



## **Competitiveness in Pakistan: A Case Study of the ICT Industry**

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## **ABSTRACT**

In developing countries, vegetable markets are inefficient in terms of information exchanges between producers and consumers on food safety attributes. This study attempts to investigate the determinants of pesticide residues and estimate information efficiency of vegetable market, by using data collected from a representative sample of 360 farmers in Pakistani Punjab. Chromatography technique is employed to quantify pesticide residues in four common vegetables. Majority of the vegetable samples surpasses the maximum residues limits; hence, they are lemons (bad products). Results of pesticide residue model show that magnitudes of pesticide residues in vegetables vary with pesticide quantity and spray interval at the farm level. Results of information efficiency model reveal that vegetable prices are negatively but insignificantly correlated with pesticides residues, implying that vegetable market is a lemon market in Pakistan. Proper implementation of food safety standards and product labelling may help to provide safe vegetables to consumers.

*Keywords:* Vegetables, Information Asymmetry, Lemons Market, Gas Chromatography, Pesticide Residues, Food Safety, Pakistan.

## **1. INTRODUCTION**

Starting from virtually scratch at the time of independence in 1947, Pakistan has made major strides in the industrialisation process. From a handful of industrial units producing sugar, vegetable ghee, tea blending, cement and cotton textiles along with some small-scale cottage industries, the manufacturing sector has grown into a fairly diversified industrial sector accounting for about 29 percent of GDP in 2016. On average, Pakistan's economy has grown at about 6 percent per annum and its per capita income has increased from USD 304 in 1960 to USD 1,180 in 2016. Despite this progress, however, Pakistan remains a low-income country, poverty is endemic, and provision of decent jobs to the growing labour force including youth remains a major challenge. For Pakistan to address these challenges and become a middle-income country by its centennial, it must strive to achieve structural transformation of the economy that is necessary to enhance productivity and bolster long term economic growth. In particular, there is a need to leverage Pakistan's inherent strengths to boost the emerging industries such as ICT to achieve a more diversified economic structure that can underpin robust economic growth.

The aim of the study is to highlight the role of ICT industry in Pakistan's economy, focusing on key sectoral issues, and to recommend appropriate policy interventions to encourage public and private investments in ICT for robust and sustainable growth. The case study provides a detailed analysis of constraints to competitiveness at the industry level and spells out key challenges that must be addressed to achieve productivity gains through allocative and technical efficiency. In addition, the case study focuses on market-supporting institutions, product and factor market regulations, experience in and policies and programs that support innovation and technology acquisition and upgradation, infrastructural issues and political economy constraints to reform. The performance of industry clusters is also investigated. The study is based on a combination of desk analysis of existing data, literature reviews, and consultations with stakeholders.

This paper has been organised as follows. Section 2 provides an overview of the information and communications technology industry. Section 3 highlights key sectoral issues while section 4 describes impediments to growth of the ICT industry. Section 4 explores Pakistan's growth experience within a political economy framework focusing in particular on governance issues that impact the process of structural transformation. Section 6 concludes the discussion.

## 2. ICT INDUSTRY IN PAKISTAN

Information Technology (IT) is “a general term that describes any technology that helps to produce, manipulate process, store, communicate, and/or disseminate information” (as defined by Williams, Hutchinson and Sawyer, 2001). As such, it includes on the one hand all the physical hardware, and on the other the software, databases, networks, and other related components which are used to build information systems [Shelly and Vermaat (2009)]. Recent developments and reduction in costs have allowed IT to be seen as a cost-effective tool for enabling socio-economic development and a major contributor to economic development. This has resulted in IT spreading rapidly in developing countries and becoming a core component of an efficient modern industrialised society in developed economies. [Long and Long (2002); Vasudevan (2003)].

Pakistan’s information and communications technology industry is a comparatively new contributor to the economy’s GDP but has become an integral part of the economy; playing a key role in the industrial and services sector and even the agriculture sector. The local business community has realised that there are significant gains to be made from integration of ICT in commercial operations by driving down costs, improving productivity and offering customers a higher level of quality service. Since 2003-4, the financial sector has invested heavily in ICT products and services and this has resulted in the increasing dependence of the banking industry on IT for streamlining day to day operations. On the industrial sector side, Enterprise Resource Planning systems are increasingly being deployed. The Government of Pakistan has also been taking an interest in developing the domestic IT sector. A few of the incentives offered to the private sector have included tax exemption<sup>1</sup>, establishment of IT Parks with low rent and overheads, foreign ownership of equity invested in IT and 100 percent repatriation of profit allowed.

Despite the efforts of the government and the potential present, the domestic IT sector has not the same measure of success in establishing a presence in the international market unlike other developing countries such as India and China. Against this backdrop this section presents a case study of the IT sector in Pakistan and implications of the challenges it faces for the broader process of structural transformation taking place in the domestic economy. This case study will highlight key developments that have marked the evolution of the industry, notable emerging trends, and the key issues facing the industry. Some bright spots in the industry that have emerged despite the hurdles observed serving as a reminder that the industry has untapped potential. Section 2 provides a snapshot of the ICT industry in Pakistan, while four key trends that have emerged in the industry are discussed in Section 3. Sectoral issues that are

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<sup>1</sup>Initially offered till 2016, the tax exemption incentive has now been extended till 2019



inhibiting the growth of the industry, as perceived by industry stakeholders are presented in Section 4, while impediments to structural transformation in the industry are given in Section 5. Policy recommendations that emerge from the analysis of the industry are discussed in Section 6, while Section 7 concludes the case study of structural transformation in the ICT industry in Pakistan.

