access to information and knowledge for self-empowerment.

Empowering Women

The foremost idea behind women empowerment is that of “power”. For empowerment to work, it is imperative that two things happen: one, a change happens in the women’s ability to participate more in socio-economic spheres, and two, they are able to apply this power to expand the horizon of social and economic opportunities for themselves. Empowerment, thus, becomes a multidimensional process as it helps them gain rightful control over the quality of their lives and of those around them.

United Nations (2011) suggests five components to define women empowerment:

- Right to have and determine choices
- Right to have access to opportunities and resources
- Right to have the power to control their own lives, both within and outside the home
- Their sense of self-worth, and
- Their ability to influence the direction of social change

These five components appear interrelated and mutually reinforcing. Women’s power to change the course of their lives and their socio-economic status seems inextricably linked to their ability to explore and create choices and opportunities around them. Education is a key link in this equation, as it enables them to apply their acquired knowledge to understanding and claiming their right to access resources for themselves, their families, and the wider community. This has the potential to raise their position in the society and increase their sense of self-worth, confidence and effectiveness.

Broadly speaking, ICT can contribute to all five components of women’s empowerment, as drawn from the UN draft above. Chiefly, it can help them find not only a voice for themselves but also enable exploration of new opportunities for meaningfully raising the quality of their lives and encouraging socio-political engagement toward positive outcomes for themselves and others around them. This has been true in Pakistan as ICT has played a key role for women in Pakistan to overcome discrimination, and enjoy greater participation and decision making toward a more favourable position in the society. Recently, a number of inspiring success stories have emerged of women putting ICT to

use successfully for achieving positive outcomes, both economic and social. Some of the examples of such achievements by women are given below.

The Reading Room Project

Mashall Chaudri's Reading Room Project (RRP) is one such success story. In her fight against female low literacy rates and a dismal public education system, Mashall Chaudri took the initiative to use ICT to change the landscape of Pakistan's primary education and improve child literacy. The RRP uses the power of the Internet to address the problem of access to teachers and textbooks. This is done through creating computer labs for high potential, low-income students to attend after school, where they are trained in the use of computer, the Internet and, a huge range of educational resources. By using educational content from all around the world and presenting it to the students, the Reading Room Project is able to ensure profound knowledge acquisition and critical thinking skills among their students (RRP, 2015). Although this project is not limited to females, the benefit to them is enormous, as a lack of computer education and training facilities in Pakistan deter females from accessing knowledge online. Many girls have already benefitted from this program.

The Women Digital League

The Women Digital League is another promising ICT initiative founded by Maria Umar. She came up with this idea while working online at home in Khyber Pakhtunkhwa after she was laid off from her work because she was expecting a baby and was not able to get maternity leave. Keeping this injustice in mind and the fact that many women in Pakistan are discouraged from working outside their homes, she came up with this social enterprise (Ehsan, 2015). Women's Digital League is a social initiative that trains and connects women to work online. Their aim is to empower the women in Pakistan through capacity building, training in digital work, and relevant skill development. They believe that by tapping into this high potential and under-utilized market, they can bring about effective and sustainable development for not only women but for the Pakistani economy as well (Women's Digital League, 2015).

DoctHERs

Pakistan's healthcare sector has some odd dynamics; while 70 percent of the students in medical schools are females, only 23 percent of the registered doctors in Pakistan are women. A recently launched project, doctHERs, has been using ICT to solve exactly this problem by bridging this huge gap through getting female doctors, who are either married after finishing medical school or quit after having a baby, back into the doctor workforce (Ilyas, 2015). It should be of no surprise that this amazing initiative was also co-founded by a woman named Dr. Sara Khurram, who herself had to quit residency halfway because she was expecting her first child. Consequently, this helped her to come up with this brilliant idea of enabling female doctors, who were unable to practice medicine due to some family constraints, work from home and serve people who do not have access to good

healthcare (Ilyas, 2015). By using online technology to set up video consultation, doctHERs is able to connect home-based female doctors to hundreds of underserved patients. Having two fully functional clinics in Karachi already and one in Mansehra in the pipeline, doctHERs wants to upgrade all its facilities by introducing telemedicine.

Markhor

Another great success story that has come to prominence is that of Markhor. Starting from the district of Okara, co-founders Sidra Ali and Waqas Ali used the Internet and social media marketing to set up their online store of delivering high quality handmade shoes around the world. By connecting local shoemakers in Okara to people all over the world through the Internet, Sidra and Waqas were able to provide top quality handcrafted shoes through their online store to customers worldwide. However, it was definitely not an easy ride for both these young entrepreneurs, especially for Sidra, who was not really encouraged to pursue her entrepreneurial ambitions. Her family expected her to teach at a local school and eventually get married like other young women of her age (Tajammul, 2015). Despite the hurdles, their continuous struggle and hard work, along with their strong interest in social media marketing and computing, finally paid off. Markhor is now successfully serving hundreds of customers all around the world.

NetSol

NetSol, a leading global supplier of enterprise software with its global delivery center at Lahore, is an example of the role corporations need to play for providing opportunities to women in Pakistan. Over the years, NetSol has been doing tremendously well in helping empower women and enhancing their knowledge. Being the largest IT firm in Pakistan, NetSol provides employment to a large number of females as almost 20 percent of the total 1500 employees are women. According to the CEO of NetSol, Salim Ghauri, NetSol has been able to provide several ICT opportunities to women who, even after they have left their jobs, are able to start and initiate their own ventures. Some of them are able to work from the comfort of their homes by selling their ICT based skills online.

HOW CAN ICT HELP WOMEN?

The examples above show that from creating job opportunities to providing more convenient access to health services, ICT is an efficient medium to utilize where women empowerment is concerned. Women empowerment is closely tied to women's ability to exercise better choices to improve their living standards, giving them greater control over the quality of their lives.

The effectiveness of ICT in helping women empowerment is multidimensional. It not only empowers women socially but also in several other ways (Beena & Mathur, 2012).

Social Empowerment

Information technology is a powerful tool that provides women easier access to new and beneficial knowledge, raises their awareness about a variety of issues, and creates interesting activities for

women to benefit from. In case of Pakistan, where women are not the primary decision makers in the family, participating in such activities, raising their voice, and being aware of their surroundings provide a liberating experience. Therefore, initiatives like the Woman Digital League and doctHERs have shown us the possibilities ICT can open up for socially empowering women.

Technological Empowerment

It goes without saying that with the inclusion of information technology in the lives of women, they are equally empowered with technology. Learning new tools and technologies, developing and enhancing their skills make women more talented. In addition to this, these newly acquired skills give women a boost in their confidence levels to utilize these skills to their advantage. It is thus, that the Reading Room Project and the Woman Digital League have placed importance on teaching, training, and empowering women through technology.

Emotional Empowerment

Having the power of decision making increases self-confidence amongst women and contributes in raising their self-esteem. They feel more valued and respected, which serves as a great motivation for them to further apply their ICT skills and knowledge. With growing confidence, an increasing number of women are using social media to put forward their voices and opinions.

Economic Empowerment

In the modern era, ICT is a great enabler of economic enterprise. Through familiarity with the use of ICT, women can explore a wider range of opportunities to engage in value generating activities, often from the convenience of their homes or neighbourhoods. The access to market information, prices, business expertise and regulatory facilities can help them initiate income generating activities to become more economically independent. These are just a few examples of how women have found a medium through ICT to help themselves and even improve the lives of others around them.

USE OF ICT IN DAILY LIVES

There are several ways in which women can put their knowledge of ICT to use in their daily lives. This can be both as part of income generation and engaging in social and advocacy activities to help women become more engaged and better represented members of the society.

Increased Engagement

In Pakistan, by and large women are marginalized and excluded from the social sphere. This limits their ability to participate in decision making in their community/society. The examples mentioned in the previous section show how ICT can help them become more involved in the political and economic spheres, allowing them a better understanding of their environment, and how they can make better and more informed choices to obtain more favorable socio-economic outcomes for themselves.

To make informed decisions, ICT plays a key role for the girls by becoming the platform to access the necessary information. Mobile phones and computers are a great method to provide girls with the freedom to explore the world around them and apply the new knowledge to help the community around.

Bridging the Gap for Isolated Women

In Pakistan mobility is a major issue for women. Network building is key to connecting women so that they may share their issues, find solutions etc., even when they cannot meet or see each other in person. Here, mobile phones again play a definitive role to help women stay connected with each other. SMS-based “peer networks” have been effective in creating secure groups for women to stay connected. This way they can even seek advice from trainers and mentors, promoting real-time knowledge sharing. This is a quick and inexpensive way to help women who face the problem of mobility in their daily lives. The most important aspect to note from the examples mentioned in the previous section is how ICT has helped to address the location issue for women. Usually in Pakistan, women coming from places like Khyber Pukhtunkhwa or Okara, find it a bit difficult to come through with their ideas. However, access to knowledge and use of ICT has opened up new horizons for women all around Pakistan and has shown that location does not really matter.

Social Mobilization

ICT has proved to be a remarkable tool to remove literacy barriers for women. Social scientists around the world have recognized this, and many are actively campaigning in its use to extend the range of possibilities for women in the most underdeveloped regions. Many case studies have documented the role of social media in the mobilization of communities, especially in developing countries, to bring about desirable political changes. ICT can afford women a medium to voice their concerns and priorities toward ensuring their uplift as a population.

In a developing country like Pakistan, adolescent girls face innumerable problems. However, most women living in an uptight society do not come up to seek help. This causes the problem to increase further as without proper documentation of cases of violence, it appears, that the episodes of violence and discrimination tend to increase. However, with technologies like SMS and social media, platforms can be created for these women where they feel free to tell their stories and seek help.

Creating Economic Opportunities

This dismal figure of female labor market (see Table 5.3) is a result of a number of reasons including lack of proper training, skill development, access, and education. Many girls in Pakistan prefer working in the informal sector, as it is easier to gain employment in these areas. However, information technology has had a positive economic impact in helping them obtain formal employment (Pakistan Economic Survey, 2014). With access to mobile phones, girls can connect and interact through various online fora for exploring business and job opportunities. They do not need to travel from door to door in order to find employment, when they have ICT at their disposal.

Table 5.3
Crude Activity Participation Rates

Indicators	2009/10	2010/11	2013/14
Total	33.0	32.8	32.3
Male	49.5	49.3	48.0
Female	15.5	15.6	15.8

(%)

Source: Pakistan Economic Survey (2012) Population, Labour Force and Employment. Ministry of Finance, Government of Pakistan. Available Online at: http://www.finance.gov.pk/survey/chapters_14/12_Population.pdf

CONCLUSION

ICT is increasingly recognized as a key focus area in government policy for socio-economic development. While its direct contribution to the country's economy is already acknowledged, perhaps a more significant role for it would be to create conditions for enabling new socio-economic opportunities for the less privileged sections of the society. In the case of women development, it is especially well suited to empower them economically, socially, politically, and intellectually, to help them obtain a more productive role in the society and the economy. By facilitating access and use of ICT by women, the government can help create the right conditions for greater labor participation and citizen engagement. Considering the size of the population, the impact of such investments on the economy and the society can be substantial.

The government would do well to promote ICT education among women. In addition, providing cheap connectivity at homes should help encourage more women to connect online and further expand their knowledge and capabilities. Creation of content that is especially targeted at them, including information on markets, health, education and even political choices, should not only attract more women to the use of ICT but also encourage them to put it to productive use.

PART III

Chapter 6

Using ICT in Least Developed Areas

Chapter 6

Using ICT in Least-Developed Areas*

Whereas the district rankings of Human Development Index (HDI)¹ can be one proxy for determining the under-developed areas of Pakistan, the technologically-backward areas typically include, but are not confined to, the non-urban areas of Baluchistan, FATA, PATA, GB, AJK, and some far flung areas of Sind such as Keti-Bandar and Tharparkar. However, the Universal Service Fund (USF)², which is created to provide technology to backward areas, defines “underserved areas” as those not having adequate coverage or provision of voice and data telecommunication services and uses tele-density and broadband-penetration as some of its metrics.

With the advent of the Big Data, the Digital Divide paradigm as applied to people, will now apply to countries. Technologically backward countries, such as Pakistan, will lose out in the decision support systems due to lack of sufficient Artificial Intelligence and Big Data Analytics. But within the country, the backward under-served areas will lose out on several fundamental services such as health, education, banking, markets, government services, social cohesion, etc.

Baluchistan, with 44 percent of area of Pakistan but only about five percent of population, is one such example, where not only the HDI and the prevalence of Information Communication Technologies (ICT) are low, but the provision of conventional utilities, such as the electricity, are economically infeasible. In such a scenario, the prototyped projects of ICT for Development (ICT4D) as practiced in Africa, which use integrated solutions involving solar panels (for power), VSATs/GSM (for bandwidth) and tablets (for processing), may be replicated. Government of Baluchistan has already planned on purchasing a VSAT based solution from a global satellite company, while it is introducing e-education projects in selected schools. However, as this chapter will discuss, policy and administrative hurdles are more than the technical and financial ones.

Eradication of polio is one example where a local problem can become a global issue. The town of Chaman, on border of Afghanistan, is struggling to cope with an explosive number of polio cases. Punjab IT Board has successfully used ICT using mobile android devices to obtain Early Warning for dengue and is tracking the vaccination process by using Apps which report the GPS coordinates of the Mobile Health Visitors/Workers, something which may be adapted in Baluchistan as well. In other examples, the Labour Department of Baluchistan has created IT-based employment exchanges, where employers and labourers can be linked up but it has not been able to sustain them. This identifies that in backward areas, not only are technological solutions difficult to deploy but are also complex in sustaining operations and pose challenges of acceptance by local communities. Towards

*This chapter was contributed by Khalid Sherdil.

the success stories one can cite the e/m-economy schemes such as the mobile banking or Easy-Paisa, whereby financial transactions may take place through SMS based (non-smart cell) phones.

This Chapter will initially discuss some typical IT schemes which underdeveloped areas may use. However, such schemes are quite basic and already considerable literature exists on them. Hence to bring in originality, this chapter will delve into some advanced technological solutions, including futuristic ones. The objective is not only to cater to generalists/practitioners but also to more technical IT specialists/practitioners. The chapter will conclude with an analysis of the use of ICT in developing areas in the field of disaster management with examples from epidemic and flood control. In light of actual experiences from such projects, this chapter will propose technological solutions to develop the backward areas and also suggest policy changes required to sustain them.

INFORMATION COMMUNICATION TECHNOLOGIES FOR DEVELOPMENT(ICT4D)

The paradigm of Information Communication Technologies for Development (ICT4D) has been a field of its own, with numerous conferences and journals presenting case studies of projects from the developing countries. However, as Richard Heeks,³ a prominent researcher in ICT4D, quotes on basis of a survey, at least one-third of such projects are total failures while almost half are partial failures. Example of Gyandoot Computer Kiosks in rural India in the year 2000 is often quoted, where the project won awards from Stockholm Challenge and the Computer Society of India. Later studies in 2002 found the kiosks were abandoned. A similar Kiosks project in Gujrat Pakistan failed a few months after its inauguration by the then Chief Minister of Punjab, who hailed from the same town. This was perhaps the reason, why the world famous IT leader Bill Gates decided to pour billions of dollars into medical initiatives rather than into ICTs in Africa.⁴ Another non-ICT social sector project is Kerala's Kudumbashree initiative that involves inducting women from below-poverty-line families into the ICT sector through hardware and services enterprises. These create real and direct benefits for poor communities – jobs, incomes, skills, empowerment, gender equalities – in a way ICT consumption projects cannot. Heeks also criticizes the Millenium Development Goals (MDGs) as necessary for development but not sufficient, and their prioritization of ICT applications for small and micro-scale firms at the expense of large enterprises as at odds with reality. This reflects that blind use of technology, without taking into consideration the social and cultural dynamics, is either not sustainable not optimally-beneficial for the masses.

ICT4D IN PAKISTAN

Standard ICT4D projects include use of ICT in e-government and governance related fields. Various public service delivery projects have been tried in Pakistan such as computerization of domiciles, arms licences, etc. Recently NADRA has ventured in these fields as well and has developed software which any Union Council may use for birth records. Ministry of IT has developed an e-filing software for paper-less office, which now is successfully used by the Establishment Division, where

the Secretary Establishment personally approves all e-filed cases⁵ on a desktop. According to the Establishment Division sources⁶, typical file turn-around time of 12 days is now decreased to half a day or 4 hours, and reliance on the Section Officer has almost finished.

However, rarely any of these projects are to be executed by public in which a citizen could file all the basic information on the Internet and then receive the government document/license by mail. Of course, personal appearance is necessary for original licence but mandatorily requiring personal attendance of an applicant for simple renewals may be red tape. Even the billing software, such as that developed for Murree Water Utility Bills, merely assists the Municipal Committee in compilation of records and possibly water theft detection but is not used for online bill payment (Figure 6.1). The Punjab Government's best public service delivery project may be the computerization of land revenue records,⁷ whose existing software was first developed by the author in collaboration with Accountancy Outsourcing Services (AOS) in 2001-03.⁸ The Punjab LRMIS project is hailed as a big success⁹ since it is now running in all the 143 Tehsils with 85 percent of the Mauzas computerized (Figure 6.2). Its next version will be completed in December 2016 with an estimated cost of Rs. 300 million. However, most of these projects are not specific to under-developed areas, since they apply equally well to developed ones. Some projects may apply to all areas yet have bigger impacts in the least developed areas. These include the Murree Water Utility Billing project, which helped improve water theft in an area where water was scarce or the polio control, which is applicable only in under-developed areas. Later in this chapter, we will discuss in more detail examples of flood relief projects which have higher impacts on populations in under-developed areas compared to the urban ones.

