CHAPTER 8

Information Technology

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8.0 Introduction

The advent of Information Technology (IT) brought with itself the potential of transforming economies by revolutionizing the way societies address some of the most pressing global challenges that we face today. The movement has reverberated throughout the world where technology has proven itself to be a key driver for economic development and many other countries have pushed for reforms to transform their economies through improved internet access, IT infrastructure and the democratization of technologies. It is these reforms and policy changes that are required to achieve advancements in technology to drive innovation in all sectors of the economy to achieve inclusive and sustainable growth.

The Government of Punjab has accorded highest priority to the development of IT infrastructure, services and applications and has achieved key milestones leading towards economic growth and development. The establishment of Information Technology University (ITU) and specialized units i.e. Punjab Information Technology Board (PITB) and Urban Unit (UU) has proved to be the major initiatives towards accelerating IT revolution in Punjab. The creation of these units provided a vision along with an appropriate infrastructure and capacities to not only benefit for available technologies but also to promote innovation and learning in the IT sector. While recognizing the recent formulation of (draft) Punjab IT Policy, 2016, the scope of Punjab Economic Report has redefined, with greater focus on review of IT policy, discussion on structure of the IT sector, mapping of important initiatives in public as well as private sector, and some recommendations on implementation of the Punjab IT Policy.

8.1 Punjab IT Policy

Punjab, like other provinces of Pakistan, has been following the National IT Policy since its formulation in year 2000. Now Punjab, through Punjab Information Technology Board (PITB) has developed a draft IT policy. The Punjab Economic Report involves a review of the significance of this latest policy for its support to provincial government departments, in the provision of quality social sector services, support to economic activities and productive sectors, and in the provision of a regulatory framework for IT industry in Punjab. In terms of coverage, the Punjab IT Policy 2016 is focusing on 6 key areas: Industry, Education, Health, Governance, Citizens and Start-ups and MSMEs. Within these broad focus areas 30 key sub-sectors have been identified, and the policy aims to provide a comprehensive set of policies and incentives to boost growth and development in these areas. The document also presents 6Es of the IT Policy which are deemed key for Punjab, to become a leading IT hub of the world: Education, Engagement, Empowerment, Economy, Entrepreneurship and Employment.

The fundamental principles of Punjab IT Policy coincide with the Punjab's Growth Strategy, which desires to leverage the role of IT for accelerating private sector growth and jobs creation.

   i. **IT legislation and conformity:** The Punjab IT Policy, 2016 is a major step towards ensuring security of business, data and intellectual property. This provides huge confidence to individuals, businesses and government own departments to effectively and legitimately use IT for improving their efficiency and effectiveness.

   ii. **Development of IT industry:** The IT Policy identified some of the very effective approaches to improve conditions for broad-based development of IT, as a sector in Punjab, especially through provision of infrastructure, incentives and regulatory framework. It also recognizes the value of fostering innovation and entrepreneurship, reducing urban and rural divide, creating diversity in job opportunities within IT sector, creating information systems and data analytics.

   iii. **Use of IT for public sector service delivery:** Use of IT in public sector has been continuously evolving and improving in Punjab. The objectively designed Punjab IT Policy can bring efficiency and effectiveness in the identified areas of strategic importance, including social sector, industry, energy, services and urban and city development etc.

   iv. **Leveraging IT for private sector development:** This area of IT Policy is aligned with the Punjab Growth Strategy, wherein opportunities of leveraging IT for productivity enhancement of private sector have been discussed. During recent years, an emerging part of business enabling environment entails provision of quality and

reliable IT infrastructure. Some of the specialized areas where IT can provide support include access to financial services, value addition in industry and agriculture and strengthening of services sector including trade and commerce etc.

The development of Punjab IT Policy is a key step towards as it provides an overarching framework along with a roadmap for progress in the field of IT. The policy can be seen as an enabling tool to make Punjab as the next go to place for investments, start-ups and an inclusive culture. If effectively implemented, the policy will provide a secure and acceptable regulatory framework to build and manage processes, support to protect the information systems and assets, a benchmark for monitoring, and measurement compliance for associated government departments and private sector enterprises.