Typically, the ICT sector contributes to the national economy in particular through the following channels: (i) exports of IT and IT related services; (ii) increasing productivity and efficiency in associated sectors (industry and agriculture at the broad level), and (iii) enhancing transparency and governance. The ICT sector in Pakistan is relatively young and as a consequence the focus has been on export of IT and IT related services. The contribution of the industry to other sectors of the economy through increasing productivity and efficiency has not taken off in the true sense of the word. Moreover, there is a trend towards greater transparency within the sector, but it remains to be seen if this will translate to other sectors of the economy.

At the time of inception of Pakistan in 1947, there was no base of Information Technology in the country. Clerical work was carried out manually and office documents were prepared on manual typewriters. The fastest communication link available was through telephone and telex. The process of computerisation in Pakistan started in 1957, when a company named “Packages Ltd.” started using computers for its work. In 1960 an IBM main frame computer was installed in PIA for flight reservation and by 1967, there were about 17 mainframes working throughout Pakistan in different organisations [Aslam (2001)].

The slow rate of adoption was due in part to the import regime of the time, which restricted the import of computers by requiring companies to obtain an import license that took on average two years to process. Custom duties and taxes on computer related products were high and the purchase of computers was unaffordable even for government departments with a large budget [Mahmood (2006)]. The computer hardware market was initially dominated by International Business Machines (IBM), followed by International Computers Limited (ICL) and National Cash Register (NCR) selling data entry machines [Aslam (2003)]. On the software development side, Systems Private Limited was formed by Packages Limited in Lahore in 1977.

Import of computer hardware and software was liberalised in 1985, through the drastic reduction in custom duties, which allowed personal computers to flood the domestic market. Custom duties were completely removed in 1991-92 and a measurable increase occurred subsequently as satellite technology was also introduced. 90 percent of all landline telephone lines were converted to digital and ISPs began providing services to customers in 1995. Government emphasis on developing the ICT sector gained steam in the 2000s when new IT educational institutes were opened, and universities began offering IT training.

Adoption of computers in the economy was initially monitored by the Ministry of Science & Technology (MoST). A new IT and Telecommunication Division under the MOST was created in March 2000. All IT related organisations were placed under this Division. MOST was constituted with two divisions i.e. Science and Technological Research Division (S&TR) and IT & Telecom (IT&T) Division with the S&TR Division focused on Science and Technology areas other than IT & Telecommunications. In November 2002, a separate ministry for Information Technology was created and the IT & Telecommunications Division became a part of the new Ministry of Information Technology (MoIT). The principal agenda of the MoIT is building Pakistan's IT competency in the twenty first century, and major objectives of the ministry are (i) transformation to an electronic government, (ii) development of the local software industry, (iii) building a state-of-the-art infrastructure, and (iv) development of a high quality human resource pool.

#### **Box 1**

##### **Success Story: NetSol Technologies - Home Grown Apps and Licensing**

NetSol Technologies was founded in 1997 in Lahore and grew to become a global company with operations in Australia, China, Pakistan, Thailand, UK and the US. The company is engaged in the licensing, customisation, enhancement and maintenance of its suite of financial applications under brand names, NetSol Financial Suite (NFS) and NFS Ascent, for businesses in the lease and finance industry.

According to NetSol management, the key to the success of the company has been the willingness to take entrepreneurial risks and the company also prioritises employee retention by offering employees' wages that are comparable with international levels, and a conducive work environment.

According to official sources, MoIT is the national focal ministry and enabling arm of the Government of Pakistan for planning coordinating and directing efforts to initiate and launch IT and Telecommunication programs for economic development of the country. It is working on national agenda to have a sound and sustainable Information Technology and Telecommunications base which will result in the socio-economic development of the country and the attainment of the vision for better Pakistan. The Ministry is maintaining firmness and viscosity with the policy and achievements made in the IT and telecommunications sectors since its inception and to cope with modern challenges and meet requirements of the IT and tele-communications, the policy is regularly updated. Other departments and institutions, including the Electronic Government Directorate, Pakistan Computer Bureau, Pakistan Software Export Board (PSEB), Pakistan Telecommunication Authority (PTA), Computer Society of Pakistan, Pakistan Software Houses Association (P@SHA). are working side by side with the MoIT to help promote IT in the country.

### Box 2

#### Success Story: LMKR - Leveraging Equity for Operations Expansion

LMKR was established in 1994 as a petroleum technology company called Mathtech with a workforce of 12 employees, focusing on exploration and production. The firm established a foothold by creating an exploration and production database and integrating it with a Geographical Information System (GIS). Mathtech was taken over by Haliburton and rebranded as LMK Resources and the expansion of operations continued, before buying back its equity in later years.