ICT4D in Least Developed Areas

Figure 6.1
Murree Water Billing System Software Sample Screenshot

The screenshot displays the 'Water Billing System [Tehsil Municipal Administration]' interface. The main window is titled 'ACCOUNTS INFORMATION' and contains the following data:

ACCOUNT INFORMATION	
Account No:	1
Account Status:	Regular
Name of Person:	MALIK ASRAR
Father Name:	ASRAR AHMED
Address:	XYZ CITY
Connection Type:	Commercial
Connection Opening Date:	01/07/2015
Connection Source:	PHED
Date of Deposit:	00/00/0000
Deposit Order No.:	
Deposit Order Date:	00/00/0000
Opening Balance	
Connection Charges:	500.00
Security Charges:	200.00
	34,638.00

METER INFORMATION	
Meter No:	Z-R-97308252
Meter Type:	China
Meter Status:	Connected
Meter Date:	01/07/2015
Ferrule Size:	1/2"
Measuring Unit:	Units
Meter Cost:	.00
Start Reading:	
Meter Rent:	.00

Remarks:

First	Previous	Next	Last	Search	Search List	List All
Add	Save	Undo	Delete	Transcript	Print	Exit



For the least-developed areas, the usual ICT4D ideas relate to tele-services such as e-health or e-education. The basic theme is to provide tele-presence of scarce human resources such as professors, science teachers or doctors who otherwise would either not travel to remote areas or it would be economically unfeasible to post them to scarcely populated areas. Several vendors are marketing such solutions and giving their sales-pitch to government but, at the moment, are encountering procedural hurdles primarily due to the inertia commitment and lack of appreciative understanding by the state apparatus notably the troika of P&D, Finance and Law Departments. After all, government officers are not held accountable for slow public service delivery in remote-areas but are taken to task by enquiries in case any such attempted projects fail.

According to the 1998 census, Baluchistan had a population of roughly 6.6 million. The population is scattered among its 33 districts where literacy rate in the year 2009 was 45 percent. This low literacy rate means it is not possible to accommodate and provide qualified teachers at every school and college. Due to the precarious security conditions and poor law and order situation, the non-local teachers face serious threat to life and, as such, several good teachers have already left the province.

Technologically, these tele-projects are very simple. At the minimum, one only needs Skype or equivalent tools for video conferencing. However, all the four provinces have deployed much more advanced video conferencing solutions than just Skype, entailing a Multi-Point Control Unit (MCU) offered by COMMTEL or PTCL, coupled with a Virtual Private Network (VPN) for security purposes.

Whereas CM Punjab extensively uses video conferencing on almost daily basis, the government of Baluchistan does not use it at all though that is where the distances are the longest. This reflects on the change in culture and mind-set of the end users.

At the backend, preparations are needed for such tele projects. For tele-health projects, one needs a doctor sitting in a central hospital, as is done by one tele-health firm which has rented a floor on Gulab Devi hospital in Lahore for a small studio. At the patient-client end, there is special equipment, provided by various companies such as Cisco (Figure 6.3), which can transmit not only video but also basic data of patients' health such as blood pressure, ECG, temperature, pulse, etc.

For tele-education, besides requiring a central studio with a teacher, one also needs on-line curriculum. Fortunately this does not have to be developed from scratch since various international



and local websites for it exist such as :¹⁰

Religious Resources

- www.tanzil.net
- www.millat.com
- www.AsanQuran.com
- www.UnderstandQuran.com

Digital Books

- www.scribd.com
- www.4shared.com

- Punjab Education Endowment Fund's Digital Library http://203.128.31.71/article_search.jsp
- Higher Education Commission's Digital Library (HEC Pakistan)

Primary and Technical Curriculum

- www.rehanschool.com
- www.rehantraining.com
- www.teletaleem.com

Schools and Colleges resources

- www.EurekaELearning.com
- www.blossoms.mit.edu
- www.KhanAcademy.org

University Courses

- Virtual University Pakistan <http://ocw.vu.edu.pk/default.aspx>
- www.coursera.org
- www.edx.org

Other Online Resources

- www.udemy.com
- www.OpenCulture.com
- www.ocwConsortium.com
- www.AcademicEarth.org

However, there are some technological challenges to overcome as well. Primarily these are lack of Internet and power (electricity). Apparently, solutions to both these challenges exist in text books but grass root realities are difficult. Let's begin with internet.

Internet Issues

Internet bandwidth can either be provided by the government or the private telecommunication companies, failing which one has to install a VSAT dish and obtain bandwidth directly from a satellite. During my visit to Gwadar in September 2015, I was told that there was no Internet available in town, which was reportedly a source of big concern for the visiting Chinese engineers. Surely if Internet supply was a non-issue, Pakistan's government would have it up and running (at least in the Gwadar port-town, if not in the entire district), considering that CPEC (China Pakistan Economic Corridor) is the most important development intervention of the current government. However, for local citizens, lack of access to Internet was not on agenda because of the absence of even bare necessities such as water and power.

The reason behind failure of private telecommunication companies is that it is financially unfeasible for them to invest in remote and low density population areas such as the “slums” of Gwadar, a town with population of 85,000 (mainly fishermen). For this purpose, most countries have formed a fund, an idea replicated by Pakistan’s Universal Service Fund (USF), in which each telecommunication company contributes 2 percent of its revenues. The USF is then supposed to invest in the under-served areas. Being a State-Owned Enterprise (SOE), the USF hires staff which could be incompetent and yet high salaried, as is the hallmark of SOEs. Logically, the Board of USF should have one member nominated from each province, such as is the case with NEPRA or the Federal Flood Commission, but despite protest from the Baluchistan Government this was not done. Hence, the whole concept behind forming USF to assist the smaller provinces failed to achieve its objectives.

USF has indeed invested in large schemes to lay hundreds of miles of Fibre Optic Cable (FOC) to remote areas of Baluchistan, including Gwadar. But once these hefty budgets were consumed, the cable lay dead and no effort was made to actually use it to either provide bandwidth or voice call facilities. When Baluchistan Government officially raised this issue with the USF and its parent Ministry of IT, a proper response was lacking. Instead, various rules were quoted against which USF was unable to intervene in the projects or allow the use of FOC to be sub-contracted to those companies which were willing to take the business risk to work in remote areas.

There is one other actor which has the ambit to provide Internet to government facilities in remote areas: It is the National Telecommunication Corporation (NTC), another SOE. But NTC has not been able to provide full coverage in even the provincial capital of Quetta, due to lack of budget, let alone remote areas. ‘Lack of budget’ may be read as lack of budget after paying for the hefty salaries and perks to the employees, who are potentially hired on political grounds, as is a common characteristic of SOEs. NTC has now been alerted to pick up Gwadar on fast track. However, other remote areas of Baluchistan, with considerably lesser strategic value than Gwadar, will remain deprived for considerable period of time.

This leads to the final resort – not to rely on any state or non-state actors and instead get your own bandwidth directly from the satellite. This of course sounds more expensive, yet is not too expensive. If economies of scale are used, such as providing satellite bandwidth to a hundred schools instead of a single one, the solution may be cheaper. It appears, however, that the bureaucracy does not have the comprehension nor the will to invest in economies of scale. The typical response, especially from the P&D Department, invariably has been to first demonstrate a couple of pilot projects before scaling to a hundred schools or hospitals. We are stressing on these red tape issues not to belittle the bureaucracy but to demonstrate why such ICT4D projects have not taken off despite the fact that technology is prevalent.

Ideally, the government, as represented by its IT Departments/Division, should take a lead in providing an infrastructure where satellite bandwidth is available on economies of scale in remote areas. Rather than just buying and selling bandwidth from satellites, the governments should form their own satellite hubs. A typical satellite hub costs not more than \$150,000 in addition to deployment and maintenance costs. Bandwidth can then be purchased from any available satellite, such as Pakistan's own Paksat-1R of SPARCO, in Ku band. A three MHz band can be purchased for around \$130,000/ a year, which then can be shared by over a hundred locations, such as field offices, schools, hospitals, or even mobile vehicles. In fact, using the concept of bandwidth sharing, this number can be doubled to 200 locations with a slight decay in quality of service. All this sharing is managed by the hub dynamically, by adjusting the bandwidth between locations at run time. Hence colleges where a live 90-minute video lecture has to be delivered may be tuned to higher bandwidth during that slot, while shutting them off completely once the college closes. Setting up each additional location costs merely \$5,500 or so, which includes the VSAT dish, solar supply, lap top, projector and a wireless router for connecting students' cell phones with wi-fi.

Power Issues

There is an immense potential for solar power in Pakistan to address the power issue. However, it entails a high recurring cost. One has to rely on batteries for power backup, since one cannot tell a critical patient to visit only on a sunny day. Issue with batteries is that their proclaimed three-year life is normally less than two years. The devil lies in the details, which in this case is their data sheets. A typical battery's life is usually calculated in cycles and is around 1,000 cycles at around 24 degrees centigrade, where one cycle stands for discharge of a battery to its 50 percent value after being charged to 100 percent. Hence, ideally if a battery consumes one cycle per day, it should last for 1,000 days or around 3 years. Problem is that users often consume more than one cycle per day by adding extra load on batteries, and they normally drain or discharge the batteries to 0 percent instead of the ideal 50 percent. Further, the temperature of 24 degree centigrade is normally exceeded in harsh environments of say the Cholistan Desert, where Quaid-e-Azam Solar Park is giving merely 11-14 percent electricity instead of the planned 18-20 percent, due to high temperatures. To make conditions worse, the heat trapped underneath the solar panels causes an additional greenhouse effect, leading to a further increase of up to 5 degrees centigrade. The moral of the story is to install large scale solar projects in areas with heavy sunshine but cooler temperatures. For smaller projects such as providing power to a school, government's technical persons often fail to list appropriate specifications or mention the quality certifications in the Request For Proposal/Terms of Reference document. For example, the following specifications are often missing in tenders:

Solar Panel	100 Watt (can be in one or more panels) Fully certified by (and not just in accordance with) IEC 61215 international standard and for CE standard
Inverter	250 W per house Pure Sine Wave (to be demonstrated by Cathode Ray Oscilloscope)
Battery Bank	Bank of 12V/100 Ah 1600 cycles at 50% discharge GEL (AGM Absorbed Glass Mate not required) Certified by CE SMF (Sealed Maintenance Free)

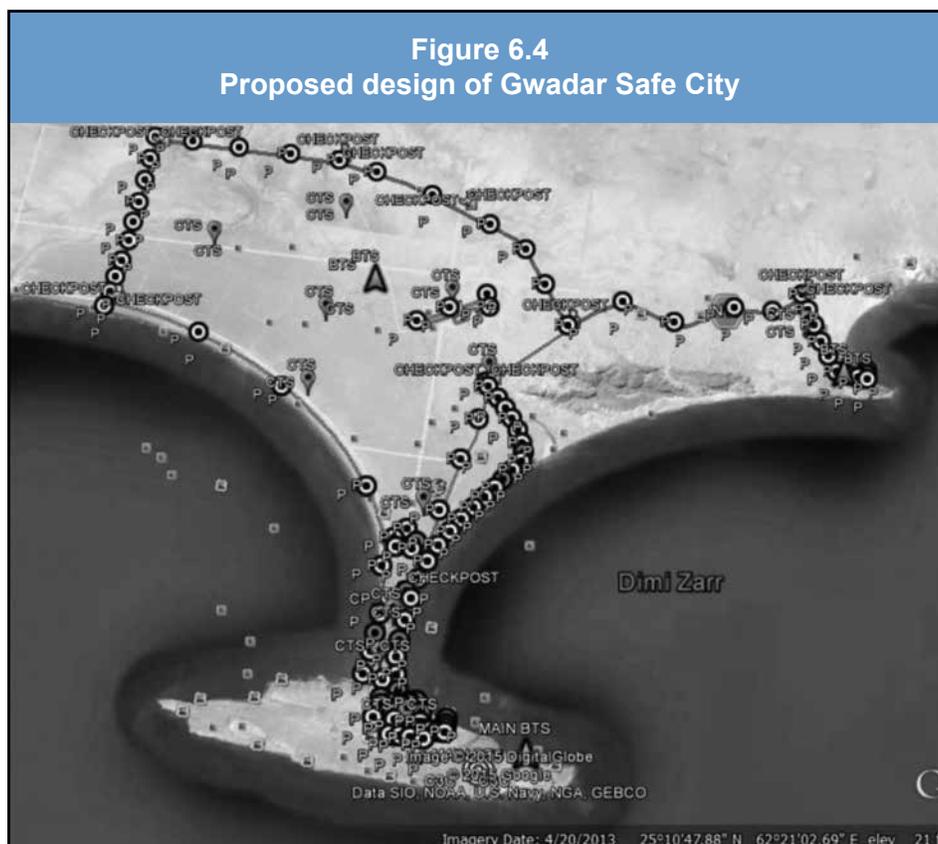
Even if there is enough budget available to replace batteries every two years, the issue of power supply does not go away when it comes to large scale distribution projects as in the Gwadar Safe City project discussed next.

ICT4D for Safety and Security

Whether there is a correlation between the law and order situation of a locality and its development index, is a matter of debate and research. In Pakistan, probably there would be a correlation had it not been for Karachi as an outlier. Baluchistan is facing serious security threat on two fronts. One is the global War on Terror against the Taliban, primarily in Pushtun areas of northern Baluchistan. The other is that of the Baloch nationalists, generally in Southern Baluchistan. The Safe City Projects are now widely being implemented to counteract the law and order issues, including terrorism, crime, and civil war. Whereas Islamabad Safe City project is scheduled to be inaugurated by the end of 2015, Punjab Safe City Authority is being developed for implementing the same in five cities. Karachi has developed a home grown solution while Baluchistan is soon launching the Quetta and Gwadar Safe City projects. Core of these projects includes cameras and other sensors (such as RFIDs) deployed all over the city as eyes, whose video feeds merge at the C4I (Command, Control, Communication, Computer and Intelligence Center) which forms the brain of the system. Artificial Intelligence is added through video analytics and other algorithms which learn from the behaviour of the observed entities and then attempt to predict some crime prior to its occurrence.

Currently, Gwadar is getting merely 14 MW of electricity (less than what a medium sized cement plant generates through its own power plants), has non-existent internet bandwidth because of lack of action by the concerned federal government agencies, and its fresh water supply is less than a large village (equivalent to 4 tube-wells or so). Why Pakistan could not import a few Mega Watts of electricity from Iran, despite Iranian offers, is due to the inability of Pakistan to extend the Iran-Jeevani grid to Gwadar (70 km). So much for the grievances of Gwadar's citizens. In order to make the Gwadar Port functional, the water and electricity problems have to be solved. An 80- km-long fresh water pipeline will be laid soon by China, since the water table of Gwadar is brackish. Similarly, a 300 MW coal fired plant will be constructed in Gwadar for the energy needs of the port and city.

The Gwadar Safe City project entails a 35-km-long electronic fence, primarily on the coastal highway, where a mix of short range optical cameras and long range laser cameras (with night vision) would be used to detect any entity crossing the virtual fence (Figure 6.4). The primary issue here is lack of power and internet across such a large distributed area. Satellite bandwidth is too expensive for high definition (or Ultra HD 4K) video feeds. Hence all across the coastal highway, solar power along with fibre (FOC) and wireless (4G LTE) equipment has to be provided. All this has to be specially done for this project since, as opposed to Islamabad and Quetta, there is no other FOC or 4G infrastructure already available for cable TV or cell phone systems. Whereas in Quetta, solar power has to be provided as a backup during the load-shedding period, in Gwadar solar power has to be provided as a primary medium with a 24-48 hour backup in case of extensive cloudy weather. To cater to such requirements entails huge costs and budget. It is indeed presumptuous to believe that China will pay for these costs, as is being done in Islamabad Safe City project, because such assistance is typically in form of a loan and not grant. In addition, the project also envisages prevention of potential terrorist attack from the harbour. This requires an extensive mechanism on VHF frequency for boat tracking for all private fishing boats. Motor vehicle tracking is to be used through ANPR (Automatic Number Plate Recognition) cameras as well as RFID (Radio Frequency ID) readers.



POTENTIAL ICT INTEGRATED SOLUTIONS FOR BACKWARD AREAS

Social National Network System

Whereas sociology is the science of society and social relationships, through systematic study of the structure, interaction, and collective behaviour of groups of humans¹¹, the social media (SM) is a set of ICT (Information Communication Technologies) tools which assist this interaction. These tools allow users to collaborate by publishing or accessing content, and hence develop relationships and communities. The analysis of the structure of these social societies is observed through the social network, typically represented by graph theory with clusters of social entities.

A simple social media system (such as Twitter, Face book, etc.) has data which is open, unofficial, voluntary, and collaborative (de Faria Cordeiro, Marino, Campos, & Borges, 2011). The national ICT systems, such as those used by the Government Departments of Health, Transport, etc., have data which is closed, official, professional, and private. The social media data is typically qualified as Big Data, while the national systems data typically does not have veracity, but is 'Lots of Data' from diverse non-interoperable silos¹². If we amalgamate the two, we get an SNNS (Social National Network System), a term coined by the author. We propose that the government systems should take advantage of the social media in order to obtain better support for decision-making, using the Big Data generated by the social media.

"The interplay between persons' social behaviours and their interactions with computing technologies" constitutes the Social Computing (Quinn & Bederson, 2011). In order to make meaningful information from the data generated from the SNS, Integrated Social Information Engineering is used to fuse the data to yield meaningful information (Wassell, Rubin, & Frost, 2011). Social network analysis typically uses graphs or sociograms with nodes representing social or cultural entities such as humans and edges representing weighted distances of their closeness, either geographically or in terms of their interactions with each other. Community Detection can be performed by a Clique Percolation Method, which finds the maximal cliques formed in a social graph, such as of the Call Detail Records (CDRs) (Dong, Ke, Cai, Wu, & Wang, 2011); Network evolution algorithms can then generate how this community evolves on a timeline, including Churn prediction.

As computing becomes progressively smaller and more powerful, it is embedded in everyday devices (as microprocessors or RFIDs) such as clothing, which are then connected to an infinite network of other devices. This is related to the Ubiquitous Computing or Internet of Things (IoT), coming out of emerging technologies such as Near-Field Communications (NFCs), embedded smart sensors or Wireless Sensor and Actuator Networks (WSAN), real-time localization, and Machine to Machine (M2M) communication. It is a paradigm which connects the real world with the digital world (Presser & Gluhak, 2009). According to CISCO,¹³ Internet of Everything (IoE) has potential to grow global corporate profits by 21 percent by 2022 when an estimated 50 billion objects will be connected to the Internet.