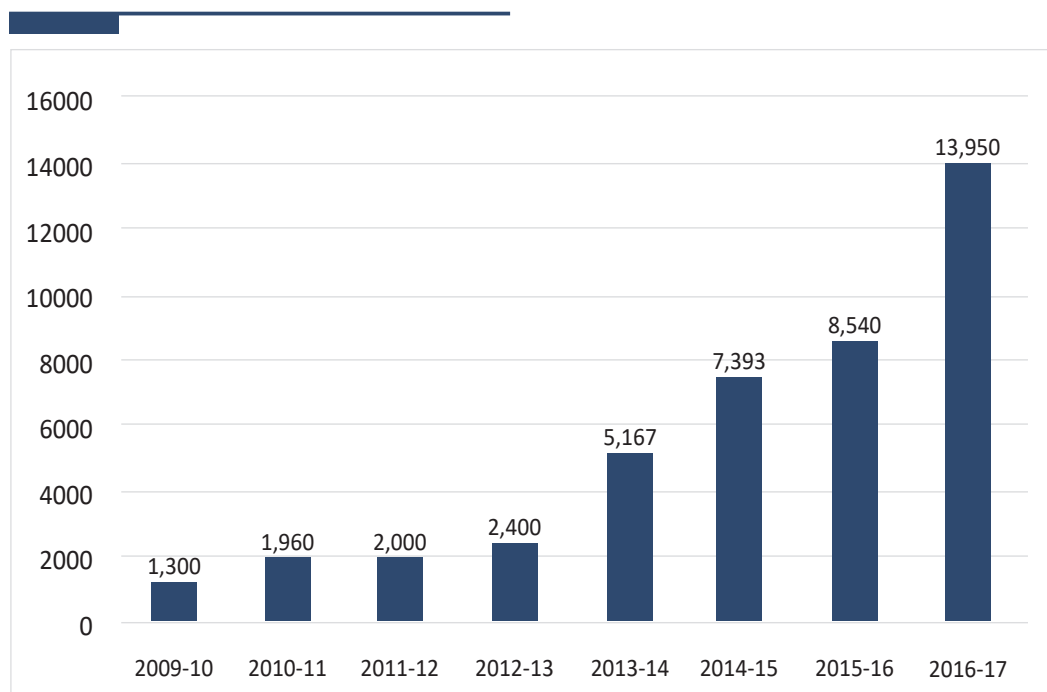## 8.2 Governance structure of the IT sector in Punjab

The function of information technology in Punjab has emerged from Planning and Development Department of the Government of Punjab (GoPb). The GoPb established Punjab Information Technology Board (PITB), in 1999, as an autonomous body under the Department of Industries. However, after the dissolution of Information Technology Department in 2011, PITB was attached to Planning and Development Department of Punjab. Now PITB is the central department in Punjab with a mandate to effectively and efficiently provide IT services and infrastructure to the government, citizens and private sector. In addition, the Board is responsible for maintaining the foundational IT infrastructure i.e. a centre for hosting data and systems along with managing official email identities. PITB is supporting key government departments, through e-governance, for the provision of quality public sector services to citizens of Punjab.

Following the establishment of PITB, Information Technology University was established in 2012 in order to advance scholarship and innovation in the areas of science, technology and engineering. ITU focuses on cross-disciplinary applied research, the cultivation of an entrepreneurial culture in teaching and research, the maintenance of a close collaboration with the Information Technology industry and the development of strong ties with government funding agencies.

Major ADP Investments and Initiatives in IT

Information technology has a unique capability to improve efficiency and effectiveness of service delivery of public sector departments. This change in public sector has evolved over the last two decades, when public sector departments started to observe the benefits of use of technology in their functions. This change has been gradual but deep rooted. This can be judged from the increasing number of government departments adopting use of information technology for planning, management and delivery of their functions. The government has also exhibited its commitment to adopting IT by increasing the ADP allocation for Governance and IT by more than 5 times over the last seven years as can be seen in Figure 1. The share of IT sector, as part of overall budget, has also reached 5 percent which if compared with other provinces is much higher.