LMKR's approach towards financing goes against the industry "wisdom" to holding ownership and equity close to one's chest rather than leveraging and spreading it around, reflecting a Silicon Valley saying that "it is better to be a 5 percent owner of a USD 1 billion company than a 100 percent owner of nothing".

The ICT industry is comprised of a wide mix of equipment manufacturers, service providers and telecommunication technologies and requires substantial infrastructure to be competitive. Infrastructure in the industry tends to be comprised of the following (i) hardware and software, (ii) human capital and (iii) telecommunications.

A thriving hardware industry is essential to the growth of an ICT sector. However, computer hardware manufacturing is an extremely capital-intensive industry and faces considerable challenges in Pakistan. Research has indicated that at present there is no computer hardware manufacturing activity in Pakistan in true sense. The reason is that imported hardware components are available in abundance and at affordable prices. As in other industries, China has established itself as a big computer hardware manufacturer and supplier, and prices of hardware components have been reduced. In this scenario, computer hardware manufacturing in Pakistan is currently not economically feasible. The hardware industry is profitable only if it can avail economies of scales, which depends upon vast markets. In the case of Pakistan, the market is negligible for hardware consumption and it is unlikely it will be able to compete with China. Local computer vendors are assembling the imported parts and components to produce personal computers. Some companies like Inbox, Raffles, Micro Pak etc. developed organised assembly lines and are producing small components such as casings of PCs and only one company, M/s Enabling Technologies was involved in hardware designing activity [Khan and Shah (2004); Ghauri (2006)].

### Box 3

#### Success Story: Voxel Communications - Outsourcing to Survive

Voxel Communications was faced with virtual elimination in mid-2005 when the internet backbone breakdown eliminated a major part of the call-center business in Pakistan. Voxel had excess capacity and equipment in Islamabad that it lent to a client in exchange for outsourcing a certain number of seats to the company.

PSEB has identified ten key areas of the ICT industry that have world class firms operating in Pakistan. Firms in these areas have established themselves in the global market and gained a foothold in foreign markets (see Table 1). According to this classification by the PSEB, domestic Pakistani firms have had the greatest success in IT Enabled Services (which include call centres, platform and data management) with 8 firms; followed by finance with 6 firms; telecom – 4 firms; healthcare – 2 firms, and even enterprise computing with 2 firms.

A closer look at the firms within these areas that are successfully competing globally reveals that the focus of the industry has shifted away from hardware towards software. The driver behind this transformation in the industry is likely on account of the fact that the capital outlay required is substantially less, and Despite this, as evident from Table 2, there are firms that are successfully competing in the global market.

Table 1

*Profitable ICT Companies in Pakistan by ICT Area*

Sr. No.	ICT Area	Number of Companies
1	IT Enabled Services	8
2	Finance	6
3	Telecom	4
4	Healthcare	2
5	Enterprise Computing	2
6	Job Portals	1
7	Document Management	1
8	Personal Productivity	1
9	Retail	1
10	Social Networking	1
	TOTAL	27

Source: PSEB

Table 2

*Top Ten ICT Exporting Firms in Pakistan*

Sr. No.	Top Exporter
1	NetSol Technologies
2	Ovex Technologies
3	TRG Pvt Ltd
4	System Pvt Ltd
5	Elixir Technologies
6	Descon IT24 Pvt Ltd

Local or domestic industry revenue has been generated in four broad areas over the years according to PSEB; primarily in PCs/Laptops/Servers; i.e. hardware, followed by peripherals, and the smallest contribution being made by IT services in 2008, as evident in Table 3 below.

Table 3

*Top Pakistani Companies with ISO and CMM/CMMI Certification*

1	NetSol Technologies (Pvt.) Ltd. CMMI Level 5, Located in Lahore
2	NCR Pakistan CMM Level 5, Located in Islamabad
3	Kalsoft (Pvt.) Ltd. CMMI Level 3, Located in Lahore
4	Systems (Pvt.) Ltd. CMMI Level 3, Located in Lahore
5	Digital Processing Systems CMMI Level 3, Located in Islamabad
6	ZTE Pakistan, Software R & D Centre CMMI Level 2, Located in Islamabad
7	Eworx Intl (Pvt.) Ltd. CMMI Level 2, Located in Lahore
8	Techlogix Pakistan (Pvt.) Ltd. CMMI Level 2, Located in Lahore
9	Si3 – System Innovations (Pvt.) Ltd. CMMI Level 2, Located in Islamabad and Karachi
10	Abacus Consulting (Pvt.) Ltd. CMMI Level 2, Located in Lahore, Islamabad and Karachi
11	Descon Information Systems CMMI Level 2, Located in Lahore
12	E-Dev Technologies CMMI Level 2, Located in Islamabad
13	Prosol Technologies CMMI Level 2, Located in Islamabad
14	Avanza Solutions CMMI Level 2, Located in Karachi
15	Shaukat Khanum Cancer Research Hospital (IT DIV) CMMI Level 2, Located in Lahore
16	Geopaq Technologies CMMI Level 2, Located in Islamabad
17	Advanced Computing and Engineering Solutions CMMI Level 2, Located in Islamabad
18	NADRA CMMI Level 2, Located in Islamabad
19	Technosoft Solutions (Pvt) Ltd CMMI Level 2, Located in Lahore
20	Prislogix CMMI Level 2, Located in Karachi.