Pervasive computing relies on convergence of wireless, electronics, and internet to form smart products in a Wireless Intelligent Sensor Network (WISN). For example, in the aftermath of Katrina Hurricane in 2005, a sensor array was installed on walls of levees in Lake Pontchartrain to monitor structural erosion, water level, temperature, and bacteria count (Meikang, Zhong, Jihe, Yang, & Yang, 2014).

The NASA Sensor Webs¹⁴ uses satellite based remote sensing, airborne and ground sensors, to create custom data products on open tools such as Google Earth. For example, the Fire Sensor Webs project¹⁵ uses the 'hot' pixels and smoke from remote sensors to detect fire and produces imagery in KML¹⁶ files for end users. Such products, which use data from multiple web sources to create a single new service displayed on a single GUI (Graphical User Interface), are also known as Mashups. When the sensors become social, they begin to communicate with each other leading to the emergence of intelligence, as in Swarm Intelligence (A. Zelenkauskaitė, N. Bessis, S. Sotiriadis, & E. Asimakopoulou, 2012).

Fully distributed multi-hop wireless networks are called Wireless Mesh Networks (WMNs), which typically work in conjunction with sensors. Mobile vehicles and drones add up to this Digital Ecosystem, by bringing in the complexity of intermittent networking, so as to form MANETS (Mobile Ad-hoc Networks) or VANETS (Vehicular Ad-hoc Networks). A Digital Ecosystem is a "self organizing digital infrastructure aimed at creating a digital environment for networked organisations that supports the cooperation, the knowledge sharing, the development of open and adaptive technologies and evolutionary business models."¹⁷

Cell Phones as a Mobile Human Sensor Network

In 2000, there were 700 million cell phone subscriptions with less than 30 percent in developing countries. By 2012, there were six billion subscriptions (for estimated 75 percent of global population) with over 75 percent in developing countries and 70 percent having smart featured phones (Brynjolfsson & McAfee, 2014). According to the Pakistan Telecommunications Authority¹⁸, \$544 million of cell phones were imported in 2013-14, 38,000 towers were installed, cellular tele-density increased to 76.6 percent - a six year high growth, and the total cellular subscribers reached 140 million – a growth of 9.1 percent over last year. This included an addition of 11 million new subscribers.

When the sensors are humans, it forms a Human Sensor Network. As billions of users sense what is going on in their environment and react to it often by sending messages (such as tweeting) through their mobile phones, they form a Mobile Human Sensor Network. These are coupled with the physical sensors, deployed by the government's national systems (such as the RFID¹⁹ readers or CCTV video²⁰ cameras) as well as by the citizens (such as the health care monitoring gadgets), to form a Distributed Sensor System. Hence the human users are no longer the recipient of data,

rather focal point of the Data Lifecycle (Evans, Cappelaere, Moe, Frye, & Mandl, 2014), in which the sequential boundaries between data acquisition, processing, and analysis are already getting blurred.

The mobile devices provide us with the location coordinates, which can assist in inferring the situation and context. Asta Zelenkauskaitė, Nik Bessis, Stelios Sotiriadis, & Eleana Asimakopoulou, 2012 provide five types of contextual variables: (a) Individuality, which describes the properties of the entity itself; (b) activity, or the tasks which entity is involved in; (c) location; (d) time; and (e) relations with neighbours or other entities. There is complexity in these contextual variables since they are transitional and keep changing. The relations between different entities form the social network (SN), and become particularly useful in disasters. SN graphs can be generated by tools which also cluster the entities depending upon their relationships.

Crowd Sourcing: Jobs for ICT Users in Under-Developed Areas

The term crowd sourcing was coined by Jeff Howe and has multiple definitions as elaborated by Estellés-Arolas & González-Ladrón-de-Guevara, (2012): “Crowd sourcing is the act of taking a job traditionally performed by a designated agent and outsourcing it to an undefined, generally large group of people in the form of an open call”. Etymologically, its suffix ‘sourcing’ refers to procurement practices for engaging suppliers of services. When Alan Turing invented computer he stated that it was intended to carry out any operations which could be accomplished by a human computer, which was the name of a job at that time (Brynjolfsson & McAfee, 2014). Human computation is synonymous to Collective Intelligence (groups of individuals doing things collectively that seem intelligent), and is “a paradigm for utilizing human processing power to solve problems that computers cannot yet solve” (Quinn & Bederson, 2011). When crowd sourcing intersects with human computation, it can do tasks which can replace either human or computer roles.

Task Rabbit²¹ is a marketplace which allows people to offer their labour in the form of small jobs and tasks to the crowd. For example, when Malaysian Airlines Flight 370 went missing, 115,000 volunteers analyzed the satellite imagery at a rate of two million pages every 10 minutes in an attempt to find the rubble²². The remote-sensing-image-analysis-crowd sourcing -website Tomnod²³ crowd sources the image data and requests volunteers for tasks. Each volunteer undertakes a task via a flexible open call by bringing in his/her work, time, money, knowledge, and experience in return for some mutual benefit, such as economic, self-esteem, social connection/recognition/status, or self skill-development (Estellés-Arolas & González-Ladrón-de-Guevara, 2012; Yue & Blevis, 2011). The four general characteristics of crowd sourcing as enumerated by Tan Tingting²⁴ are (a) open production for anyone to participate, (b) dynamic organization structure which can evolve, (c) physical scope distribution, and (c) participant autonomy/independence. Any user can adopt the triple roles of producer, communicator, or consumer of information or tasks.

Disaster Management in Least-Developed Areas

Disasters do not affect the rich and poor equally. The citizens of under-developed areas often face long term implications of disasters, while the citizens of developed areas recover much more quickly. In fact, developed areas are often better prevented from disasters due to better mitigation technologies. In 2010 alone, Natural disasters killed over a quarter of a million people (Wassell et al., 2011). A hazard is a dangerous phenomenon, substance, human activity, or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage (UNISDR). A disaster is defined as a serious disruption of the functioning of a community, causing widespread human, material, economic or environmental losses that exceed the ability of the community to cope using its own resources (UNISDR). Hence for the same hazard, the actual effects of a disaster can be different on a developed community compared to an under-developed one. Humanitarian crisis involve a series of events representing a critical threat to the safety, security or wellbeing of a community, usually over a wide area. Vulnerability is the characteristics and circumstances of a community, system, or asset that make it susceptible to the damaging effects of a hazard (UNISDR). Risk is a function of hazard, vulnerability and emergency-preparedness. For example, in Bangladesh, the risk due to cyclones has been decreased due to preparedness; in 1991, about 138,000 persons were killed by a weaker cyclone compared to 128 deaths of a stronger cyclone in 1997²⁵.

The measures taken by governments and communities to prevent or encounter a disaster fall under the domain of disaster management. Disaster management is different from project management because you cannot plan for disasters, and rather have to be reactive, though you can have SOPs²⁶ to ensure that your re-activism/reaction is managed and not ad hoc. ICT4D can be used for mobilizing the community in the process of disaster management. In pre-digital era, disasters were coped without any ICT systems. For example, the Garrison town of Quetta was established by the British at the junction of Iran, Afghanistan and modern day Pakistan. It has been prone to earthquakes. It was completely destroyed on May 31, 1935 by an earthquake with 35,000 fatalities and then damaged again on October 8, 2005 by another²⁷. In modern information era, the US Geological Survey (USGS)²⁸ offers a Tweet Earthquake Dispatch program,²⁹ where it provides early warning regarding earthquakes, by analyzing all the tweets with the keyword 'earthquake.' Similarly, within two hours of the Haiti earthquake³⁰, which had 59 aftershocks and caused over 200,000 deaths, the Open-Street-Map based "Ushahidi-Haiti"³¹ system was set up by volunteers. It also integrated email, SMS, tweets, etc., for sending messages for assistance, which were then visualized on a Geographical Information System. Public then releases labelling information (UGC) based on these professional map platforms to produce new map products overlaying the base map. The other prominent open source public disaster information platform is Sahana³² which was developed in Sri Lanka in the aftermath of the 2004 Tsunami. A Red Cross study on the 2010 Chile earthquake,

in which two million³³ people were injured, showed that during disasters people were more likely to seek help through social networks (Stiegler, Tilley, & Parveen, 2011).

An integrated Disaster Management System (DMS) connects several ICT systems, typically linking the different government systems. The government uses DMS for the purposes of Emergency Disaster Response Coordination Mechanism. For example, in Korea ten different disaster related systems are integrated to form a DMS, which has successfully reduced the early warning time to 4,000 agencies in 3,585 towns from 35 minutes to 1 minute (Na, Youngtae, HyeogIn, HiYeob, & HyeYeon, 2013). In both the Hurricane Katrina and the Sri Lankan Tsunami, it was realized that no appropriate government systems exist for keeping public informed (Walle & Turoff, 2007).

The global *climate change* phenomenon is increasing the frequency of disasters, and coupled with human development and population increase, it is imperative that we should aim for disaster resilience and adaptation, rather than disaster control. However, once a disaster is forecasted and imminent, an Early Warning System (EWS) is required to minimize the damages. It is clear that the potential of geospatial data and tools for DMS are not fully realized, and often people living far from the disaster impacted area are better informed through media than those carrying out the relief efforts within (Goodchild & Glennon, 2010).

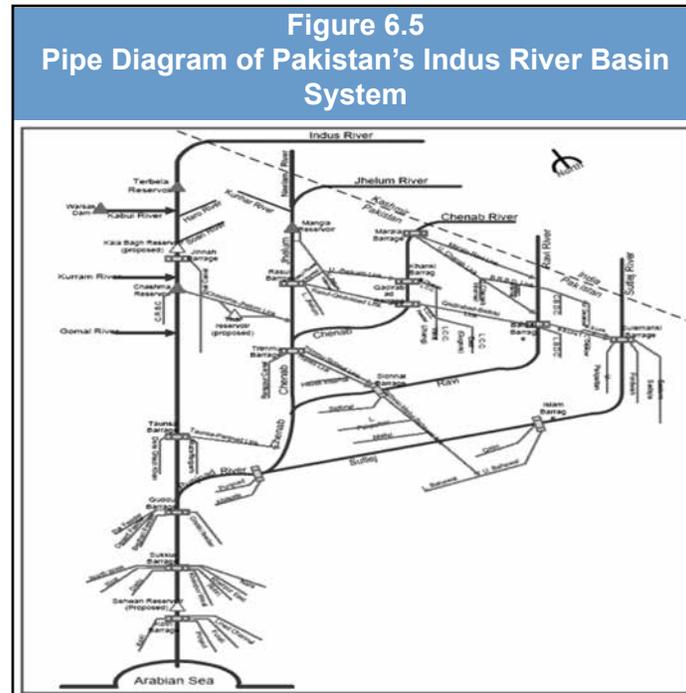
Flood Early Warning ICT Systems

Provincial Disaster Management Authority PDMA³⁴, Punjab has used a DMS for a flood warning system which is based on a GIS which can predict the population likely to be affected given the inflow of water in upstream rivers. PDMA has also used the Sahana DMS³⁵, which was used in the 2004 Tsunami. PDMA also uses telemetry data of water flows from rivers all over the country.

Hydrological disasters are the largest ones in terms of frequency of occurrence and number of victims (Guha-Sapir, Hoyois, & Below, 2014). Pakistan's Indus river basin of five rivers is flood prone. It can be converted into a tree or pipe diagram (Figure 6.5). At various points in the river system are the barrages or reservoirs which store water. Using calculations on flows of river in each node, outflow from each node, and the reservoir capacity (which can act as a buffer), we can predict the likely flood water in a river, hence generating early warning. At any given node, the flow of water plotted over time gives the discharge plot, also known as a hydrograph. A telemetry system has been deployed in all the rivers across the country, where discharge data from 42 points is received live through cellular-based sensors in the rivers. It can be used for early warning.

The forecasting of floods starts when the snow falls on glaciers. This is followed by estimation of the rainfall or precipitation in the catchment areas. The glaciers' melting causes only 60 percent or so of the water in the river. For heavy floods, a weather system must be developed as well. These systems can cause rapid monsoon rains, which coupled with the glacial melting, can engender peaks of heavy floods. Multiple Weather Radars have been deployed which can detect such weather

systems. Due to effects of climate change over a period of twenty years, the monsoon rains peak has shifted towards the West by over 100 miles. Since the rivers in Pakistan originate from India, the forecasting and scenarios require collaboration and data from India. There is an agreement between the two countries according to which India gives six- hourly data of river discharges to Pakistan.



In 2010, the heavy floods affected over five million citizens and damaged half a million houses in the floods affected areas of Pakistan.³⁶ China also has major flood issues since two-third of its land is flood prone, causing a damage of \$16.5 billion annually in 2002-07 (Qing & Qiang, 2007). A Decision Support System has been proposed by (ibid) which caters to all phases of the disaster cycle. It uses the electronic maps of the river basin to predict the expected damages depending upon vulnerable areas as revealed by a flood simulation. This is then complemented by the actual post-flood damages to chalk out a reconstruction plan. Similarly, NASA's Sensor Webs' Namibian Early Flood Warning Project³⁷ uses water gauges to obtain river flow data and overlays it on past flood data to give early warning.

Monaghan & Lycett (2013) propose that the disasters and humanitarian affairs data qualifies as Big Data, and its analytics could be used for improving the distribution of relief goods and funds. Once a disaster strikes, initially there is lack of data along with incomplete information due to disruption of communication. But according to Manoj & Baker (2007), soon afterwards there is a glut of imprecise information or information overloading (Carver & Turoff, 2007), from which useful knowledge has to be filtered requiring skills for Big Data mining.

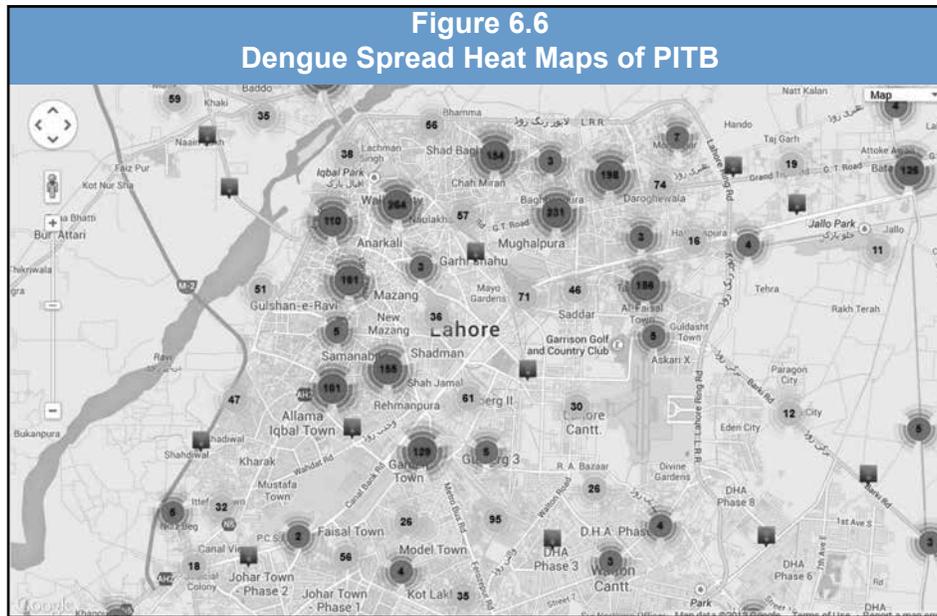
Epidemic Control System

Punjab Government uses an Epidemic Control System, which is a collection of systems used by the Punjab IT Board (PITB) for early warning on epidemics through surveillance conducted by mobile operators who send data through android devices. The text and pictorial data is then analyzed on a GIS. Perhaps the most popular similar example is Dr. John Snow's Google Earth mash-up of London during 1854 cholera outbreak with on-line data of the cholera deaths and water sources which pin-pointed the single central water source as responsible for the outbreak (Goodchild, 2007). Various cities of Pakistan are under the threat of having a dangerous spread of dengue epidemic. For this purpose, the Government of Punjab (the largest province of Pakistan, with a population of 100 million) decided to take some key initiatives which are described below. Running on war footing in 2011, the government used over 20 departments for a comprehensive and coordinated approach to fight dengue and to pre-empt it in subsequent years (Sherdil, Naru, & Rajwana, 2012).

To coordinate the efforts of all the departments, the task was assigned to the Punjab Information Technology Board (PITB)³⁸ to develop an integrated IT System. An integral feature of it was a GIS based system which spatially displayed all the data on the map of Punjab province. This system is designed primarily for dengue but is also used for the 26 other notified diseases. Data is obtained directly from hospitals. For the government hospitals, data of each patient is entered in the system, including the address. Since dengue is a mosquito/vector borne disease, address of the location where the patient was bitten and infected is more important than the address of the hospital where she/he eventually went for treatment. The data is communicated live to the Local Town Government, where a ticket is open, and they have to send a pesticide spray/fumigation team to the house of the patient. Fumigation is conducted within a radius of approximately 150 meters around the house of the patient. The fumigation team carries an Android device with it and takes a photograph of the activity before and after the treatment.

As soon as the data is uploaded in the server directly from the Android device, it is juxtaposed on the GIS system which shows the Heat Maps showing the areas where disease is emerging (Figure 6.6). Just because the heat maps are showing that a particular geographical area has a high frequency of patients, doesn't imply that there is an epidemic likely to erupt in that area. In fact, it is quite possible that such an increase in patients is due to seasonal variations or other weather related variables such as the humidity, temperature, or precipitation (since mosquitoes breed in standing water). Hence, the past data and other such variables are first checked prior to issuing an epidemic outbreak warning for any particular area/city.