Figure 1: Punjab - Development Allocation in IT Sector

Source: Annual Development Programme, MTBF, GoPb

Table 1: ADP Allocations in IT Sector

IT Investments in Public Sectors	ADP Allocation (PKR.Million)		
	FY 2015-16	FY 2016-17	Increase (%)
Punjab Information Technology Board	678	1231.72	82%
Lahore High Court	90	193.15	114%
Police Department	4109	11252.43	174%
Transport Department	10	0.00	-100%
Board of Revenue	3569	336.03	-91%
Health Department	15	72.31	382%
S&GAD	18	25.00	38%
Prosecution Department	31	93.00	199%
Excise & Taxation Department	20	533.56	2568%
Finance Department	0	100.00	N/A
Home Department	0	72.80	N/A
Law Department	0	40.00	N/A
Total ADP allocations	8540	13950.00	63%

Source: Annual Development Programme, MTBF, GoPb

The total IT ADP budget (Table 1) is allocated among 12 public sector departments, including PITB. This confirms the widespread use of information technologies in government functions. This list includes functions such as judiciary, law and order, transportation, health, revenue collection and finance etc. As table 1 indicates, the highest allocation has been observed in Punjab's police department, mainly because of recent initiative of safe cities project. This involves development of an integrated command control and communication centre for Punjab police. In the Board of Revenue, a major IT based initiative i.e. automation of stamp papers (e-stamping) is underway. PITB itself is implementing number of important initiatives to promote e-governance, such as service delivery monitoring, setting up of free Wi-Fi service etc. The rationale behind all these public-sector investments in IT, is motivation to improve productivity of government departments. That will eventually lead to better public-sector services experience for citizens. Some of the IT based development initiatives undertaken in Punjab are:

i. Establishment of Information Technology University in Lahore in 2012 to nurture an environment of high-tech research and entrepreneurship with state-of-the art facilities, world class faculty, in-house start-up incubator and well-established government and industry linkages. Around 700 students are currently enrolled in various IT disciplines.

ii. Smart Monitoring of Schools Program which helps monitoring teacher and student attendance. The initiative has improved facilities, access and quality of education in 52,695 public schools encompassing more than 10 million students and 339,000 teachers.

iii. Free Wi-Fi Service access to 3.5 million citizens of Punjab's major cities including Lahore, Rawalpindi, Multan, Faisalabad, Bahawalpur and Murree. The initiative with a cost of Rs.1140 Million is a step towards smart cities and has the capacity to provide service to 160,000 users on daily basis with an aim to benefit the youth for their knowledge-based activity.

iv. Establishment of Pakistan's first business incubator – Plan 9 with a cost of PKR 186.519 million. The incubator has graduated 130 start-ups till date and has received a combined valuation of more than $60 million.

v. Establishment of Arfa Software Technology Park in Lahore to support IT led economic growth in Punjab. The initiative is promoting IT and Telecom industry through human resource development, employment generation and exports boost. Currently, there are 75 national and international businesses operating within the technology park with state-of-the-art business facilities employing nearly 3000 people. The park receives on average 5000 visitors every day.

vi. E-Learn Punjab Program is the first government e-Learning initiative in Pakistan, revolutionizing the entire education doctrine of the country. E-Learn Punjab, an official repository of free digitized textbooks augmented with videos, animations and simulations, with an aim to enhance conceptual learning and improves quality of education for grades 6 -10. The initiative will facilitate 5.963 million students and 200,000 teachers of 14,244 middle and higher secondary schools of Punjab.

vii.   Disease Surveillance System project has been completed with a total cost of Rs.198.974 million. The initiative identified the use of Innovative technological approaches in health sector and plays a preventive role through surveillance of disease outbreaks, with the help of GIS Mapping and Surveillance.