Source: DPC Centre Website [<https://dpc.center/software/>]

Table 4

*Local Industry Revenue Generation by Area*

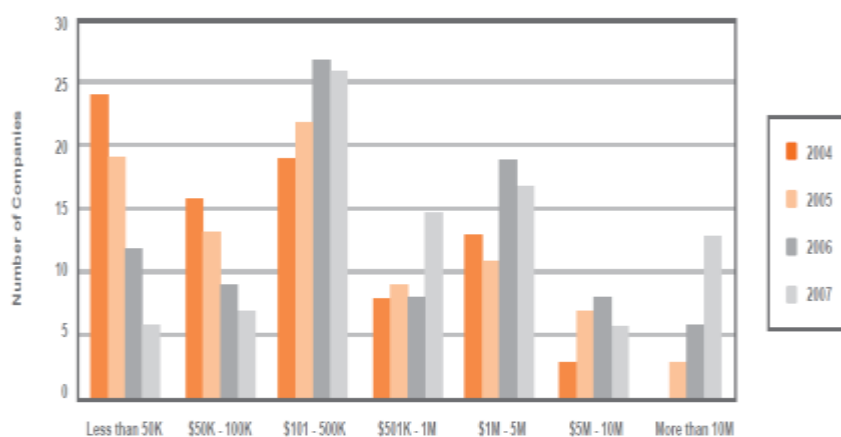
Sr. No.	Area	(USD Million)
		Revenue
1	PC/Laptops/Servers	600
2	Peripherals	200
3	International Software Vendors	150
4	IT Services	200
	TOTAL	1,150

Source: PSEB

In an exercise conducted by P@SHA, revenues generated by the industry over a period of time were categorised by size and correlated with the number of companies. In 2004, the single largest revenue category comprised companies with less than USD 50,000 of revenue - essentially start-ups or fairly limited software development operations - and none of the companies reported revenues USD 10 million or greater. In contrast, in 2007, 13 companies reported global revenues of USD 10 million or higher. Similarly, in 2005, 85 percent of the companies reported revenues of less than USD 1 million - a fraction that decreased to 60 percent in 2007.

The analysis also found that there was a movement towards growth of, and rising corporatisation of companies within the industry. The noteworthy trends that were highlighted include a small number of firms moving up the value chain as it were and providing a much higher class of product to their customers. Systems Ltd., NetSol, Techlogix, Elixir, LMKR, and SI3 as well as several other firms within the industry have been driving a major part of the overall growth in the industry. Furthermore, a growing number of firms have experienced sustained growth in revenues over the time period in question.

**Fig. 1. ICT Industry Revenue Generation**



Source: PSEB

Also, small firms have been unable to realise revenue growth due to either growing pains or on account of operating with only a general business plan or target market which limits them to one-off contracts. Finally, a characteristic of revenue base of domestic firms that is a matter of concern is their dependence on small number of clients that naturally exposes these firms to high market risk. Cressoft is an oft cited example of a promising company that failed to diversify their customer base and survive.

**Box 4**  
**Government Institutions in the ICT Sector**

1.	Ministry of IT and Telecom (MoITT)
2.	Pakistan Telecommunication Authority (PTA)
3.	National ICT R&D Fund
4.	Electronic Government Directorate
5.	Universal Service Fund
6.	Securities and Exchange Commission (SECP)
7.	Board of Investment (BoI)
8.	Punjab Information Technology Board (PITB)
9.	Higher Education Commission (HEC)
10.	Trade Development Authority of Pakistan (TDAP)

Source: MoIT

**Box 4**  
**Subsidiary Organisations of the MoIT**

1.	Ignite
2.	National Information Technology Board (NITB)
3.	National Telecommunication Corporation (NTC)
4.	Pakistan Software Export Board (PSEB)
5.	Special Communication Organisation (SCO)
6.	Telecom Foundation (TF)
7.	Telephone Industries of Pakistan
8.	Universal Service Fund (USF)
9.	Virtual University (VU) Of Pakistan

Source: MoIT

## 2.1. Key Emerging Trends in the Industry

The scope of the industry extends from software development and free-lancing to medical transcription, technical support, telemarketing and even consulting. The ICT sector in Pakistan has evolved a budding start-up eco system with incubators, co-working spaces and technology accelerators. Pakistan has emerged as number four in the top-ranking countries of the world for free-lancing. IT and related services have been incorporated into a number of industries across the economy, including textiles, automotive, pharmaceuticals, fertilisers, power, government, finance, health, power, tourism, entertainment, manufacturing, education and defense. This reflects a trend of growing domestic demand for IT products and services that resulted in the mix of domestic and export revenues growing from 40:60 percent in 2004-05 to 52:48 in 2007-08 and continuing in recent years.

Key export markets for the industry over the last couple of decades have been the US, UK, Canada, UAE and China with 58, 9, 4, 3 and 2 percent shares of total industry exports respectively. This reflects a more recent trend of firms in the industry using innovative business models to create high end skills and products for foreign clientele which is currently serving as an advantage over other countries that have focused on low cost all-purpose custom software house business models.