At the preventive side (as opposed to the curative or post-disease monitoring side), the Activity Tracking System is perhaps the most comprehensive system devised to nip the evil in the bud. It took 30 years for various countries, such as Sri Lanka, to control dengue. Yet the success of the



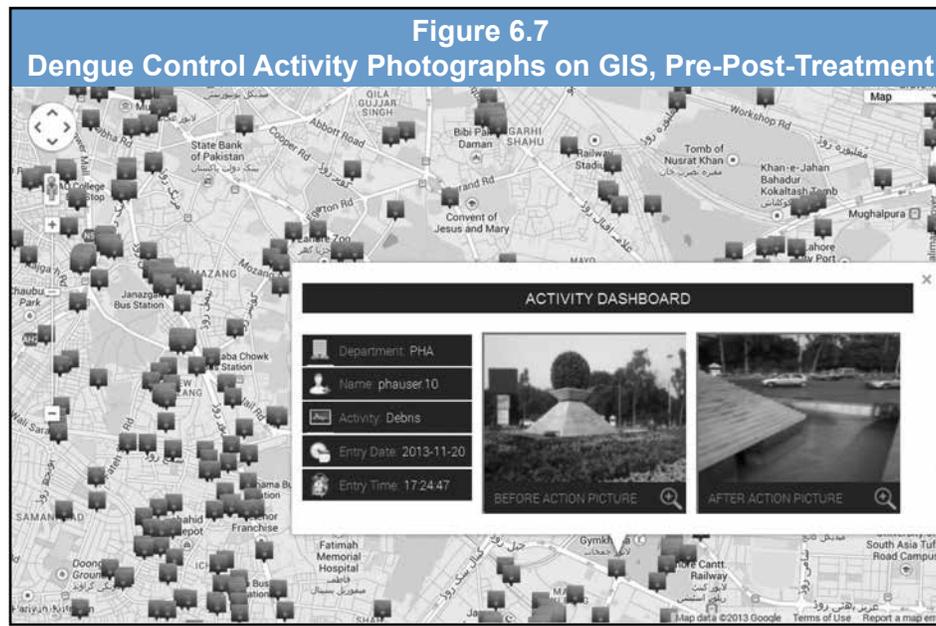
Punjab Government was within the first year, due to scientific tracking of all the preventive actions taken. This system was developed towards the end of the 2011 dengue season; hence, 2013 is its second season of operation. The system monitors the following preventive activities:

Fumigation of likely mosquito breeding places such as stagnant water, debris, tyres stores, etc.

- Pesticiding (spraying) of infected areas where patients have been reported
- Larviciding in ponds
- Debris removal
- Waste removal
- Stagnant water removal
- Sampling of larva from different localities

For each of these activities, photographic evidence is recorded to ensure that the government worker dispatched to conduct an activity has actually conducted his or her job (Figure 6.7). Some activities, such as sampling of larva, also involve reporting of data as to what percentage of samples tested positive for the *Aedes* type of mosquito (which carries dengue, as opposed to the malaria carrying mosquitoes).

For this purpose, over 1,500 workers across the province have been given Android devices, whereas various Line Departments are now purchasing these devices through their own budgets. A special App has been developed which is available at the Google Play-Store for downloads. The App provides a simple user interface to the government worker to take the photograph of the activity before and after the event. Some activities such as spraying require only a few minutes, yet others, such as debris removal, might require a few days since heavy machinery has to be called. Whenever a



photograph is taken, the App automatically tags it with the time-stamp taken from the cell phone service provider and with the GPS coordinates of the physical position of the device. In this way, the spatial and temporal data is authentically logged without any effort from the government worker. The government worker has to then enter a few text fields of data in which the task specific details are entered. This can be done in English or in the local Urdu language. Some other data, such as the department of the worker, is pulled in from the user's predefined details. When the worker clicks on the submit button, the App conducts the following:

- Compresses the photos and data because of limited bandwidth which is normal for emerging/developing economies. Parts of Pakistan are still on 2G/GSM networks while 3G and 4G/LTE cellular networks are gradually expanding
- Geo-tags and time-stamps the data
- Transmits the data to the central server where it is immediately displayed on the maps

As of 2014, over 325,000 photographs of the activities had been logged in a period of just two dengue seasons. These can then be visualized on a dashboard with a Heat Map of patients (disease occurrence). The system also shows the photographs of before-and-after the activity.

Various pre-built vendor platforms are used for the above mentioned process. The Google Earth platform provides satellite imagery and maps along with the API³⁹ to access the platform. The Google's Fusion Table⁴⁰ Application is a web service (WS) provided for data management in which data is stored in multiple tables, that internet users can view and download. This WS provides means for visualizing the data with pie charts, scatter plots, etc., and geographical maps⁴¹. Fusion

Tables was used to merge/fuse the data on various variables but was found to be inadequate for the task. Hence it had to be customized or evolved to suit to the user needs.

Another platform used was the Open Data Kit (ODK)⁴², which is a free and open-source set of tools for the organizations to author, field, and manage mobile data collection solutions. In addition to socio-economic and health surveys with GPS locations and images, ODK is being used to create decision support for clinicians and for building multimedia-rich nature mapping tools. This toolkit was found to be very closely related to the tasks conducted by the government.

All the stake-holders have access to the central GIS system, which shows the heat maps and also displays the Early Epidemic Detection warnings. However, not everyone logs on to see these maps. Hence for early warning information dissemination, an SMS/text based warning is issued to cell phones of all the government officers of the respective geographical areas/cities. The warning message also gives the data on the number of cases detected.

BIG DATA FOR INTELLIGENT DECISION MAKING

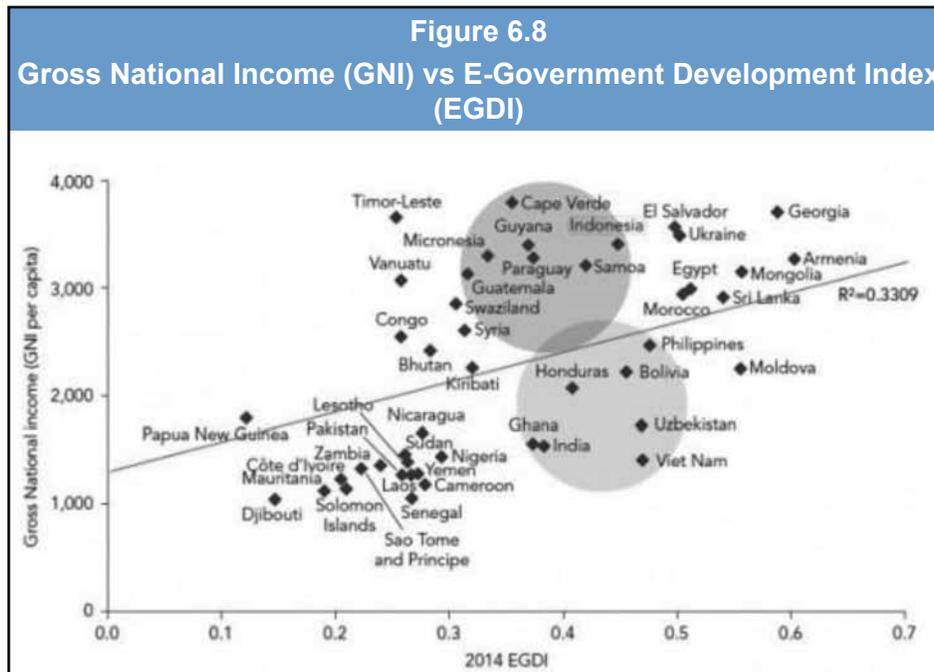
According to CISCO,⁴³ in 2012 alone we created more data than in the previous 5,000 years combined. Using the Big Data paradigm, Google offers a Flu-Trends service. As Google states⁴⁴:

“Each week, millions of users around the world search for health information online. As you might expect, there are more flu-related searches during flu season, more allergy-related searches during allergy season, and more sunburn-related searches during the summer. We have found a close relationship between how many people search for flu-related topics and how many people actually have flu symptoms. Of course, not every person who searches for “flu” is actually sick, but a pattern emerges when all the flu-related search queries are added together. We compared our query counts with traditional flu surveillance systems and found that many search queries tend to be popular exactly when flu season is happening. By counting how often we see these search queries, we can estimate how much flu is circulating in different countries and regions around the world” (Ginsberg et al., 2009).

Punjab government conducted a study on how its Epidemic Outbreak System worked compared to the Google’s Flu Breaks. It concluded that Google uses a tool called SAT Scan which uses a Negative Binomial CUSUM method which is Spatial and Temporal (with Time Series analysis). Punjab Government’s IT Board improved the SAT Scan tool using Poisson CUSUM which also uses seasonal trends in addition to Temporal data, which led to more accurate results (Pervaiz, Pervaiz, Rehman, & Saif, 2012).

CONCLUSION

Despite the above mentioned success stories, global indicators show that much remains to be done to advance the ICT4D in the least developed areas within Pakistan and to improve Pakistan's own e-Government rankings globally. A simple plot of the EGDI (E-Government Development Index) against the GNI (Gross National Income) shows Pakistan clustered with the likes of Cameroon, Senegal, Laos and Sudan (Figure 6.8). Contrary to all the claims of the Pakistan Telecommunications Authority (PTA) and Ministry of IT, Pakistan's digital advancement is exposed here when compared globally. What is more disturbing is that the data is retrogressing. In 2008, the UN issued the e-Government Readiness Ranking using measures of human capacity, infrastructure and access to information and knowledge. Pakistan ranked 131st, from where we dropped to 146th in 2010, 156th in 2012, and 158th in 2014. This is despite the fact that in 2012, Pakistan ranked 27th in terms of internet users (of 20 million) and currently ranks 8th in the world in terms of mobile penetration (140 million subscriptions). In the World Economic Forum's Global Competitiveness Rank, Pakistan is 129 out of 144. It is high time that we liberalize our telecommunication policies so as to encourage private sector to take a lead. We have already shown the limitations of the public sector State Owned Enterprises; hence, once the private sector is facilitated, a combination of SOEs and Private ICT firms would be able to provide better facilities in the under-developed areas of the country.



Chapter 7

Technology and the Delivery of Public Services: Sheikhupura Case Study

Chapter 7

Technology and the Delivery of Public Services: Sheikhpura Case Study*

This Chapter, based on a case study in the Sheikhpura Municipality, proposes specific ICT related technological and management interventions to achieve more responsive, pro-poor, accountable and efficient delivery of social services in the health, water and sanitation and solid waste management sectors. The case study attempts to demonstrate that the innovative and context specific use of ICT and the digital management system leads to a transformative change in the delivery of social services; ensures inclusive participation of the citizens; and facilitates improved monitoring and accountability in governance and management of these services.

More specifically, this chapter aims to do the following: (a) briefly describe the socio-economic profile of Sheikhpura and the potential for application of ICT solutions for delivery of municipal services; (b) review the existing system of service delivery by the municipality in the areas of public health, water and sanitation and solid waste management (SWM) and propose specific ICT solutions for improved governance (provision, management and accountability) and better delivery of these services; and (c) present specific policy recommendations for more responsive, efficient and inclusive delivery of public services to the citizens.

The case study has benefited from the comparative analysis of the best practices and success stories from around the world including the countries in the region comparable to Pakistan.

THE SOCIO-ECONOMIC PROFILE OF SHEIKHPURA

Sheikhpura, a well connected and industrial city of Punjab with a history of almost 400 years, is situated at a distance of about 36 km from Lahore, the provincial headquarters. The total area of the city is 38 sq. km, with a population of around 382,000, which makes it the 16th largest city of Pakistan¹. The average household size is 6.8 persons. The Municipality comprises 14 union councils.

Agriculture, agro-commercial enterprises, trade and industry constitute the backbone of economy of the district with the city serving as a hub. Major agronomic and horticulture crops of the district are sugarcane, wheat, rice and guava. As for the agro based enterprises, there are 23 flour mills, 93 rice mills, four fruit juice factories, four solvent extraction units, and 15 vegetable ghee/cooking oil units. In addition, there are 28 tanneries, one milk processing unit, one ice cream unit, 11 leather products units and five leather shoe units already operating in the district². The district also possesses a huge potential for investment in the livestock sector.

*This chapter was contributed by Shahid Najam.

In the industrial sector, a variety of important industrial units are functioning around and close to the city including fertilizer, pharmaceutical, safe drinking water, chemicals, ceramics, paper and paper board, yarn and jute, tractor and motorcycle assembling, tyres and tubes etc which speaks of the robust industrial base of the city. It ranks 5th among the top 13 cities in Pakistan in the ease of doing business (World Bank, 2010). The 840 registered factories employing 106,546 persons (BoS, 2015) are indicative of the robust agro-industrial and economic growth base of the area with concomitant potential for ICT interventions.

Table 7.1 provides a comprehensive demographic and socio-economic profile of Sheikhupura District, compared to the rest of Punjab and Pakistan.

It is evident from Table 7.1 that the district has relatively a rich economic base and well developed infrastructure. Its performance on most of the socio-economic indicators is comparable or better than the national and provincial averages. In some of the indicators, though, tangible improvement is required. For example in the education sector, it has a high percentage of people who have never attended school – 67 percent compared to 64 percent of Punjab and 61 percent of Pakistan. The mean years of schooling of the district is 4.4 years, slightly lower than that of Punjab and Pakistan. The main reason for this is the comparatively high percentage of people out of school who are of old age.

The performance of the district concerning the child health e.g., the immunization of children under five years suffering from diarrhea etc., is high compared to the rest of Punjab. On indicators like people diagnosed with hepatitis, infant mortality rate, and under-five mortality rate, the record of the district is below the Punjab average.

The overall indicators with regards to water and sanitation are favorable compared to the rest of Punjab. There is, however, an immense scope for further improvement which could contribute to enhancing the health outcomes through, inter alia, eliciting household and community level participation in the development of utilities and delivery of services related to the health sector. The low value of multiple deprivation index of Sheikhupura, which signifies access to and availability of the basic facilities for social development compared to the other districts of Punjab and Pakistan, is already indicative of the potential for success in mobilizing household and community action.

In terms of economic development, the district comes 2nd in Punjab as shown by the rank of the economic development index. Similarly, the district has high value of human development index compared to that of Punjab and Pakistan. This adds to the reasons for low incidence of poverty in Sheikhupura compared to Punjab and Pakistan.

Table 7.1
Demographic and Socio-Economic Profiling of Sheikhpura District and Comparison with Punjab and Pakistan, 2013-2014

(percentages)

Indicators	Sheikhpura	Punjab	Pakistan
Geography and Demographic			
Population (000)	3,052	99,005	188,020
% Urban	31.4	31.9	38.6
% Rural	68.6	68.1	61.4
Land area (sq km)	5,960	205,345	796,096
Population density (people per sq km)	512	482	236
Economic			
Unemployment Rate (15+ years)	9.1	6.7	6.0
Ease of Doing Business Rank among 13 cities in Pakistan	5 (Faisalabad comes at top)		
Education			
<i>Population that has never attended school</i>	67	64	61
Female	62	56	50
Male	72	73	72
<i>Adult literacy rate (15 years & above)</i>	61	59	57
Female	56	50	45
Male	67	69	69
Mean Years of Schooling	4.4	4.5	4.6
Health			
<i>Health Provided/Consulted</i>			
Private Dispensary/Shop	80.4	74.8	70.9
Public Dispensary/Shop	17.1	17.6	18.6
RHC/BHU	0.2	1.1	3.0
Hakeem/Herbalist	1.0	2.4	2.4
Others	1.3	4.1	5.2
<i>Percentage of Fully-immunized Children aged 12-23 months</i>			
Female	61	62	55
Male	69	68	59
<i>Children under 5 suffering from Diarrhea (in past 30 days)</i>			
Female	5	10	10
Male	6	10	10
<i>Pre-natal Consultation (% of which Govt. Hospital/RHC/BHU)</i>			
Rural	76 (21)	73 (25)	69 (29)
Urban	72 (22)	69 (24)	63 (29)
Urban	83 (19)	83 (27)	83 (29)
<i>Post-natal Consultation (% of which Govt. Hospital/RHC/BHU)</i>			
Rural	24 (20)	28 (20)	29 (25)
Urban	24 (21)	25 (21)	25 (25)
Urban	25 (20)	37 (19)	37 (25)
Had cough for more than last three weeks	4.7	3.2	-
Diagnosed with Hepatitis during last one year	1.8	1.5	-
Care provided by Lady health worker (visited house a month)	25.4	37.6	-

Table 7.1
Demographic and Socio-Economic Profiling of Sheikhpura District and Comparison
with Punjab and Pakistan, 2013-2014 (Contd...)

(percentages)

Indicators	Sheikhpura	Punjab	Pakistan
Infant mortality rate	81.0	76.0	-
Under-five mortality rate (per 000)	102.0	96.0	-
Total fertility rate	3.5	3.5	-
Water Supply and Sanitation			
Percentage Distribution of Households by Drinking Water Sources			
Tap Water	22	22	30
Hand Pump	26	28	27
Motor Pump	50	42	30
Dug Pump	0	1	3
Others	2	6	9
Percentage Distribution of Households by Type of Toilets			
Flush	94	77	71
Non-flush	0	5	14
No Toilet	6	18	15
Percentage Distribution of Households by Type of Sanitation Facilities			
Piped sewer system	17.5	21.3	-
Septic tank	74.5	44.1	-
Pit latrine	0.2	8.7	-
Open defecation (no facility, bush, field)	9.9	17.5	-
% of people who do not use any water treatment method	94.0	93.6	-
Percentage of population with access to Electricity	99.3	95.6	67.0
Percentage of population with access to Gas	46.6	37.0	31.0
Access to basic household utilities (% of population)			
Mobile	95.2	94.3	-
Computer	18.9	17.2	-
Bicycle	33.4	35.0	-
Motorcycle	48.6	52.8	-
Number of person per household	6.8	6.4	6.4
Other Social Indicators^a			
Index of multiple deprivation	18.4	27.3	30.3
Sub-national poverty index	34.0	43.7	48.2
Economic development of the district	0.688(ranked 2nd out of 35 districts of Punjab)		
Human development index	0.513	0.504	0.490

Notes. Reprinted from Demographic Survey of Pakistan, Institute of Public Policy, Labour Force Survey, Multiple Indicator Cluster Survey, Punjab Development Statistics, Household Integrated Economic Survey, Pakistan Social Standards and Living Measurement Survey, Social Policy and Development Center, Haroon (2012a, 2012b) and Imran (2015).