viii.   Disease mapping and child immunization coverage where more than 6 million observations have been recorded and analysed till date. The project has supported in child immunization record management, through a smartphone with a mobile application. Moreover, it has also improved access to health services as it helps in monitoring vaccinator's attendance at assigned locations, vaccinator log to enter number of children vaccinated and antigens used.

ix.   Dengue Activity Tracking System is based on a real time reporting mechanism on portal through a GPS enabled android based mobile application. More than 6.0 million anti-dengue surveillance activities reported via android mobiles since March 2012.

x.   Flood Monitoring System is designed in a way where PITB, in alliance with various other government departments, updates the dashboard with an hourly disaster bulletin. The monitoring system facilitates the government to keep a track record of the flood conditions and take real-time relief and evacuation decisions; thus, minimizing the possible chaos in such circumstances.

xi.   Citizen Feedback Monitoring Program which received World Bank Innovation Fund Award, has so far recorded more than 9 million transactions. The Rs.142.442 million initiatives developed a feedback mechanism that seeks feedback from citizen who utilize public services of various government departments including health, LDA, PDMA, Police, Rescue, Food and Revenue. The feedback is analysed to identify problem areas and assist relevant officials in taking evidence based corrective measures.

xii.   Model Police Stations initiative with a cost of Rs.169.257 million. 440 out of 709 police stations in 36 districts of Punjab, now have computerized FIR filing mechanisms. The initiative has improved performance of Punjab police and has facilitated citizens' access to law and order services.

xiii.   Establishment of Integrated command, control and communication system (PPIC3) in major cities of Punjab province including Rawalpindi, Multan, Gujranwala, Faisalabad, Bahawalpur and Sargodha for public safety. The Punjab safe cities' project has an estimated cost of Rs15,000 million and initially PSCA has identified 2000 locations for installing more than 10,000 cameras for surveillance. The Punjab Police Integrated Command Control and Communication Centre Lahore has already been working successfully. The Initiative will improve service delivery, traffic management, monitoring law and order, electronic evidence collection, crime reduction, secure police communication and accountability.

xiv.   Restaurant Invoice Monitoring System or RIMS is an innovative step by the Pakistan Revenue Authority (PRA), in collaboration with the Punjab Information Technology Board (PITB). It is a web-based monitoring tool with the help of which, invoices issued by the restaurants can be captured and monitored in real time for efficient collection of sales tax on services. The initiative has increased revenue of Punjab Revenue Authority.

xv.   Land Records Management and Information System costing Rs.12260.480 million is contributing to better management of land revenue record. The initiative has resulted in increased access to land records at lower transaction cost, client-responsive service to citizens, increased level of tenure security of land-right holders and increased transparency in transactions of land.

xvi.   Automation of Transport Department is Rs.127.560 million projects to enable all 36 District Regional Transport Authorities (DRTAs) to issue Computerized Route Permits, Certificate of Fitness, Licenses of Bus Stands and Goods Forwarding Agencies etc.

8.3 Leveraging IT for private sector development

IT plays significant role in an economy based on its contribution to GDP, emergence of new services and industries, business innovation and direct job creation. As is well reflected in Punjab IT Policy, the Government of Punjab is mindful of these global changes and is proposing interventions to keep Punjab up to date with these changes. The implementation of IT Policy will keep Punjab as a viable and competitive player in the global economic market. In addition, it seems

that the policy will streamline the governance process, ensure intellectual property rights and protection. This will create room for new and innovative businesses, leading towards increase private sector investment in Punjab.

Economic Policy Institute, in its briefing paper "Public Investments - The next 'new thing' for powering economic growth" by Josh Bivens (April 2012) established that the productivity acceleration in the late 1990s was driven largely by private-sector investments in information and communications technology (IT), and not by increased public investments. This confirms that, especially in developing counties, investments in IT have strong contributions in private sector development as the transaction costs in market reduce financing costs in investment and ultimately lead to cheaper financing and this is considered a motivation for private sector investment.