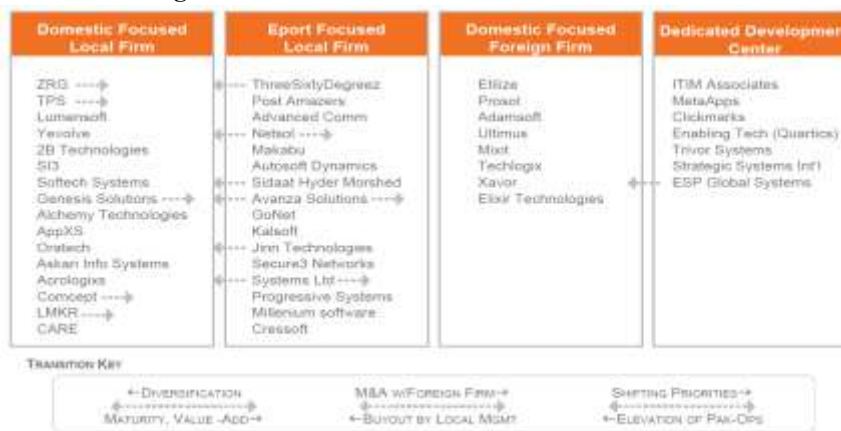
According to P@SHA, domestic firms are also engaging in Systems Integration (SI) solutions that build on well-established platforms for value addition. This has had the added benefit of drawing back IT professionals from abroad and building a pool of domestic expertise for local firms that are well funded to draw on and compete with foreign firms. These firms specialising in SI solutions have been able to secure some of the largest domestic contracts in recent years. Furthermore, if domestic firms continue to demand such solutions rather than what is known as the homegrown approach, it will benefit the industry.

Industry perception now is that domain expertise, intellectual property and innovative idea content in new start-ups is increasingly important. The number of start-ups operating in the country has risen in recent years, reflecting a growing and fairly robust start-up eco-system.

In 2004-5, a study was commissioned by the PSEB to assess the strategic challenges and best practices within the Pakistani software industry. This pioneering study systematically analysed the organisational characteristics of the relatively more successful firms with the rest of the industry and based on this analysis sought to highlight strategic and organisational challenges faced by the Pakistani software firm.

The software industry at that time was more fragmented than it is today, and it lacked a future direction. There were only a limited number of success stories in the industry and general perception at the time was that growth of the industry was hampered by what was termed a “200-people barrier” – the vast majority of firms growing to that size either seemed to lose steam or simply disintegrate in the face of organisational dysfunction in scaling up. One of the key findings of the study was that strategic challenges could not be generalised for the industry as a whole but are a function of the business model the firm fits into. Four generic business models were identified in the study and have been replicated in Figure 2 below.

**Fig. 2. Business Models and Transition Scenarios**



Source: P@SHA



### 3. KEY SECTORAL ISSUES

This section describes the key sectoral issues that are inhibiting the competitiveness of the fast evolving and ever-changing ICT industry in the global context. These issues have been stressed upon by private sector stakeholders, industry unions, policy makers and other stakeholders.

#### 3.1. Human Capital Deficiencies

On the one hand, salaries in the ICT industry in Pakistan are not rationalised; employees feel at liberty to demand salaries they feel are commensurate with their expectations, while employers perceive the lack of experience and level of education as a deterrent to offering internationally comparable wages. This naturally leads to a “brain drain” as talented labour seeks employment abroad.

On the other hand, the education curriculum for graduates seeking employment in the ICT sector is not aligned with current industry developments and trends. As a consequence, the local graduates entering the labour market are mismatched for the positions in the industry. Bridging this gap will require investment on the part of the firms in on-the-job trainings, which translates into a disincentive to hire new labour.

#### 3.2. Low Adoption Rate of Automation

The ICT industry is technology intensive, and gaining competitiveness entails the adoption of automation of tasks and processes. However, in Pakistan, automation of even simple tasks has not been accomplished and neither have industry practices such as process correction. This means that tasks that otherwise have been automated in other countries are still performed manually in Pakistan, leading to rise in inefficiencies that could otherwise be avoided. Also, even if a task is automated, if the process itself is faulty or inefficient, it is rarely corrected and as a result the fault as it were is multiplied and causes greater friction in industry operations.

#### 3.3. Access to Finance

Limited access to finance for firm operations and expansion has been cited as a key issue adversely impacting various Ease of Doing Business indicators and has led to a decline in ranking in recent years.

Large, established firms are able to secure credit when needed, but small and medium sized firms, and in the IT sector free-lancers are at a disadvantage on account of their scale. The cost of serving such customers involves too high a transaction cost on the part of the bank to make it economically viable for them to do so. This can also be linked to the underdevelopment of the venture capital market in the economy; though the appetite for it exists.

Given the weak potential of traditional sources of finance, the Punjab Information Technology Board (PITB) has launched several initiatives that at first glance appear to be compensating for this market failure. A televised show that allows young entrepreneurs to pitch their ideas to a group of potential investors has seen some success, while e-Rozzgaar centers set up in the Lahore Software Technology Park have allowed free-lancers to monetise and out-source their services and skills. International donor agencies have now shown an interest in funding such initiatives, which holds promise for the industry if these efforts can be replicated successfully.