^a Data for the year 2010-11.

Multiple Deprivation Index consists of 17 indicators covering social, housing and economic deprivations. The higher the value of the index is, the more deprived it is in the above mentioned dimensions.

Economic Development Index is a composite index consisting of three sub-indices Income and Wealth, Education and Health and Economic Infrastructure. The lower the rank of the district in this index, the higher is the level of development of the district.

Sub-national Poverty Index The poverty measures are taken from Jamal (2015). The technique used to measure the Sub-national Poverty Index is based on the welfare function of non-monetary poverty variables like employment level, household size, education of the household head, assets score, type of house, number of rooms etc.

THE EXISTING SOCIAL SERVICES DELIVERY MECHANISM AND POTENTIAL ICT SOLUTIONS

Before dwelling on the existing service delivery mechanism and the potential for improvement through ICT application, it is important to review the resource situation of the Municipality especially the human resource and the financial health.

Regarding the human resources, while most of the management positions are filled with the permanent staff, the intermittent vacancies in the key areas of planning, finance, and management continue to adversely impact the performance and productivity of TMA human capital. Then there is a major issue of capacity deficit and techno-professional stagnation especially in the functional areas of planning and development, finance and policy analysis, monitoring and accountability, and managing a transformative change. The discord between the HR and the enormity of municipal tasks and services, misalignment of the skills-competence with the roles and responsibilities, poor salary structure and incentive mechanism, and absence of even bare minimum performance management and reward and punishment system add to the gravity of the problem.

The financial situation of the Municipality also seems to have been under enormous stress since July 2014 owing to the transfer of some of the major sources of revenues of TMA by the Provincial Government, such as cattle mandi to the District Government and conversion fee to the Lahore Development Authority (LDA). The demolition of municipal shops for the road expansion program has also deprived the Municipality of substantial source of income. Following Table 7.2 gives the summary of the revenue losses (in million rupees) to TMA on these heads of accounts:

Table 7.2	
Revenue Losses to TMA	
	<i>(Rs. in million)</i>
1. Cattle Mandi	64.3
2. Conversion Fee	60
3. Rent of Shops	12
TOTAL	136.3
Source: Sheikhpura District Government	

The total deficit in the budget for the year 2014-15 amounted to Rs.136.3 million, which in itself speaks of the financial fragility of the Municipality.

It may also be added that the Provincial Finance Commission (PFC) award which distributes resources to the local governments including the Tehsil Municipal Administrations, based on pre-defined criteria and indicators, has remained unchanged since July 2010 without factoring in the huge financial transfer from Municipality to the District Government and LDA and the salary increases per Government directions. The following Table 7.3 clearly amplifies the discord between the staff salary budget and the total resource allocation under the NFC award:

Table 7.3
Provincial Finance Commission Awards vs. Budgeted Staff Salary

PFC Award for the Year 2009-10	Salary for the Year 2009-10	PFC Award for the Year 2014-15	Salary for the Year 2014-15	PFC Award for the Year 2015-16	Salary for the Year 2015-16
225.480 Million	138.000 Million	254.328 Million	300.000 Million	254.328 Million	381.500 Million

Source: Sheikhpura District Government

The PFC award caters for both development and non-development budget, which in the instant case does not even meet with the salary related expenditure not to speak of carrying out the development work.

If the annual running expenditures related to electricity bills, POL and repair and maintenance of the infrastructure and services is also included, the overall annual budgetary requirement of the TMA comes to around Rs 498.4 million for the year 2014-2015. This situation is further exacerbated owing to a huge amount of liabilities accumulated over the years by TMA including outstanding charges for services and utilities and staff pension fund share amounting to around Rs 151.6 million.

While the foregoing facts portray a very bleak scenario for improving the management and delivery of services, it does highlight the need to achieve costs and efficiency gains in utilizing the existing financial, human and organizational resources, and infrastructure through a prudent and appropriate mix of ICT interventions. However, there seems to be very little appetite in the operational staff for ICT applications and integrated solutions to improve the TMA business and management processes or to harness its potential for better and inclusive service delivery. This is not surprising, given the inadequacy of human and financial resources and a massive requirement for physical infrastructure development. As such, in the wake of paucity of motivation and competence, a transformative change to bring about tangible improvement in the delivery of municipal services poses a daunting challenge and entails a leadership which could demonstrate commitment and resolve, focus and tenacity, and discipline and energy to mobilize effective TMA wide organizational effort at all levels. At the time of writing the report, the leadership both at the District and TMA levels did exhibit these traits and spirit to initiate the process for harnessing ICT potential in the priority areas of health, water and sanitation, solid waste management, and citizens' complaints and grievances management.

PUBLIC HEALTH SERVICE DELIVERY

The overall environment to realize the potential for developing an ICT-rich model for service delivery is extremely conducive and ripe. Mobile phones, broadband and emerging wireless technologies have converged opening the doors for, inter alia, better public service delivery including the health services. Technology such as mobile phones is part of everyday life of the potential recipients of health services and affords them a tangible opportunity to secure improved access to the health system and services. There is also a growing willingness amongst the doctors and medical practitioners to

embrace technology with a view to enhancing their professionalism, increasing their effectiveness, and improving patient health management. A cost-effective and beneficiary friendly integrated ICT solution can be developed to address both the health management issues and constraints and improve service delivery.

A four tier healthcare system comprising the Basic Health Unit (BHU), the Rural Health Centre (RHC), the Tehsil Headquarters Hospital (THQ), and the District Headquarters Hospital (DHQ) has been established by the government to provide health care and services to the citizens at the district level.

Despite the conducive environment in terms of availability of/access to technology, there are a number of constraints in the way of improving health services through ICT applications – notably lack of resources, cultural impediments to change, institutional inertia, governance dysfunction, and widely prevalent corruption and embezzlement. The large and complex primary, secondary, and tertiary public healthcare system with mostly outdated methods of governance; inefficient planning, procurement and inventory management of medicines; non-availability of essential medicines; absence of reliable data and information for policy analysis and planning; and lack of monitoring, reporting and accountability mechanisms have cumulatively resulted in sub-optimal use of public health facilities to the great detriment of health outcomes for the poor segments.

An inspection report by the Punjab Health Sector Reform Programme validated the wide prevalence of these problems and constraints and additionally revealed these difficulties: (a) absence of or vacant positions of a number of staff members; (b) poor inventory management of medicines like antibiotic tablets, syrups and x-ray films; and (c) lack of availability of the essential equipment like incubator, fetal heart detector, oxygen cylinder, and air-conditioner for operation theatre. The standard list of equipment that the BHUs and RHCs are obliged to maintain is given in the Table 7.4.

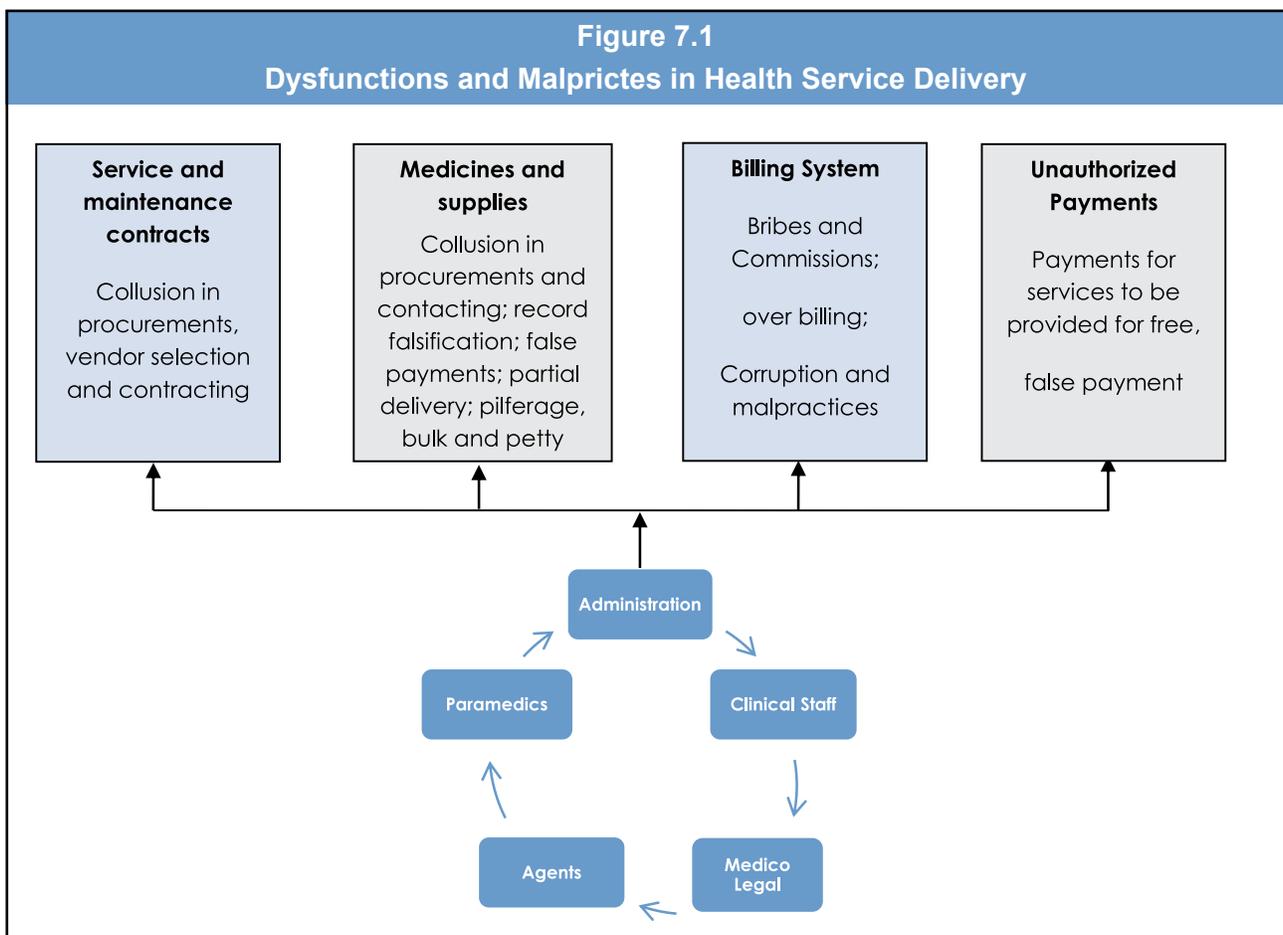
Then, there are widespread complaints and allegations that besides mismanagement, unnecessary medicines with large kickbacks are procured with complete disregard to healthcare needs. Similarly, at the Basic Health Units (BHUs), most of the 18 essential medicines required are often missing nor is the incidence of important diseases reported e.g., during floods or natural disasters, there are reported cases that several doctors sent fake reports of malaria tests whereas they did not even have the test slides in stock. Even if the test slides were available, it took around 14 days for the test results to arrive at the BHUs since the testing equipment was only available at the District Head Quarter Hospital (DHQ). By that time, often the patients were not traceable. The cumulative impact of mismanagement, dysfunctions and malpractices in the health management and health services delivery not only leads to waste of the already meager resources allocated to the decentralized health system but, more importantly, deny the poor and marginalized segments of the access to these facilities to avail free of cost treatment and medicines.

Table 7.4
List of Standard Equipment

BHUs (Basic Health Units)	RHUs (Rural Health Units)
Sucker	Ambulance
Oxygen cylinder	Dental Unit
Auto Clave	ECG Machine
Labour Room Equipment	Autoclave (Steam Sterilizer)
Safe Delivery Kit	Fetal Heart Detector
Hospital Bed	OT Table
Glucometer	Obstetrics Instrument Set
Computer	Ambulance
	Dental Unit
	X-Ray Unit
	Dental X-Ray
	Hot Air Oven
	Ultrasound
	Ot Ceiling Light
	Gen. Surgery Instrument Set
	Air Conditioner For O.T

Source: Punjab Health Sector Reforms Programme

A diagrammatic depiction of the prevalent health service delivery dysfunctions is given in Figure 7.1:



In order to address some of the constraints and dysfunctions in the decentralized health system and ensure tangible improvement in the health outcomes and indicators, an ICT based integrated solution is proposed to improve the governance and ensure efficient delivery of health services.

“Teemardaar”: Procurement, supply chain and distribution of medicines at government health facilities.

The ICT Solution “Teemardaar” envisions improved and better governance and delivery of health services through: (a) computerized inventory management including all the tenders and work orders related to medical equipment and medicines issued to the vendors; (b) patients tracking and records management system; (c) disease early warning system; and display of critical messages for informing and sensitizing the public about the important health related issues. Teemardaar consists of the following modules:

(i) Inventory Management

- Automating the inventory management and point of sale from DHQ to tertiary health facilities down to patients’ level;
- Insulating health services against false procurements; reducing inventory management failures; bridging the information gaps to secure financial savings; and generating accurate data for planning the health services delivery;
- Computerizing all orders related to procurement of medical equipment and medicines by creating a computerized store room at District Head Quarter Hospital linked with THQs, RHUs and BHUs;
- Vertically linking the inventory and stock management with Director General Health Services and Health Department for monitoring and accountability purposes.

(ii) Patient Tracking

- Through the efficient Point of Sale (POS) system, keeping track of patient health records including their addresses, phone numbers etc;
- Generating reminders to the patients on receipt of their test results or arrival of pending medicines for collection.

(iii) Disease Early Warning System (DEWS)

- Based on the patients’ health records, identifying the incidence of disease in a particular area or impending risks to vulnerable people;
- Enabling initiation of timely medical intervention to mitigate potential harm and/or preventive action to avert the potential medical hazard;
- Complementing the Punjab Information Technology Board’s (PITB) Early Warning System of the Directorate General of Health Services Lahore.

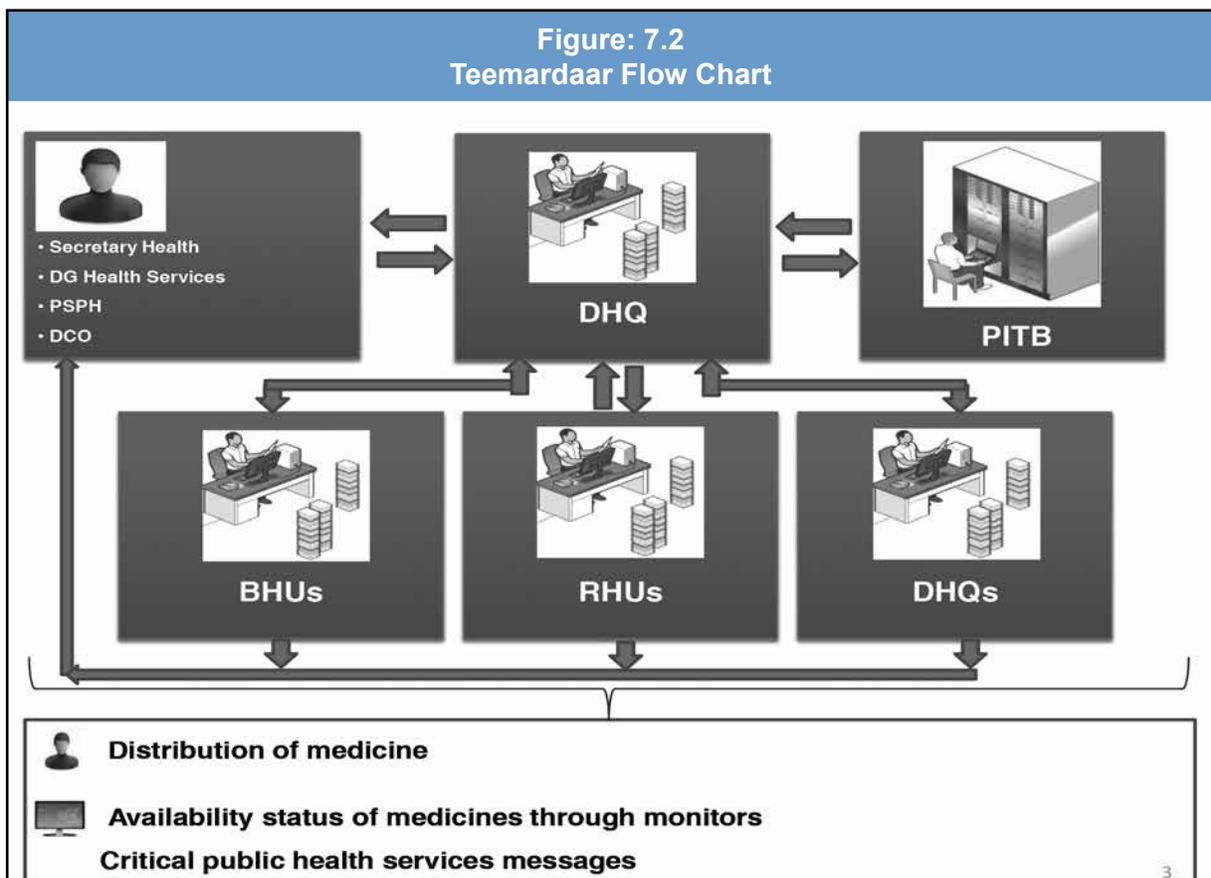
(iv) Governance

- Improving governance and delivery of health services through efficiency gains in the management and operational processes;
- Reducing pilferage and corruption and ensuring full transparency in health governance mechanisms through continuous accountability and citizens' empowerment.

In particular, the following service delivery issues will be addressed:

- Inventory and Stock-Pile Management
- POS automation
- Disease Early Warning
- Patients Health Records Management
- Patients Identity Authentication
- Availability of accurate health data and patterns of diseases with demographic information that can be used for future evidence based policy formulation

Figure 7.2 shows the governance and operational modality of the medicine inventory management



and distribution and vertical linkage with the district and provincial health functionaries for planning, monitoring and accountability purposes. The real time ready access to information by citizens on the availability of medicines and critical health messages will lead to responsive and responsible health management.