Growth in IT Sector

Pakistan's IT industry has come a long way and is today the fastest growing export sector of Pakistan. From less than $20 million in annual exports back in 2000, the country's annual IT exports have crossed the $2 billion mark now at an annual growth rate of 30 percent to 40 percent-PSEB

The IT revolution has set the stage for unprecedented increase in financial activity across the globe through automation of banks to improve general business climate, opening up new markets, new products, new services and efficient delivery channels for the banking industry. Online electronics banking, mobile banking and internet banking are a few examples. The use of IT has reduced the cost of global funds transfer.

During last few years, new private enterprises have been established in Pakistan due to supporting environment by government. To further harness the potential of private sector, the Punjab government has established IT incubation centres as Plan 9 and Plan X to support establishment of new private enterprise and empower commercially viable mid-stage technology start-ups by providing access to multiple funding channels, specialized network of mentors and global exposure to establish high impact businesses.

Plan 9 has completed 9 batches of 6 months incubation cycle and has established 130 private enterprises. The incubator provides a stipend, infrastructure facilities, mentorship, networking, business and product development support to young graduates, with highly feasible business idea to establish new private enterprises.

Plan X Accelerator Model established in 2014, and has facilitated 27 mid stage technology enterprises, raised an investment of $3 Million and has created more than 800 new jobs in two years. The Plan X accelerator has supported enterprises through dedicated mentorship, trainings, identifying investment sources, scalability, customer acquisition, resources provision, business development and partnership opportunities.

Some other highly effective and successful IT driven initiatives that led to the overall development of private sector i.e. real estate, e-trading, automobile industry and banking, emerged in Pakistan are:

- **Zameen.com** Pakistan's leading real estate portal which connects buyers and sellers across the country. Now over 10,000 real estate agencies have signed up with Zameen.com along with top national and international developers. This IT based initative has led to an unpreceded growth in not only real estate, but also in the construction industry.

8.4 Cyber Crimes

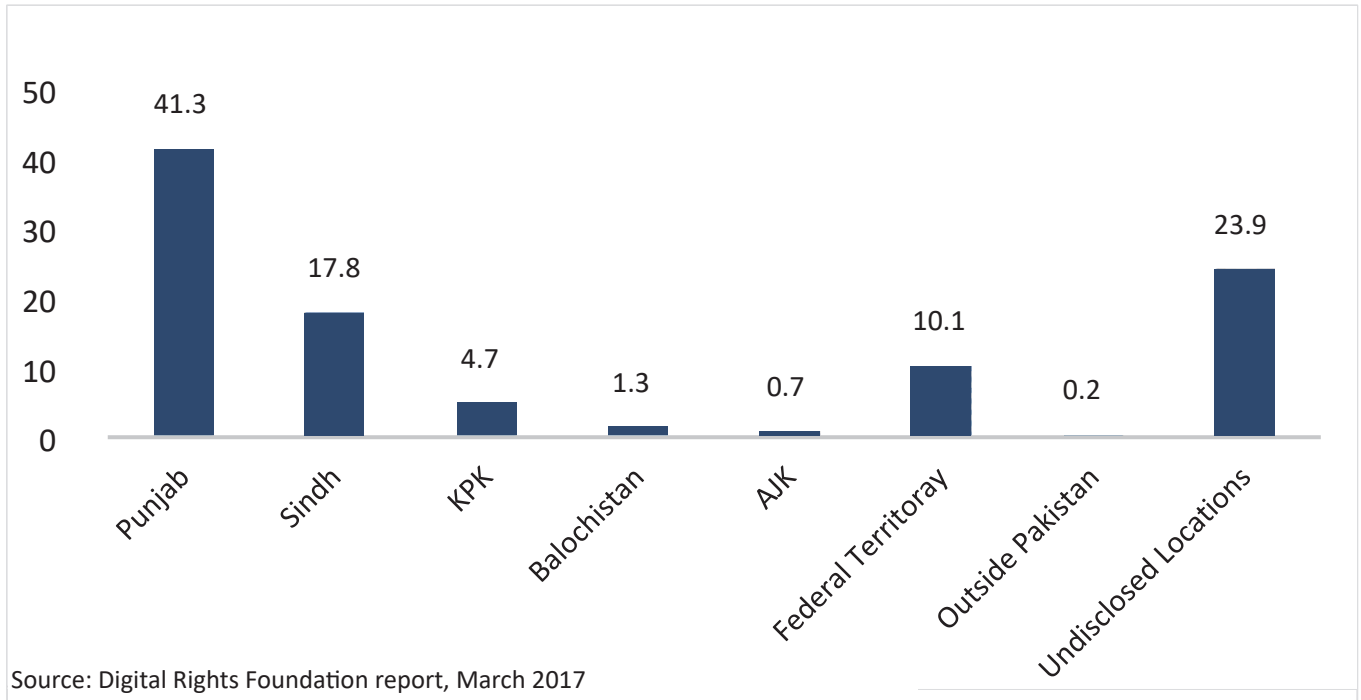In an increasinglynetworked economy and emerging technological developments, safeguarding Information and Communication Technology (IT) systems and infrastructure have taken on real urgency. It is essential to instil confidence to promote its use. Effectively preventing