### **3.4. Policy Consistency**

The general perception in the industry is that the government lacks a coherent and consistent long-term vision for development of the industry, despite having identified it as a strategic growth sector on numerous occasions. In this regard, PITB has held several round table conferences with industry stakeholders to engage with them and an IT policy has now been developed that will address these concerns.

### **3.5. Regulatory Burden**

As with other industries, the ICT industry is also faced with regulatory burden, which has increased since the 18<sup>th</sup> constitutional amendment that decentralised fiscal responsibilities of the federal government. Whereas earlier, firms had to deal with just the federal government in filing taxes and acquiring licenses etc., now they are having to deal with multiple authorities operating at the local, provincial and even federal level.

General perception of private sector stakeholders is that government institutions by and large are not contributing to the development of the industry. A number of incubation centres, training institutes and assistance programmes have been launched over the years, but due to issues with their implementation, firms in the industry are unable to benefit from them, and some are even unaware of specific initiatives. The government has been unable to compel or incentivise industry stakeholders to invest in local labs, R & D centres and training centres that can have positive implications for industry labour pool and linkages with segments of the economy, such as between industry and the academic community and industry and the government.

### **3.6. Market Identification and Capture**

Firms in the industry are unaware of the markets where their products can be sold, and they can establish themselves as key global players. The PSEB has not had the level of success in this area that has been desired by domestic firms, with the result that the latter are left to identify and secure their markets on their

own. Conversely, global markets are unaware of the products and capabilities being offered by local Pakistani ICT firms.

### **3.7. Institutional Weaknesses**

Though the government has been pro-active in setting up software technology parks, but the benefits they provide are not incentivised properly, resulting in the parks being unable to generate the desired outcome to the full extent. Similarly, the government has from time to time intervened in the market to offer incentives to the industry, such as software training or internship programs for fresh graduates. However, these interventions fail to achieve the intended outcome because of lack of or inadequate follow-through. Individuals that acquire subsidised training are not given opportunities to work in the domestic market and utilise their acquired skills, resulting in their movement to other markets where they can benefit from those skills. Internship programs are not geared towards the demands of the industry or adequately monitored to ensure that the trainees are acquiring the skills and experience the program was actually designed to give them. Nor is there any post training follow-up to see where the trainees ended up. Call centres were established in Pakistan when the global ICT bubble began, but there was no provision of adequate infrastructure, or redundancies which resulted in too high a level of risk for companies to bear and the opportunity was lost when firms opted to set up shop in countries such as India and China.

In the absence of proper merit and appropriate checks and balances being imposed, industry stakeholders in the private sector perceive this weakness as a wastage of resources.

## **4. IMPEDIMENTS TO GROWTH OF ICT INDUSTRY**

Industry feedback provided to PSEB by IT firms in three cities in Pakistan; Islamabad, Karachi and Lahore highlighted the key areas of concern for domestic firms. The greatest level of concern was the quality and availability of human capital, followed by telecom bandwidth and marketing/country image. Company capability development and availability of finance were not cited as a major concern. However, public policy and strategy and research were concerning to domestic firms.

From the discussion earlier of the structure of the ICT industry in Pakistan, and key emerging trends in the industry, it is evident that the lack of appropriate business plans is limiting the ability of firms to grow and diversify their product portfolios effectively.

Lack of up to date and context relevant legislation regarding intellectual property in particular is an impediment to firms and individuals developing innovative ideas. Though high quality human resources are vital to growth of the industry and hence economy, growth in business and work demand has far

exceeded a declining supply of human resources. Interestingly, this is not a constraint that is unique to Pakistan and is being faced by numerous countries across the globe. Global responses to this issue will provide lessons Pakistan can benefit from, but the underlying constraint in Pakistan's case is what the industry perceives as an inadequate educational system and the oft quoted "brain drain".

#### **4.1. Mismatch in Labour Market**

According to industry stakeholders, there is a mismatch in terms of the requirements of domestic ICT firms and what is available in the labour market. When the industry was taking off in the 1970s and 1980s, Pakistan was just as competitive as India in terms of the quality of ICT graduates, producing roughly 3,000 per year. Currently, though the country is producing on average 10,000 graduates per year, only 3,000 of them are from one of five reputable institutions and of sufficiently high calibre to be offered market competitive wages when they enter the job market. The remaining 7,000 plus graduates may hold degrees but the relevance of what they have been taught, not to mention the quality is not considered to be of adequate calibre for the types of jobs and wages these graduates seem to expect.

The role played by the Higher Education Commission (HEC) is crucial in regulating and directing the efforts of educational institutions and is considered to be deficient. The ICT curriculum reviewed and approved by the HEC is not current with market and industry developments and the quality of education in terms of analytical and problem solving is severely lacking. As a result, if firms need an influx of labour they must be prepared to train these new employees with the skills and knowledge needed to be competitive in the industry. This is a constraint on operations of these firms and an impediment to structural transformation of the industry from low to high value added.