At the time of publication of this report, the project financing has already been approved by the UK Department of International Development (DFID) under their Sub-National Programme and is being implemented by BIPP in conjunction with Pakistan Administrative Service Alumni Research Centre and the District Government. The Project, during the course of implementation will develop horizontal linkages with the two on-going ICT projects in Sheikhpura district: Provision of *Tele-Treatment Solution* at BHUs (providing diagnostic and prescriptive specialist services to patients in the remotely located BHUs); and Every Life Matters (introduction of electronic vaccination cards and a database to record the child's vaccination history and generate alert calls for the parents through SMS). The synergy among these technological interventions will lead to better health services delivery and enhanced impact on the health outcomes of the district.

WATER AND SANITATION

The major sources of water supply to the Municipality are the ground water, recharged from the nearby perennial Rahbah-Hiran Minar Canal, and 45 pumping stations installed within the municipal area. There are 17365 water connections to the household served through direct pumping by 35 km long distribution network. According to the municipal administration, water availability is ensured for 18 hours. The network laid by the Municipality for water distribution covers hardly 1/3rd of the city and around 40% + of the population which is self-evident of the gross inadequacy of the population coverage. The incidence of low water pressure (5 percent), water wastage, and that of illegal connections, (only 100 identified recently) as reported by the municipality, is not high; rather, it is within the manageable limits which is quite contrary to the perception and assertions of the citizens who seem highly dissatisfied with the volume and quality of services. The water quality monitoring system is also rudimentary and is based on periodic check through PHED laboratories. There is very little use of technology either to improve management processes or delivery of service except recording of data for sanitation staff.

The demand for water greatly exceeds the supply resulting in perpetual scarcity and inadequate access to water services. The urban residents have to rely on alternative sources of clean water supply, which for the poor segments becomes usually unaffordable. The problems of low pressure, inequitable water distribution, huge water wastage, unsanitary storage, theft, illegal hook ups or leakage, and the likelihood of increased incidence of water borne diseases are major challenges which the Municipality has to negotiate and deal with. This situation is further compounded by inefficient

management of water supply system, absence of reliable monitoring and accountability system for water losses, and lack of capacity to measure water supply and manage data and information to assess inputs and outputs.

A series of meetings and consultations was held with the District Coordination Officer and her staff and the Municipal Administration including the Administrator and the relevant technical and operational staff besides the citizens. The aim was to carry out a needs assessment for ICT related interventions both for improved management of the services as well as better service delivery. Based on the priority areas of deficit identified through this process, the following ICT solutions and interventions are recommended:

(i) GIS and Hydraulic Modeling

It is a powerful tool, which uses the software “WaterGem” in conjunction with the GIS based satellite imagery for digital mapping of the roads and streets network and the properties located thereon, to develop the water supply system for the entire Municipality. It should, however, be implemented in selected areas to pilot-test its robustness.

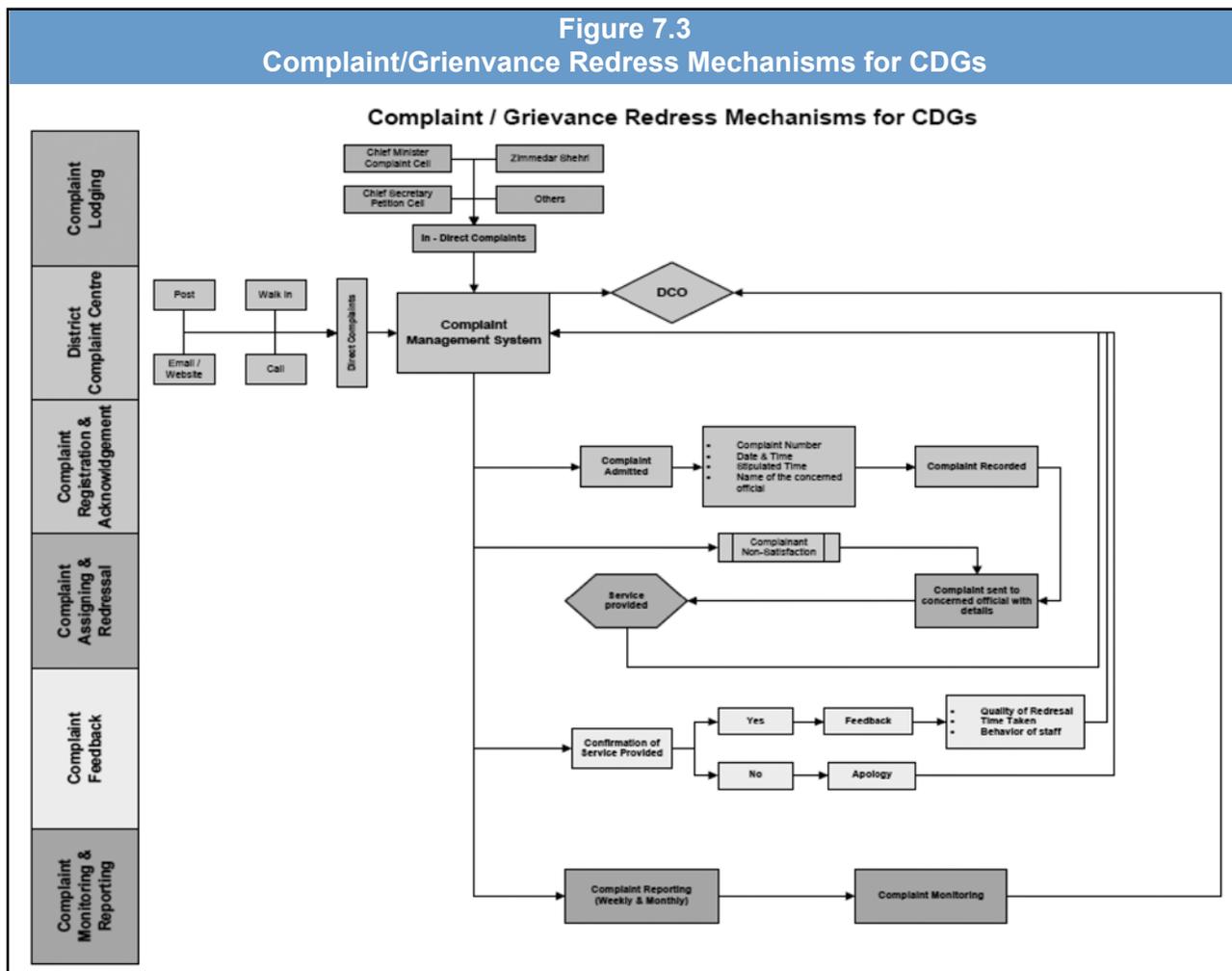
The implementation of this ICT intervention will lead to substantial quantifiable reduction in non-revenue water, cost-efficiency gains in the service delivery including water distribution management, and prompt identification of illegal collections. The linkage of the system with the Citizens Complaints and Grievances Redress Mechanism will enable the citizens to monitor the water supply and distribution system and the Municipality to achieve better and improved customer satisfaction.

(ii) Citizens’ Complaints and Grievances Redress Mechanism

The present system for entertaining and addressing the citizens’ complaints or grievance about the delivery of public services in the District Government or the TMA is very basic in that the complaints are manually processed for onward transmission to the department concerned for ultimate resolution. Each department of the district has a complaint cell. People report their complaints either by telephone or verbally or in writing mostly by walking-in the concerned office. The use of the ICT in the complaint management system is non-existent. The existing system does not have the monitoring or tracking features nor capability to respond to the citizens and provide them with feedback on the action taken for redress of their complaints. It does not even help the managers to assess the quality of services and performance efficiency of the services.

The Punjab Urban Unit has already developed an ICT based “Citizens’ Complaints and Grievances Redress Mechanism” for the five big cities of Punjab pursuant to the requirements of the Punjab Local Government Ordinance 2001. The mechanism provides means for tracking a complaint and institute a follow-up system to ensure its timely redress. The system has several

attributes: electronic complaint lodging and its registration as per the pre-defined categorization; assignment of the complaint to a specific department/functionary for resolution; complainant feed-back; and monitoring, reporting and accountability features. A District Complaint Centre from out of the existing staff outfit is established with one manager and two data entry operators to manage and implement the system. The District Coordination Officer (DCO) and the designated officials have direct access to the system for on-line monitoring. The system also prescribes the time limit for complaint resolution. The mechanism is easily accessible to the citizens who could log in giving their cell number, name, address and CNIC. The mechanism is not, however, fully functional so far. The District Coordination Officer and Municipal Administrators showed keen interest in its full implementation after customization to fit the requirements of the Municipality. The following Figure 7.3 captures the salient features, process flows and modus operandi of the system.



The Punjab Urban Unit, in collaboration with BIPP and District Government, is already customizing the mechanism to conform to and fulfill the Sheikhpura Municipality requirements for specific services: health, water and sanitation, and solid waste management. Besides improved and

inclusive governance, the system will facilitate better and citizens inclusive service delivery. It will also ensure effective state/municipality-citizens synergy, timely resolution of service delivery complaints and problems, better on-line complaints management, and effective accountability of the officials. This project will be implemented without entailing much cost through utilizing the existing HR and organizational resources and assets available with the Municipality.

(iii) Electronic Water Billing System

Currently, Water Supply and Connection Department at Tehsil Municipal Administration (TMA) Sheikhpura is performing all operations manually. The new connections are issued to the customers on submitting the prescribed form along with the required documents. After processing the application, water connection is installed at consumer's premises. Record of connections and consumers is maintained in D&C (Demand and Collections) register. A uniform water rate of Rs. 300 per month per connection is currently charged for all types of connections as from July 2015, which previously was a meager amount of Rs. 60 per month per connection. The bills are prepared union council wise on a monthly basis, including the water charges and arrears and surcharge (if any), and issued to the consumers manually through local staff deputed for the purpose. Recovery of the water charges is made through the scheduled banks mainly the National Bank and the Bank of Punjab. Based on the receipt scroll from the banks, all entries are posted manually in the D&C registers. The manual process transaction invariably leads to problems of recovery, lack of timely bills generation, and inadequate tracking of account history. Besides, the absence of a system of measured water supply or quantifying the input-output assessment invariably leads to the uneconomic water use and wastage.

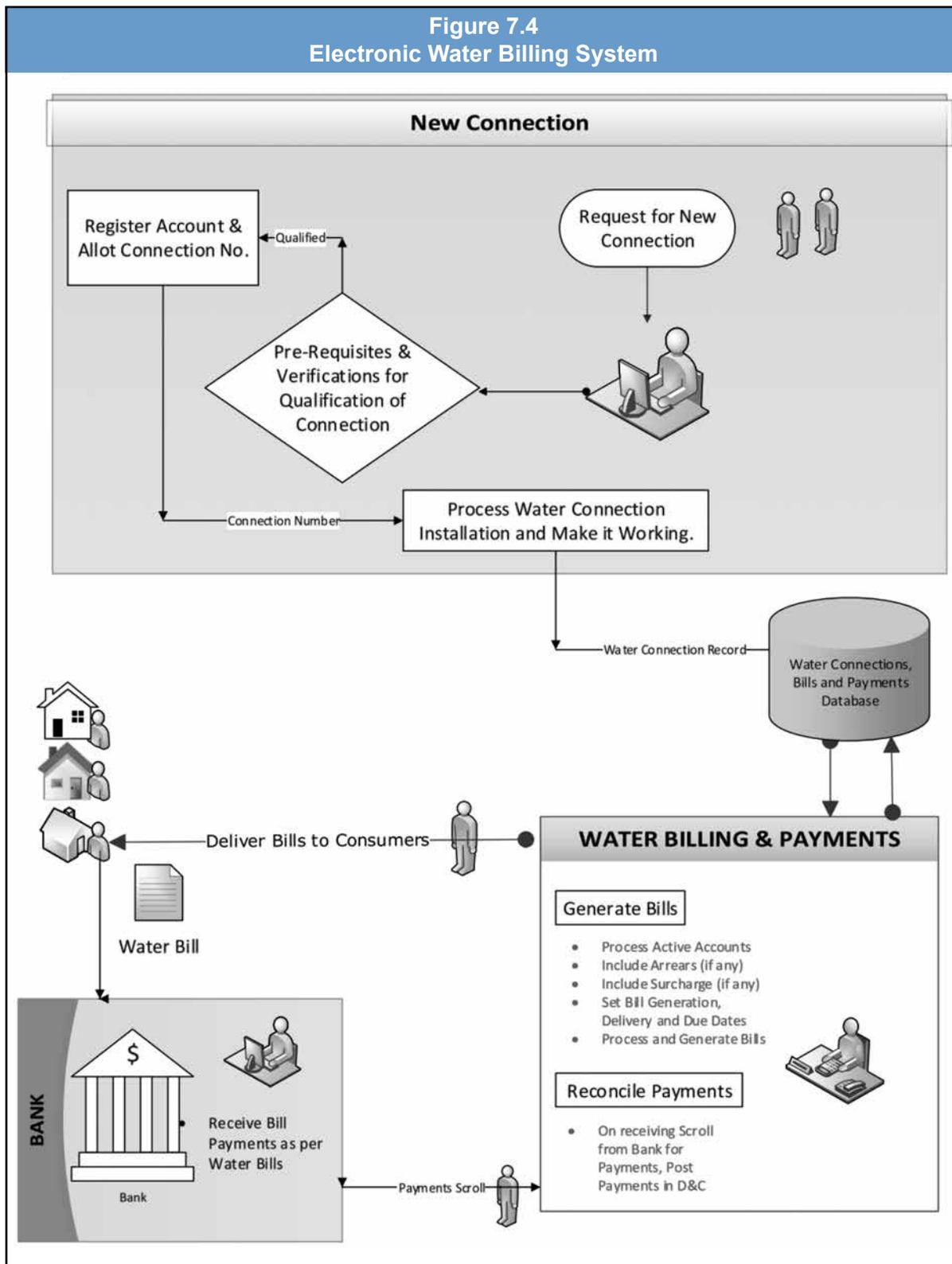
The following ICT solution with specific modules is proposed for water billing system for implementation (see Figure 7.4):

(i) Water Connections & Customer Accounts: To manage record of all existing and new customer accounts and their connection details, the following functionalities will be part of this module:

- Customer accounts management
- New accounts
- Existing connections
- New connections
- Account and connection details
- History record of account & connection
- Bills history
- Payments history
- Connection types

(ii) Billing Module: This will contain:

- Previous bills history



- New bills generations
- Arrears management
- Surcharge management
- Auto calculations and bills

(iii) Payments Collections: On receiving scroll from the bank(s) for paid bills, payments will be posted in the system and these will be reconciled and posted in relevant accounts and connections.

- Posting of payments against accounts/connections
- Payments collections reports
- Outstanding and defaulters listings

The proposed system is capable of generating standard reports to fit the requirements of the operational and the supervisory managerial staff to carry out monitoring and accountability functions. However, a comprehensive and concerted training program will be needed to develop the new skills and competence mix for the staff especially of the water supply management, water supply administrator, and end users of the system for the new roles and responsibilities associated with the system implementation. It is also important that a backup support and maintenance system is built into the implementation plan to ensure smooth transition and sustainability of the project.

The system is very cost effective and would entail around Rs 300,000 (if taken up within the coming three months) for implementation and would recover its cost within 3 months of commissioning.

SOLID WASTE MANAGEMENT

As in many other urban locations, the solid waste collection is done in two parts i.e., primary collection and secondary collection. The city, however, lacks a proper and scientific waste disposal system. A huge ditch, three km away from the city on Faisalabad by-pass, is used as a dumping site @ Rs. 40 per ton of the solid waste. Tractor trolleys and front-end loaders are used for dumping the waste. For waste collection, however, tractor trolleys, waste containers, donkey carts and hand carts are used. There are 460 sanitary workers on the direct payroll of the Municipality who cover around 165 km of roads and streets and 40 km of drains within the municipal limits. A total of around 200 metric tons per day is collected. While cost of sanitation services both direct (staff salaries) and indirect (through contractors) yearly increases, the improvement in sanitation services continues to remain a major challenge. The staff attendance and problem of ghost workers also plagues the system. The monitoring and attendance of the sanitary staff, as also the lifting of garbage, are monitored manually by the sanitary supervisor and TMA officers. Besides exorbitant costs and inefficiencies, this leaves a huge scope for wrong and exaggerated reporting or manipulation. TMA complains of the huge

deficit of sanitary staff and lack of machinery such as. excavators, sucker machines (2), tractor trolleys (10), mini-dumpers (15), and water bowsers (4), which severely impacts its ability to manage SWM function. The institutional fragmentation, lack of effective regulatory and legal framework for SWM, and absence of strategic planning further aggravate the situation.

The SWM problems are multifold and multi-faceted. The case for supplementary and special allocation made by the Tehsil Municipal Administration, in the wake of transfer of “cattle mandi” resources and conversion fee from the Municipality, merits serious consideration to improve the financial health of the Municipality. This needs to be augmented by an equitable tax regime to ensure financial and functional sustainability of the Municipality. However, while efforts on that account with the provincial government need to continue, there is a vast scope to improve the management and governance efficiency as well as actual delivery of SWM services through a composite use of ICT solutions.

The attendance of the sanitary staff and elimination of ghost employees has distinctly been identified as the most challenging problem and pressing need. There was a general consensus that if this problem is adequately addressed, it will enormously improve the SWM services.

In this regard, there is a variety of ICT solutions out of which the Municipality could choose one. The cost effective and the ones which could meet with the Municipality requirements are the following three ICT solutions with costs ranging between Rs. 200,000 to Rs. 300,000 (these cost estimates are valid for three months).

(i) Off-Site Real Time Monitoring System for SWM

Through the use of mobile phones and GPRS, images are taken, stamped with time and location, and are put in public domain for scrutiny on real time basis. These technologies enable monitoring and scrutiny of the entire process, including workers’ attendance, dumper bin lifting etc., in real time. Crowd-sourcing of scrutiny and monitoring is put in public domain on real time basis.