cybercrime would contribute towards national security while providing and enabling a secure environment for investment in information technology, e-commerce to facilitate businesses, Cybercrime is any activity commissioned via computer, digital devices and networks used in the cyber realm, and is facilitated through the internet medium. Commonly known cybercrimes include hacking, computer viruses and worms, identity theft, malicious software, cyber bullying, cyber stalking, intellectual property rights, money laundering, denial of service attack, financial fraud, electronic terrorism, vandalism and extortion and digital piracy. Cybercrime can affect an individual, government or corporate entity through criminal trespassing into unauthorized remote systems around the world and the number of cyber-crimes based on mobile devices and social media is exploding.

Based on increasing trend of cybercrimes, Prevention of Electronic Crimes Bill 2015 was developed and approved by Government of Pakistan, to prevent unauthorized acts with respect to information systems and provide a mechanism for investigation, prosecution, trial and international cooperation for related offences. The act supports government surveillance and expanded capacity of Pakistani authorities, particularly intelligence agencies to protect individuals and society.

The Digital Rights Foundation (DRF) has established a cyber harassment helpline to provide digital security support, emotional counselling, legal advice, and a referral system to victims of online harassment. The organization received 513 individual complaints in 1st Quarter of 2017. Around 62 percent of the callers were women whereas

Figure 2: Cyber Crimes Reported-DRF Report

Source: Digital Rights Foundation report, March 2017

37 percent were men. Common crimes reported include information seeking, fake profile, blackmailing, unsolicited messages, hacking, non-consensual usage of information, online stalking, doxing, gender-based bullying, financial fraud, non-consensual photo shopped pictures and pornography, threats of sexual/physical violence and non-cooperation from social media platforms. Efforts to reduce the high number of cybercrimes in Punjab will go a long way in restoring investor confidence and will provide both big and small enterprises a better and more enabling platform for their growth.

8.5 Way Forward

This section of the Punjab Economic Report stands with the Punjab IT Policy. The IT Policy provide a robust framework for IT environment, structure and initiatives in Punjab. It provides objectives and policy commitments in all relevant areas of provincial importance.

i) **Implementation of Punjab IT Policy:** The implementation of IT Policy will not only require ownership and commitment from PITB, but also a structural and behavioural change in the overall functions and department of the Punjab government, both at provincial and district level. And this should be guided by a Policy Implementation Framework, which should delineate clear roles and responsibilities of all relevant stakeholders, funding commitments from Government, and a robust policy implementation framework. It is also important that the medium to long term impact of the Policy should be assessed to ensure its alignment with the overall strategic objectives of the Punjab Growth Strategy. Specific recommendation includes:

• **Appropriate IT structure in government departments:** PITB and Urban Unit are two central entities – with greater capabilities – providing IT and related services to all key provincial and district government departments. Nevertheless, it is important for the departments to develop their own basic capacities in the area to explore opportunities of engaging IT for their productivity enhancement. Goal 10 of the Punjab IT Policy emphasizes the utilization of IT for a more efficient transparent and green governance model in Punjab. The Policy further suggests number of measures to build capacity of government departments to share responsibility for implementation of Punjab IT Policy, including develop-

ment of a uniform IT Cadre in the provincial services for implementation of IT based initiatives in a better and coordinated manner.