#### **4.2. Lack of Widespread Entrepreneurial Spirit**

In Pakistan there is evidently a lack of entrepreneurial spirit. That is not to say that it doesn't exist, just that it is not widespread or readily apparent. There are a number of instances in the domestic ICT industry where individuals have succeeded in making a name for themselves and their companies by offering high quality, globally competitive products. But these instances are the exception and not the rule. Interestingly enough, there are also a number of cases where Pakistani entrepreneurs have risen the ranks in Silicon Valley in the US, but these individuals tend to be trained and residing abroad. This suggests that entrepreneurial spirit is not missing, rather it has not been uncovered and explored effectively.

### **4.3. Policy Shortfalls**

There is no shortage of ideas on how to develop the domestic industry in Pakistan, but there is a gap between policy formulation and implementation. On the one hand, stakeholders are busy talking about issues, but no concrete, practical steps are being taken to realise the potential of the industry because while the government for example would like to have a knowledge-based economy, they do not appear to have a credible idea of how to achieve it.

For example, to compete with other economies such as India, there is a desperate need to increase the number of globally competitive graduates in the domestic industry from the stagnant number of 3,000. However, with only 5 reputable institutions capable of producing these graduates, no steps are evident to increase this statistic to roughly 50,000, the minimum required to effectively compete with India producing over 1.5 million graduates annually. If there is a plan, there is no effective execution and implementation of this plan.

## **5. POLICY RECOMMENDATIONS**

To create a suitable business environment and growth oriented legislative framework in the industry, industry participants need to be made aware of existing laws, and these need to be revised and adapted keeping in mind developments in the industry, such as the widespread use of software and digital designs not connected to industrial designs. The ability of the legislative and regulatory environment in the country to adapt to evolving developments in the industry will be vital for ensuring FDI inflows, and the security of local intellectual capital and innovation of Pakistan's dynamic youth in the population.

### **5.1. Census of ICT Industry**

To formulate effective responses to gap between industry demand and supply of human capital, accurate data on local business needs and available supply is required. For example, a Needs Assessment study to outline requirements for the economy for the coming 20 years would allow effective policies to be recommended.

### **5.2. Education Policy Alignment**

Low quality of education and a mismatch between industry requirements and degree programme curricula has been identified as one of the key bottlenecks facing the industry currently. The problem is particularly noticeable in the fresh graduates that are emerging and entering the labour market. Aligning the education policy and in particular the curricula to match industry requirements will increase the pool of qualified labour firms can hire from, lead to increased productivity and allow firms to concentrate more on expanding their markets and products and competing at a global level.

### **5.3. Industry Aligned and Effective Skill Development**

Another issue that has been highlighted and is closely linked with the quality of education is the level and quality of skills labour bring to the market. Firms are generally of the view that the majority of skill development programmes under way do not yield the results that are expected due to ineffective monitoring and evaluation. Effectively monitoring skill development initiatives and evaluating their performance once the trainees have graduated will allow these programmes to produce labour that has up-to-date and effective training that firms can leverage to improve their competitiveness and productivity levels.

### **5.4. Incentivise Industry Operations**

Lack of effective and timely government involvement in regulating and guiding the industry has been highlighted by stakeholders as a major concern. For example, the government has not taken the initiative to compel major players in the industry to invest in labs, R & D centres, training centres for the local industry. As a consequence, quality training is not imparted in the domestic industry, which negatively impacts industry productivity and competitiveness. The government can require major firms to set up centres for research and training in exchange for tax breaks or access to infrastructure or markets, and that will improve the quality of labour in the ICT market.

### **5.5. Expanding Innovation and Incubation Centres**

There are a number of innovation and incubation centres that have been established across the country in recent years, and some of them, such as the NUST Centre for Innovation and Entrepreneurship (CIE) have produced promising results from young and upcoming individuals. Industry perception is that such initiatives can help boost Pakistan's ICT industry globally and should be encouraged and the existing successful ones need to be expanded on. This will encourage the spirit of entrepreneurship and culture of innovation in the economy that will result in productivity enhancements and improved competitiveness of firms.

### **5.6. Effective Product and Capability Marketing**

In the global marketplace, Pakistani firms, their product lines and capabilities are in general not well known or perceived in a positive light. Marketing of these aspects is deficient in comparison to the efforts of countries such as India and China. Performance based appointment of commercial attaches abroad and a definitive stance by the state through the PSEB for promoting Pakistani ICT firms will create a conducive business environment where domestic firms can flourish.

### 5.7. Encouraging Cross Border Linkages

Industry stakeholders highlighted the limited nature of cross border linkages between local ICT experts in Pakistan and those in neighbouring countries which hindered the cross pollination of ideas that is quite crucial to growth of this fast-changing industry. A policy to encourage such linkages in the ICT industry, such as facilitating visits, would allow the domestic industry to benefit from innovations and developments being made abroad while also promoting the skills and capabilities of local experts abroad.

### 5.8. Software Technology Parks

Software Technology Parks (STP) in Pakistan have been designed with the aim of encouraging, promoting and boosting exports of the ICT industry. However, industry perception is that these parks do not perform the function they were intended for as they are not incentivised properly. Rather than setting up new parks, the existing ones should be properly incentivised and operated efficiently. By charging rent in these facilities, commercialisation of spaces has taken place, resulting in the parks not being utilised for the purpose they were intended for and in the manner, it was designed for. Limiting occupancy to ICT firms, and those firms not being charged rent but being given a performance-based criterion for maintaining occupancy would create a positive environment and encourage growth of the industry.