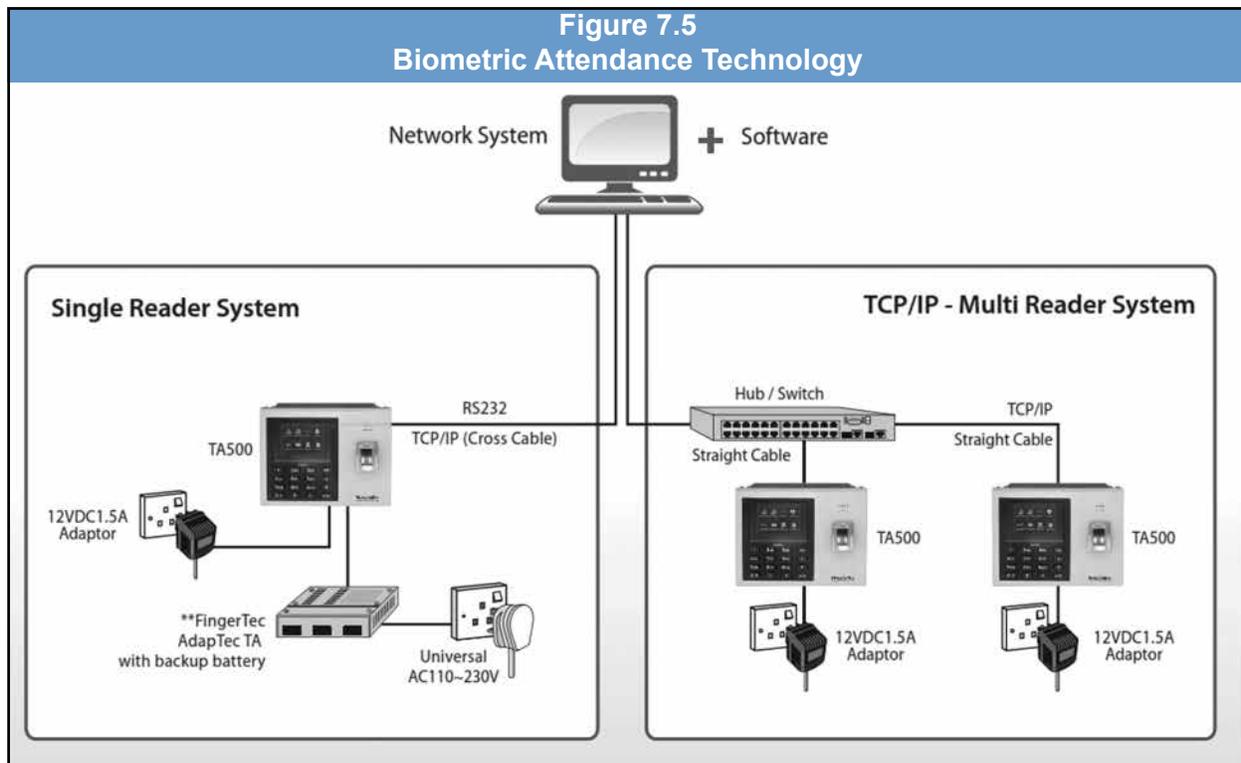
It is indeed a very low cost technological intervention involving fixed costs of the software package and costs of cell phones with minimal recurring costs of GPRS annual connectivity charges.

The expected benefits are as follows: improved attendance of workers and their performance monitoring, increased dumper bin lifting, reduced grievance redress time, and increased responsiveness.

(ii) Biometric Attendance System for Sanitary Workers

This involves establishment of biometric based attendance system for sanitary workers, streamlining of the payroll system and expenditure efficiency, and better delivery of sanitation

services. Again, the technology involved is simple and cost effective comprising hand geometry biometric technology, which captures the image of hand each time the employee punches to verify his/her identity; dial-up high speed modem for quick communication; and desk top computer and dedicated telephone line. The system architecture is shown in Figure 7.5.



The expected benefits include elimination of ghost workers and protection of bona fide workers, improved transparency resulting in better service delivery, and efficiency and costs savings.

(iii) SMART Eyes and Face Recognition Biometric System

The system is based on the most advanced multi-model biometric platform for face and retina recognition and covers all aspects of identity and credentials of the employees. This technology is considered to be superior to other biometric devices. It overcomes the problems of “buddy punching” or “proxy attendance” to prevent payroll losses and secure 100% accurate attendance. The technology involves eyes and face recognition device, LAN connectivity at all locations, UPS and power line, internet connectivity, and desk top computers.

The expected benefits are the same as for (ii) above with the additional advantage that this is more reliable and accurate solution.

CONCLUSION AND POLICY LEVEL RECOMMENDATIONS

This case study based on the desk review of the public service delivery models designed and successfully implemented in the region and around the globe, consultations with the relevant

government functionaries and the stake holders, questionnaires and interviews has been an extremely productive and constructive exercise. In the 5th annual report 2012, the State of the Economy: the Punjab Story, the need for allocative efficiency of resources in the social sectors development was emphasized. At the same time, while pointing out the “North-South” divide in Punjab primarily owing to the limited access to infrastructure and social services in the southern part, it was recommended that access to, inter alia, health facilities and improved water and sanitation needs to be integrated as a matter of priority in the regional planning in Punjab.

As a sequel, this case study has led to the establishment of prescriptive models based on ICT integrated solutions for cost effective, inclusive and improved service delivery in the health, water and sanitation and solid waste management sectors. There is a huge potential to appropriately adapt, replicate and/or up-scale these models at the local/district/ municipal levels in the rest of the province, particularly the lagging South, to achieve these benefits: (a) efficiency gains in the management and governance functions; and (b) cost effective, wider and improved coverage, and delivery of social services with focus on poor and marginalized segments.

It may be added that during the course of implementation of the integrated ICT solutions for each of the studied services, i.e., health, water and sanitation and solid waste management, a large amount of valuable data will be generated to profile the health, water and sanitation, and, solid waste management sectors of Sheikhpura. This reservoir of extremely valuable data, through socio-statistical analysis, could lead to specific and robust policy recommendations for consideration by the decision makers with a view to ensuring better management and delivery of services in these sectors.

Be that as it may, there are albeit some important policy recommendations for consideration:

- A participatory, inclusive and socially cohesive approach based on active engagement of citizens and civil society with adequate representation to the poor is absolutely essential for formulating the policy frameworks and designing the new systems. This approach creates a wider sense of ownership, engenders sense of civic responsibility, reduces wastage of resources and time, and secures stakeholders buy-in thus reducing the gap between what is planned and what is implemented.
- The transparency and openness in governance lead to better state - citizen synergy, reduce the credibility gap, and facilitate better monitoring and accountability in public service delivery. It is at the same time important to put in place good grievance redress mechanisms to respond to the citizens' complaints and concerns about the functioning of the public service delivery entities.
- The robustness and accuracy of the data and information are crucial both for planning and

public information to ensure that right and responsive policies and plans are formulated; at the same time, citizens feel empowered and engaged in the planning and development processes.

- For sustainable development based on the felt needs of the citizens, especially the poor, it is imperative for the city and state to integrate and mainstream provision of health, water and sanitation services in the planning for infrastructure development. The slums and Katchi Abadis have their own specific requirements for social services like health, water and sanitation, and solid waste management in the urban settings, which should be appropriately integrated in the urban development plans.
- In specific term, water connections for the households should be linked to the provision of sanitation facilities and waste management thus integrating the troika of water, sanitation, and solid waste management.
- In view of shrinking water resources and need to optimize water use efficiency, a water management policy should be articulated with emphasis on the needs and vulnerabilities of the poor. The policy should, inter alia, focus on optimal water resource and sector planning, improving and expanding the delivery of water services, fostering the conservation of water and reducing wastage, increasing systemic efficiencies, facilitating water related knowledge management, improving governance of water delivery services, and above all sensitizing and educating the citizens for efficient use of water and its conservation.
- Similarly, a Solid Waste Management Policy and Plan should also be formulated by the Municipality with a view to ensuring improved quality of life of the citizens and using solid waste as a resource to harness its economic potential without compromising the ecological integrity in a sustainable manner. The SWM Policy should establish the framework for managing the Municipality's solid waste in an efficient, cost effective and environmental friendly manner with a focus on:
 - making waste management an integrated function for achieving high level of cleanliness and sanitation for the citizens through cost effective and efficient utilization of HR, financial, organizational and physical resources and equipment;
 - minimizing land-filling with an increased focus on maximizing reduction of toxicity and volume of waste, reuse, recycling and source-separated organic waste management; designing and implementing environmentally friendly and public health sensitive waste management system;
 - minimizing long-term financial liability for citizens, businesses, and taxpayers;

**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	9.88	-2.2	6.33	0.78
2001/02	3.1	6.10	-0.2	4.37	0.88
2002/03	4.7	4.06	1.4	4.10	1.14
2003/04	7.5	2.30	3.9	10.19	0.59
2004/05	9.0	2.03	4.8	11.62	0.92
2005/06	5.8	3.43	0.6	17.38	0.74
2006/07	5.5	3.50	-0.5	3.38	0.86
2007/08	5.0	3.86	-1.5	5.43	0.83
2008/09	0.4	7.02	-6.2	5.61	3.90
2009/10	2.6	3.81	-2.6	3.81	1.07
2010/11	3.6	8.64	-0.2	8.64	0.97
2011/12	3.8	3.17	0.4	3.17	1.12
2012/13	3.7	4.42	0.6	4.42	1.20
2013/14	4.0	2.57	1.2	2.57	0.99
2014/15	4.2	2.09	0.7	2.09	1.08
Average	4.3	4.46	0.0	6.21	1.15

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.

n.c. = not computed

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 Investment as % of Total Fixed Investment	Share of Private Investment in Labor Intensive Sectors (%)
1999/2000	17.4	91.0	65.0	51.6
2000/01	17.2	95.8	64.6	46.0
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	15.0	92.7	73.1	46.4
2013/14	15.0	91.3	74.6	44.1
2014/15	15.1	96.0	71.9	45.2
Average	16.8	90.8	72.5	41.5

Source: Pakistan Economic Survey (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	-2.0	-5.4	0.0
2002/03	4.1	57.8	2.0	-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	-10.0	9.6
2009/10	0.2	n.c	-4.1	17.3	1.0
2010/11	2.0	20.8	-1.1	-4.9	3.3
2011/12	3.6	36.3	1.4	-48.3	-9.0
2012/13	2.7	23.2	0.5	7.8	6.2
2013/14	2.7	47.8	0.3	10.6	3.9
2014/15	2.9	14.1	0.6	4.3	14.1
Average	2.9	n.c	0.2	-5.2	-0.1

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
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 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	52.0	1.5
2002/03	6.9	4.3	7.6	68.2	22.2
2003/04	14.0	8.0	15.5	84.6	11.6
2004/05	15.5	26.5	12.7	87.0	15.6
2005/06	8.7	5.9	11.1	75.2	14.4
2006/07	9.0	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	4.3	1.9	6.3	73.7	0.6
2013/14	1.1	n.a	n.a	72.4	-3.9
2014/15	-3.9	n.a	n.a	60.5	-1.6
Average	4.9	9.4	7.0	78.7	6.7

n.c. = not computed

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

Table A-5
Growth in Employment by Sector

	Employment (000)					2001/02 to 2012/13		
	2001/02	2005/06	2007/08	2009/10	2013/14	Employment Growth Rate (%)	Value Added Growth Rate (%)	Employment Elasticity
Agriculture	20474	19075	21894	23945	24586	1.5	3.6	0.42
Manufacturing and Mining	4982	5421	6382	7024	8026	4.1	4.2	0.98
Electricity and Gas ^a	299	296	n.a		n.a	-0.3	3.9	-0.07
Construction	2757	3579	3093	3565	4126	3.4	4.2	0.81
Wholesale and Retail Trade	5090	6635	7167	8673	8252	4.1	4.1	1.00
Transport and Communication	2216	2452	2700	2820	3109	2.9	4.6	0.63
Finance and Insurance ^a	247	491	n.a	n.a	n.a	18.7	17.9	1.05
Public Administration and Community Services	7151	8405	6725	5920	7404	0.3	6.9	0.04
Total	43286	46365	49090	53210	56520	2.4	5.0	0.48

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-6
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	2.5	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	4.5	3.5	6.5	1.3	9.0
Average	8.0	9.8	8.4	12.5	10.3

n.a = not available

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

Table A-7
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	14.0	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	14.0	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	13.0	21.0	11.7	-8.0	-3.0
2013/14	14.0	19.0	11.3	-5.5	-1.5
2014/15	14.4	19.7	11.4	-5.3	-1.0
Average	13.9	19.0	11.0	-5.3	-1.8

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- 8
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	58.0	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	63.0	10.7	52.0
2012/13	-3.7	62.7	9.7	79.5
2013/14	-1.0	65.4	9.5	23.3
2014/15	-0.5	65.1	9.3	61.2
Average	-1.0	63.5	11.2	34.2

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

^aEstimated 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- 9
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	12.0	4.3	14.1	9.1
2002/03	4.4	14.8	3.6	14.8	9.4
2003/04	4.0	14.3	3.1	12.7	9.2
2004/05	3.8	11.2	2.9	10.0	9.1
2005/06	3.9	12.1	2.4	10.3	9.4
2006/07	5.0	10.5	2.7	9.9	9.7
2007/08	4.9	7.6	2.9	10.0	9.8
2008/09	4.6	5.7	5.7	10.0	9.1
2009/10	4.8	5.7	5.0	10.1	8.9
2010/11	4.4	5.6	4.3	10.3	8.6
2011/12	4.6	5.6	3.3	11.0	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	11.0
Average	4.4	10.0	4.1	11.6	9.5

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- 10
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 ^c
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
Average	5.1	6.9	11.5	9.0	14.6	8.1

Source: State Bank of Pakistan, Annual Report (various issues)
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^aGrowth rate of net foreign assets/broad money ratio

^bGrowth rate of net domestic assets/broad money ratio

^cDifference between the interest rate on advances and deposits

Table A- 11
Level and Pattern of Trade

	Merchandise Export Growth (US \$; %)	Extent of Product Diversification of Exports ^a	Extent of Market Diversification of Exports ^a	Merchandise Import Growth (US \$; %)
1999/2000	11.2	0.801	0.230	13.1
2000/01	12.5	0.798	0.221	14.3
2001/02	2.3	0.786	0.221	-7.5
2002/03	20.1	0.791	0.223	20.1
2003/04	13.5	0.782	0.232	21.2
2004/05	16.2	0.778	0.218	38.3
2005/06	14.3	0.769	0.229	31.7
2006/07	3.2	0.737	0.228	8.0
2007/08	16.5	0.722	0.210	31.2
2008/09	-6.4	0.709	0.202	-10.3
2009/10	2.9	0.717	0.199	-1.7
2010/11	28.9	0.697	0.184	14.9
2011/12	-2.6	0.722	0.183	12.8
2012/13	0.4	0.719	0.189	-0.6
2013/14	1.1	n.a	n.a	3.8
2014/15	-3.9	n.a	n.a	-0.9
Average	0.1	0.760	0.212	11.8

Source: Pakistan Economic Survey (Various issues)
United Nations Conference on Trade and Development

^aThis 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

**Table A- 11(Contd.)
Level and Pattern of Trade**

	Change in Terms of Trade %	Share of Essential Imports ^a %
1999/2000	-15.3	39.3
2000/01	-7.1	39.3
2001/02	-0.2	36.7
2002/03	-9.6	35.0
2003/04	-4.1	28.8
2004/05	-6.5	25.0
2005/06	-11.7	30.7
2006/07	-3.7	29.1
2007/08	-11.5	38.9
2008/09	2.8	41.9
2009/10	0.0	42.3
2010/11	2.8	42.7
2011/12	-5.9	45.8
2012/13	-2.4	42.9
2013/14	0.9	43.9
2014/15	-0.4	37.8
Average	-4.9	37.5

Source: Pakistan Economic Survey (various issues)

State Bank of Pakistan, Annual Report (various issues)

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

**Table A-12
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	282.0	4337	3.7	5.1	-2.6
2002/03	4.9	229.0	9529	6.5	-4.7	-0.1
2003/04	1.8	209.5	10564	5.0	-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
Average	-1.5	217.6	9113	3.3	4.7	1.1

Source: SBP, Annual Report (various issues)

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TABLE A-13
TREND IN INCOME INEQUALITY
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	-1.0	-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 2013-14						
Pakistan	2.1	1.9	1.4	2.2	2.6	2.1
Pakistan Urban	2.2	0.8	0.7	2.6	2.6	2.6
Pakistan Rural	1.7	2.1	1.6	2.0	2.6	1.2
Growth Rates between 2001-02 to 2013-14						
Pakistan	3.4	2.2	2.5	2.8	3.4	4.0
Pakistan Urban	2.5	1.5	1.4	2.0	2.1	2.8
Pakistan Rural	3.5	2.4	2.8	3.0	4.0	5.0

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

Table A-14 A
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
Gross Primary Enrolment Rate								
Punjab	75	76	100	97	97	98	98	100
Sindh	64	63	79	80	84	84	81	76
K-PK	70	77	82	83	87	89	91	89
Balochistan	64	62	72	75	75	74	73	67
Max/Min Ratio	1.172	1.242	1.389	1.293	1.293	1.324	1.342	1.492
Net Primary Enrolment Rate								
Punjab	44	45	62	61	62	61	62	64
Sindh	41	40	50	51	54	53	52	48
K-PK	39	41	49	49	52	51	54	54
Balochistan	36	32	41	41	44	47	45	39
Max/Min Ratio	1.222	1.406	1.512	1.488	1.409	1.298	1.378	1.641
Gross Middle Enrolment Rate								
Punjab	43	45	55	59	57	58	60	59
Sindh	38	34	43	46	49	48	48	46
K-PK	37	38	53	52	54	57	61	61
Balochistan	29	33	34	35	36	35	39	41
Max/Min Ratio	1.483	1.364	1.618	1.686	1.583	1.657	1.564	1.487
Net Middle Enrolment Rate								
Punjab	19	18	20	19	22	23	25	25
Sindh	17	14	17	18	18	19	19	17
K-PK	11	12	16	17	17	17	21	26
Balochistan	9	8	9	11	11	13	14	12
Max/Min Ratio	2.111	2.250	2.222	2.000	2.000	1.769	1.786	2.083
Gross Matric Enrolment Rate								
Punjab	37	44	51	54	57	61	62	65
Sindh	51	42	45	44	50	55	54	50
K-PK	36	41	45	48	51	54	58	56
Balochistan	41	29	33	34	34	38	37	33
Max/Min Ratio	1.244	1.517	1.545	1.588	1.676	1.605	1.676	1.969
Net Matric Enrolment Rate								
Punjab	12	12	11	13	13	14	15	17
Sindh	10	13	10	11	11	11	12	11
K-PK	6	10	6	6	8	7	10	9
Balochistan	3	6	5	5	5	6	6	5
Max/Min Ratio	4.000	2.000	2.200	2.600	2.600	2.333	2.500	3.400
Literacy Rate (10 +)								
Punjab	46	47	58	59	59	60	62	61

Table A-14 A
Trend in Regional Inequality
Coverage of Education and Health Services (Contd...)