• **Adoption of Punjab IT Policy by provincial and districts/ local governments:** The most critical challenge would be in creating the ownership of the IT Policy, for its institutionalization and adoption within government departments and functions. This can only be done by creating greater synergies and complementarities within government functions, especially between administrative departments and PITB for IT innovations. The Punjab IT Policy, 2016 suggests that all government departments to prepare '5-year IT plans' with yearly deliverables containing information of investments envisioned in IT infrastructure, training of individuals and automation processes etc. Implementation of such plans should be the joint responsibility of respective administrative department and PITB, with clear division of work.

• **Funding for IT Policy:** It is evident that public investments on IT pay off, only if planned and managed well. The budgetary allocations, in Punjab for the last 7 years indicate continued increase in allocations of budgets for IT initiatives. This is a good sign and an indication of government's interest and commitment to leverage IT for public and private sector development. It is, however, important to estimate the overall productivity of public investments on IT in bringing efficiency savings within public sector service delivery and also in leveraging private sector investments and growth. At micro level, the IT Policy indicated the need for government departments to budget their IT needs on yearly basis.

• **Effective monitoring and evaluation of Policy implementation:** The effectiveness of the IT Policy 2016 will be ensured through its implementation in Punjab. It is therefore important that, as Policy itself suggested, a detailed Policy Action Plan along with its monitoring and evaluation mechanism should be developed soon. The monitoring of IT Policy and its Action Plan should involve periodic review of implementation of policy commitments. Whereas evaluation should involve assessment of impact of Policy interventions against its strategic objectives of improvement in productivity of public sector service delivery and creation of conditions for broad based private sector led economic development.

• **Learning and adoptive approach to IT Policy:** The context of the Punjab province is changing quite rapidly, because of internal and external factors. The Punjab Economic Growth Strategy is valid till 2018, and thus the priorities of the political government for the province. The new Government, after elections, will bring a fresh Strategy for the Punjab province. Similarly, there are advancements in the IT technologies and economies are emerging with new sectors and dynamics. It is important to be mindful of these evolving contexts and thus the need for learning and adopting Punjab IT policy to remain relevant and effective.

• **Punjab should continue to invest in transport and IT.** While the transport sector offers economies of scale, innovations in the IT sector can usher in decades worth of scope economies for virtually every service sub-sector as well as for industry and agriculture. The rate of return on investments in the IT sector are remarkable in this regard.

• It has been estimated that Pakistan has a revealed comparative advantage (RCA>1) in transport, communications, as well as financial and insurance services, based on average RCA indices calculated over 2000 to 2006. Pakistan could follow the Philippines model by using Punjab as an IT hub with a small but high-quality pool of IT labour and service capacities to target niche markets such as web design and software development. This could provide Punjab with more immediate results than trying to create a high quality broad-based IT sector which ultimately hinge upon Punjab's success in increasing investment in education.

• The Punjab government should view the IT and IT-enabled services (IT and ITeS) sector as an "industry".

• The IT and ITeS sectors of Punjab should lobby (with government assistance) the Pakistan government to join the WTO International Technology Agreement. This would directly increase the competitiveness of exports through lowering tariffs on imports of IT goods. This is crucial if Punjab wants to enter the global value chain, as demonstrated by India, Thailand and Malaysia.

• Punjab government should—with the help of Punjab Board of Information Technology—ensure compliance with GATS principles, at least within Punjab to reduce uncertainty for global investors.