Table 5  
*Software Technology Parks in Pakistan*

Description	Total Area			Occupancy (%)	Average Rent per Sq. Ft. (PKR)
	Covered	Rentable	Rented		
Aiwan-i-Iqbal Complex	108,000	80,000	72,000	90	70
Shaheen Complex	360,000	150,000	110,430	100	80-110
Anjuman Himayat e Islam	24,692	24,692	24,692	80	30
NetSol IT Village	50,000	43,000	43,000	100	
JGC Descon	38,000	34,000	34,000	100	
Imran House	28,378	28,378	28,378	100	
TRG Complex	31,960	31,960	31,960	100	
Systems	120,000	100,000			
Awami Markaz	82,405	82,405	70,000	100	120
Evacuee Trust Complex	173,856	173,856	100,000	100	120
KSL	81,000	81,000	81,000	100	70
Rose Center	30,000	30,000	30,000	100	50
Meridian	44,719	36,160	36,160	100	70
Tariq Center	61,646	61,646	50,000	81	45

Source: PSEB Website.

## 6. CONCLUSION

This case study of the ICT industry in Pakistan has highlighted the key trends of the industry that have emerged in recent years, identified the core impediments to structural transformation within it, and recommended policy prescriptions designed to boost competitiveness of domestic firms. The key issues that have been constraining the performance of the industry are primarily a weak and limited labour supply, lack of market identification and capture, policy inconsistency and institutional weaknesses. To boost productivity and competitiveness levels and encourage structural transformation within the industry, it is recommended that there should be an integrated approach to align education policy and skill development with industry needs, support and encourage firms while also regulating the industry. This will entail education policy reform, incentivising firm operations, and strengthening the monitoring and evaluation of programmes within the industry.

The general perception in the industry is that domestic firms are realising that they have the potential to compete globally if they do “their own thing” rather than follow an Indian or other country model. Snapshots of several success stories have been given in the preceding discussion to highlight the entrepreneurial spirit and trend in adoption of modern approaches that have helped these firms establish a foothold and even expand their operations across products and markets. The presence of globally successful and competitive domestic firms within the industry suggests that Pakistan has the potential to capitalise on its strengths and compete globally at a much broader level if the policy framework can provide a supportive environment that encourages firms to engage globally.

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### **List of Acronyms**

BI	Business Intelligence
BOI	Board of Investment
BPM	Business Process Management
CAP	Credit Application Processing System
CEO	Chief Executive Officer
CIE	Centre for Innovation and Entrepreneurship
CMS	Contract Management System
CPEC	China Pakistan Economic Corridor
CSP	Computer Society of Pakistan
DAAS	Dealer Auditor Access System
EGD	Electronic Governance Directorate
ERP	Enterprise Resource Planning
FCCI	Faisalabad Chamber of Commerce and Industry
FDI	Foreign Direct Investment
FIEDMC	Faisalabad Industrial Estate Development and Management Company
FMS	Fleet Management System
FY	Fiscal Year
GDP	Gross Domestic Product
GIS	Geographical Information System
GPS	Global Positioning System
HEC	Higher Education Commission
IBM	International Business Machines
ICL	International Computers Limited
ICT	Information and Communication Technology
IGC	International Growth Centre
ISMS	Information Security Management System
IT	Information Technology
KCCI	Karachi Chamber of Commerce and Industry
KPK	Khyber Pakhtun Khwa
LMKR	Landmark Resources
LNG	Liquified Natural Gas
LOS	Loan Originating System
MDM	Master Data Management
mFI	mobile Field Investigator
MoIT	Ministry of Information Technology
MoST	Ministry of Science and Technology
mPOS	mobile Point of Sale
NCR	National Cash Register
NFS	NetSol Financial Suite

NITB	National Information Technology Board
NTC	National Telecommunication Corporation
NUST	National University of Science and Technology
P@SHA	Pakistan Software Houses Association
PC	Personal Computer
PCB	Pakistan Computer Bureau
PITB	Punjab Information Technology Board
PKR	Pakistani Rupee
PML-N	Pakistan Muslim League - Nawaz
POS	Point Of Sale
PPP	Pakistan People's Party
PSQCA	Pakistan Standards and Quality Control Authority
PSEB	Pakistan Software Export Board
PTA	Pakistan Telecommunication Authority
R&D	Research & Development
S&TR	Science & Technology Research
SaaS	Software as a Service
SCO	Special Communication Organization
SECP	Securities and Exchange Commission
SI	Systems Integration
SITE	Sindh Industrial Trading Estate
SME	Small and Medium Enterprises
SMEDA	Small and Medium Enterprises Development Authority
SRO	Statutory Regulatory Orders
STP	Software Technology Park
TDAP	Trade Development Authority of Pakistan
TF	Telecom Foundation
TRG	The Resource Group
UAE	United Arab Emirates
UK	United Kingdom
US	United States
USD	United States Dollar
USF	Universal Support Fund
VU	Virtual University
WFS	Wholesale Finance System
WTO	World Trade Organization