	1998/99	2001/02	2006/07	2007/08	2008/09	2010/11	2012/13	2013/14
K-PK	37	38	47	49	50	50	52	53
Balochistan	36	36	42	46	45	41	44	43
Max/Min Ratio	1.417	1.306	1.381	1.283	1.311	1.463	1.409	1.418
Full Immunisation								
Punjab	55	57	83	76	85	86	89	86
Sindh	38	45	65	67	69	75	74	61
K-PK	54	57	76	74	73	77	76	75
Balochistan	34	24	54	57	43	56	53	41
Max/Min Ratio	1.618	2.375	1.537	1.333	1.977	1.536	1.679	2.097

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

TABLE A-14- B
TREND 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 2013-14	2001-02 to 2013-14
Overall				
Pakistan	4.7	-1.3	2.1	3.4
Punjab	5.6	-0.8	3.5	4.5
Sindh	3.0	-2.8	-1.9	0.6
KPK	5.0	-2.6	-5.0	-0.1
Balochistan	-0.6	3.3	4.6	2.0
Urban				
Pakistan	2.8	-0.2	2.2	2.5
Punjab	3.4	-1.2	5.3	4.4
Sindh	2.0	2.3	-3.1	-0.6
KPK	3.3	-7.2	4.0	3.6
Balochistan	0.5	8.2	3.6	2.0
Rural				
Pakistan	5.3	-2.1	1.7	3.5
Punjab	6.7	-0.5	2.0	4.3
Sindh	2.3	-9.5	-0.2	1.1
KPK	5.3	-1.4	1.7	3.5
Balochistan	-2.5	-1.5	5.4	1.4

Source: Pakistan Integrated Household Survey, Various Issues
Pakistan Bureau of Statistics

Table A-15
Trend in Pakistan's Ranking in Different Governance Indicators

Source	Type	INDICATORS					
		EARLIER YEAR ^a			LATEST YEAR ^b		
		Year	Number of Countries	Ranking ^c	Year	Number of Countries	Ranking ^c
1. Transparency Intentional (TI)	Corruption Perception Index (CPI)	1995	151	39	2013	177	134
2. Freedom House (Freedom in the World)	Political Rights Score	2002	151	131	2013	195	126
	Civil Liberties Score	2002	Not Free	135	2013	195	142
	Status	2002	30	-	2011	Partly Free	-
3. Freedom House (Countries at the Crossroads)	Civil Liberties	2004	30	28	2011	35	28
	Rule of Law	2004	30	27	2011	35	21
	Anticorruption and Transparency	2004	30	22	2011	35	24
	Accountability and Public Voice	2004	191	27	2008	35	12
4. Freedom House (Countries at the Crossroads)	Voice & Accountability	1996	Not Free	123	2009	197	138
5. Freedom House (Press Freedom Survey)	Status	2002	187	-	2009	Not Free	-
	Legal Environment	2002	187	172	2009	195	174
	Political Environment	2002	187	177	2009	195	178
	Economic Environment	2002	187	176	2009	195	172
	Total Score	2002	194	172	2009	195	175
6. World Bank Institute (Governance Matters)	Voice & Accountability	2002	180	139	2012	214	158
	Political Stability and Absence of Violence	1996	182	162	2012	213	212
	Government Effectiveness	1996	183	120	2012	212	165
	Regulatory Quality	1996	171	130	2012	212	149
	Rule of Law	1996	154	105	2012	214	170
	Control of Corruption	1996	76	127	2012	214	179
7. World Bank - World Development Indicators [Country Policy and Institutional Assessment (CPIA)]	CPIA Building Human Resources Rating	1996	76	46	2012	80	54
	CPIA Business Regulatory Environment Rating	2005	76	15	2012	80	51
	CPIA Debt Policy Rating	2005	76	12	2012	80	41
	CPIA Economic Management Cluster Average	2005	76	15	2012	80	68
	CPIA Efficiency of Revenue Mobilisation Rating	2005	76	40	2012	80	68
CPIA Equity of Public Resource Use Rating	2005	76	38	2012	80	43	

Table A-15
Trend in Pakistan's Ranking in Different Governance Indicators

Source	Type	INDICATORS					
		EARLIER YEAR ^a			LATEST YEAR ^b		
		Year	Number of Countries	Ranking ^c	Year	Number of Countries	Ranking ^c
	CPIA Macroeconomic Management Rating	2005	76	17	2012	80	76
	CPIA Policies for Social Inclusion/ Equity Cluster Average	2005	76	54	2012	80	53
	CPIA Policy and Institutions For Environmental Sustainability Rating	2005	76	22	2012	80	72
	CPIA Property Rights and Rule-Based Governance Rating	2005	76	41	2012	80	62
	CPIA Public Sector Management and Institutions Cluster Average	2005	76	39	2012	80	46
	CPIA Quality of Budgetary and Financial Management Rating	2005	76	34	2012	80	32
	CPIA Quality of Public Administration Rating	2005	76	19	2012	80	15
	CPIA Social Protection Rating	2005	76	55	2012	80	28
	CPIA Structural Policies Cluster Average	2005	76	2	2012	80	44
	CPIA Trade Rating	2005	76	37	2012	80	62
	CPIA Transparency, Accountability, and Corruption In The Public Sector Rating	2005	76	63	2012	80	61
8. UNDP Human Development Report	Gender Empowerment Measure	1996	104	101	2007	109	99
9. Overseas Development Institute (World Governance Assessment)	Civil Society	1996	16	15	2000	15	16
	Political Society	1996	16	16	2000	16	16
	Government	1996	16	15	2000	16	16
	Bureaucracy	1996	16	14	2000	16	12
	Economic Society	1996	16	15	2000	16	13
	Judiciary	1996	16	16	2000	16	16
	Total	1996	16	15	2000	16	15
10. Human Rights Commitment (Danish Centre for Human Rights)	CPR Violations	2000	72	30	n.a		
11. Data on Governance Indicators (IADB/DIFID)	Freedom of the Press	1993	92	80	2008	211	180
	Political Rights	1993	92	85	2008	211	162

Table A-15
Trend in Pakistan's Ranking in Different Governance Indicators

Source	Type	INDICATORS					
		EARLIER YEAR ^a			LATEST YEAR ^b		
		Year	Number of Countries	Ranking ^c	Year	Number of Countries	Ranking ^c
13. Democracy Index Intelligence Unit (EIU)	Overall Score	2006	167	113	2012	167	108
	Electoral Process and Pluralism	2006			2012	167	104
	Functioning of Government	2006			2012	167	83
	Political Participation	2006			2012	167	148
	Political Culture	2006			2012	167	142
	Civil Liberties	2006			2012	167	106
14. Polity IV Country Reports (University of Maryland - Center for International Development and Conflict Management)	Polity	1972	154	112	2007	163	145
	Democracy	1972	154	121	2007	163	129
	Autocracy	1972	154	110	2007	163	134
	Durable	1972	154	135	2007	163	148
	Tentative	1972	Not	-	2007	Yes	-
15. Business Environment Risk Intelligence (BERI)	Political Stability and Absence of Violence	1996	101	47	2008	101	92
	Government Effectiveness	1996	119	84	2008	119	87
	Rule of Law	1996	119	87	2008	119	52
	Control of Corruption	1996	122	59	2008	119	57
16. Gallup International (Gallup World Poll)	Voice & Accountability	2006	122	80	2008	143	102
	Government Effectiveness	2006	122	61	2008	143	53
	Rule of Law	2006	122	62	2008	143	94
	Control of Corruption	2006	122	75	2008	143	62
17. Index of Economic Freedom (Heritage Foundation and Wall Street Journal)	Business Freedom	1995	101	88	2014	184	82
	Trade Freedom	1995	101	87	2014	180	144
	Fiscal Freedom	1995	101	63	2014	183	77
	Government Size	1995	101	35	2014	183	21
	Monetary Freedom	1995	101	48	2014	183	149
	Freedom from Corruption	1995	101	90	2014	184	145
	Labor Freedom	1995	155	88	2014	184	148
	Overall Index	1995	101	52	2014	186	126
18. Voter Turnout: Global Report	Vote to Registration Ratio, Parliamentary Elections	1945-2004	169	164			
19. Inter-Parliamentary Union or single House (Women in National Upper House or Senate Parliaments -Statistical Archive)	Lower or single House (Women's weight)	1997	102	95	2008	136	46

Table A-15
Trend in Pakistan's Ranking in Different Governance Indicators

Source	Type	INDICATORS					
		EARLIER YEAR ^a			LATEST YEAR ^b		
		Year	Number of Countries	Ranking ^c	Year	Number of Countries	Ranking ^c
	Deleterious Economic Policy	2004	48	44			
	Inadequate Accounting and Governance Practices	2004	48	29			
	Detrimental Regulatory Structures	2004	48	19			
	The Opacity Index	2004	48	28			
21. Reporters without Borders (Press Freedom Barometer)	Press Freedom Index	2002	139	119	2013	179	159
22. University of California Santa Barbara (Stohl)	Political Terror Scale Amnesty International	1977	101	89	1977	152	
	US State Department	2008	111	96	2008	179	
23. Governance-III (USAID)	Voice & Accountability	1996	192	151	2005	208	182
	Political Stability and Absence of Violence	1996	186	165	2005	213	201
	Government Effectiveness	1996	180	108	2005	210	139
	Regulatory Quality	1996	182	138	2005	203	147
	Rule of Law	1996	167	104	2005	208	158
	Control of Corruption	1996	151	127	2005	204	140
24. Bertelsmann Transformation Index (Bertelsmann Stiftung)	Voice & Accountability	2002	116	85	2008	125	93
	Government Effectiveness	2002	116	53	2008	125	81
	Regulatory Quality	2002	116	61	2008	125	78
	Rule of Law	2002	116	80	2008	125	97
	Control of Corruption	2002	119	63	2008	125	86
26. International Fund for Agricultural Development (IFAD Rural Sector Performance Assessments)	Voice & Accountability	2004	124	21	2008	90	59
	Government Effectiveness	2004	124	27	2008	90	68
	Regulatory Quality	2004	124	71	2008	90	28
	Rule of Law	2004	124	106	2008	90	62
	Control of Corruption	2004	124	45	2008	90	59
27. Institutional Profiles (Institutional Profiles Database)	Voice & Accountability	2006	85	63	2008	85	63
	Political Stability and Absence of Violence	2006	85	81	2008	85	81
	Government Effectiveness	2006	85	75	2008	85	75
	Regulatory Quality	2006	85	59	2008	85	59
	Rule of Law	2006	85	69	2008	85	69
	Control of Corruption	2006	85	49	2008	85	49

Table A-15
Trend in Pakistan's Ranking in Different Governance Indicators

Source	Type	INDICATORS					
		EARLIER YEAR ^a			LATEST YEAR ^b		
		Year	Number of Countries	Ranking ^c	Year	Number of Countries	Ranking ^c
	Government Effectiveness	1998	181	157	2008	203	176
	Regulatory Quality	1998	181	159	2008	203	199
	Rule of Law	1998	181	133	2008	203	185
	Control of Corruption	1998	181	150	2008	203	179
29. Country Security Risk Ratings (IJET Country Security Risk Ratings)	Political Stability and Absence of Violence	2004	167	149	2011	190	183
30. Cerberus Corporate Intelligence Gray Area Dynamics [Merchant International Group (MIG)]	Political Stability and Absence of Violence	2002	118	118	2008	164	162
	Government Effectiveness	2002	118	118	2008	164	145
	Regulatory Quality	2002	118	107	2008	164	57
	Rule of Law	2002	118	113	2008	164	87
	Control of Corruption	2002	118	118	2008	164	148
31. Country Policy and Institutional Assessments (Asian Development Bank)	Government Effectiveness	2005	25	6	2011	212	165
32. Brown University's Center for Public Policy	Government Effectiveness	2002	194	127	2008	196	109
33. Trafficking in People Report (United States Department of State)	Rule of Law	2000	82	74	2008	153	76
34. World Economic Forum	Global Competitiveness Scale	2008	131	92	2013	144	124

^a The earliest year denotes the year for which the data of the indicator is available
^b The latest year is the most recent year for which the data of the indicator is available
^c The most we are away on the most bad in terms of performance in that indicator
Source: IPP estimates from the various international sources of governance indicators

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Notes

Foreword

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Chapter 2

1. GDP is a measure of a country's production of the value of goods and services produced within a country's borders. GNP adjusts GDP for payments/ receipts to/and from the outside world related to interest, investment income, and income transfers such as worker remittances. GNI further adjusts GNP for changes in international terms of trade of country during a year. The net improvement in the terms of trade- a greater improvement in export prices relative to import prices improves national income, other things being equal, while a rise in import prices relative to export prices worsens GNI.
2. Also, it can and has been argued that the national income statistics do not fully reflect the level of activity in the informal economy. The proportion of unmeasured activity has been rising as reflected in widespread tax evasion and stagnant tax ratio. Additionally, the official figures for income transfers into the country probably significantly understate both worker remittances and substantial illegal transfers supporting terrorism.
3. See a recent piece by Mr. Shahid Kardar, a former Governor of the State Bank of Pakistan on "Widening Perception Gaps" in the Daily Dawn of August 4 2015, Sakib Sherani on "Policy Response to Challenges" in the Daily Dawn of November 2014, and Nasir Jamal on "Gap in Promises and Delivery" in the Daily Dawn of May 2015.
4. As against the target of Rs1342 billion, the actual deficit was Rs 1457 billion 8.7% higher.
5. For detail see Seventh Review Under the Extended Arrangement and Modification of Performance Criteria, IMF Pakistan Country Report 15/162 June 2015 page 7.
6. See State Bank of Pakistan Annual Report 2013-14 Chapter on Balance of Payments
7. Net reserves exclude future commitments of foreign exchange and foreign government placements.
8. Sakib Sherani on "Pakistan's Failing Exports" in Dawn Newspaper of September 4, 2015.
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10. In January 2008, Pakistan Electric Power Company (PEPCO) signed a Rs. 23 billion (\$329 million) contract with Dong Fang Electric Corporation of China to construct the Nandipur Power Project and paid it a 10 per cent down payment. By mid-2010, much of the work at this power project was complete and it was expected be finished on schedule in April 2011. However, the project suffered delays as the summary, sent by the Ministry of Water and Power for legal opinion of the Ministry of Law & Justice, remained pending with the latter for two years from March 2010 to March 2012. As a result, machinery worth \$85 million remained stuck at the Karachi Port for over two years. In September 2012 Dongfang Electric Corporation terminated the contract for the construction of the Nandipur power project, saying his company had suffered colossal losses because machinery worth \$85 million had been awaiting clearance at the Karachi Port. he company also demanded \$40 million as compensation for losses suffered

because of depreciation and damages on machinery stranded at the Karachi Port for the two years

11. In June 2013, Pakistan's Ministry of Water and Power started renegotiating the contract with Dongfang Electric Corporation and the firm agreed to resume work on the power. Prime Minister Nawaz Sharif inaugurated the first turbine of the project on 31 May 2014. But the plant remained operational for only five days after the inauguration and had to be shutdown due to mismanagement and use of inappropriate fuel. (Source Various Press Reports quoted by WIKIPEDIA.)
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21. Parvez Hasan, My Life My Country, Ferozesons Lahore 2011 p.437
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Chapter 6

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5. As quoted by Secretary Establishment Nadeem Hassan Asif, JS Establishment Jawad Pal, and DS Establishment Sarfraz Durrani
6. Bhoomi Project was the first such prototype in India

7. The first non-sustainable attempt was the Kasur Pilot Project, headed by Mr. Zahoorul Haq Shiekh, in the early nineties
8. PD Irfan Elahi, currently Chairman P&D, should be given the credit for ultimately completion and data entry of the project
9. Credit for compiling this list goes to Mr. Saleem Ranjha, Founding Director of Akhuwat Bank, and a prominent government officer
10. Several countries are now removing this anomaly through Open Data initiatives such as UK's <http://data.gov.uk/> or USA's <http://www.data.gov/> accessed June 25, 2015
11. <http://internetofeverything.cisco.com/vas-public-sector-infographic/> accessed 19 October 2015
12. <http://sensorweb.nasa.gov/index.html> accessed June 27, 2015
13. <http://sensorweb.nasa.gov/Fire.html> accessed June 27, 2015
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15. <http://www.digital-ecosystems.org/> , DG Connect program of the European Commission's Directorate General on Communications Networks, Content and Technology, accessed June 25, 2015
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19. has been cancelled and added into acronyms
20. <http://edition.cnn.com/2014/03/12/us/malaysia-airlines-plane-crowdsourcing-search/> accessed on 15 June, 2015
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23. Other contributing variables such as different timing of day during impact, low tide, etc. may also exist
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Chapter 7

1. As per the population criteria.
2. For details, see the websites of the Punjab and Sheikhpura Governments.

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