

Digital Opportunities in Pakistan

Joseph Wilson*

* B.A., LL.B. (Punjab), LL.M. (Georgia) LL.M. D.C.L., (McGill); Assistant Professor of Law, Lahore University of Management Sciences, Lahore, Pakistan. The author wishes to thank Hina Sarfaraz for her extensive research assistance.

Table of Contents

I.	INTRODUCTION	3
II.	IT POLICY OF PAKISTAN	7
A.	DOI MEASURES.....	7
1.	<i>Building Human Capacity and Generating Jobs in a Knowledge-based economy (O)</i>	8
2.	<i>Infrastructure and access (I)</i>	8
3.	<i>Intellectual Property, Legal Issues and Security (O)</i>	8
4.	<i>Role of Technology: Relevant Content (U)</i>	8
5.	<i>Dissemination and Outreach (I)</i>	8
6.	<i>Cost of hardware (O)</i>	9
7.	<i>E-Government Readiness (I)</i>	9
8.	<i>ICT for Crisis Prevention and Recovery (O/U)</i>	9
III.	DOI FOR PAKISTAN	9
A.	DOI CALCULATED USING WORLD BANK AND PTA DATA.....	9
B.	DOI CALCULATED USING ITU DATA.....	12
C.	COMPARISON OF PAKISTAN’S DOI WITH OTHER COUNTRIES IN THE REGION	12
D.	REASONS FOR LOW-RANKING OF PAKISTAN’S DOI	13
1.	<i>Broadband Policy’s Impact on DOI</i>	13
2.	<i>Cellular Broadband</i>	13
3.	<i>Broadband Services</i>	14
IV.	BARRIERS TO DETERMINATION OF DOI	15
V.	PAKISTAN: A SUCCESS STORY	15
	ANNEXURES	17
	ANNEX-A.....	17
	SUMMARY OF LEGAL INSTRUMENTS/POLICY DOCUMENTS WITH POTENTIAL IMPACT ON DOI.....	17
	ANNEX-B: WORKING DATA USED TO CALCULATE DOI BY US.....	20
	ANNEX-C : GRAPHIC REPRESENTATION OF THE INDICATORS	22

I. Introduction

Countries have since long recognized the importance of telecommunications industry, and impact it has on the economic and social lives of the people.² The developing countries, in particular, have realized that “wealth does not create telephone density, but that telephone density creates wealth.”³ With rapid advances in the communications industry, the world has moved towards a Global Information Economy and Information Society, thus shifting the importance from mere “telecommunications” to the Information and Communications Technologies (ICTs).⁴ ICTs are defined in the OECD *Guide to Measuring the Information Society* as the product of services and outputs that are limited to those industries that “facilitate, by electronic means, the processing, transmission and display of information, and it excludes the industries which create the information, the so-called ‘content’ industries.”⁵

The growing importance of the ICTs can be gauged from the fact that in November 2005, the United Nations held the second phase of the World Summit on the Information Society (WSIS) in Tunis, Tunisia. WSIS demonstrates the pervasiveness of ICTs, as well as the recognition these technologies are having a profound impact on people’s lives. “Besides putting the spotlight on the Information Society, the WSIS also highlighted the need to measure it.”⁶

Before measuring ICT indicators, it is pertinent to note why ICTs are so important. ICTs create “digital opportunities.” Digital opportunity means extending Internet benefits to all, that is, “making available to everyone the infrastructure, skills, content, relationships and community awareness resources that empower individuals and organizations in the digital age.”⁷

The differential access to ICTs or digital opportunities is popularly referred to as digital divide, which in turn is seen as digital opportunity untapped. According to Wilhelm Greyling, the various definitions of digital divide include:

² Id. at 23 (The phenomenal growth in information and communication technologies (ICTs) has real implications for economic growth, in both developed and developing countries).

³ D. Benton, MSS systems advance telecommunications in India, *Satellite Communications*, v18, n11, p18(1) Nov, 1994.

⁴ The ICT market refers to information technology (the combined industries of hardware for office machines, data processing equipment, data communications equipment, software and services) and telecommunications (carrier services, end-users communications equipment, PBX, key systems and circuit switching equipment, cellular mobile radio infrastructure, transmission and other datacom and network equipment). (Source: EITO). WTDR, *supra note 6*, at 37, endnote 34.

⁵ OECD, Working Party on Indicators for the Information Society: Guide to Measuring the Information Society, DSTI/ICCP/IIS(2005)6/FINAL, at 101. (The definition permits the immediate gathering of statistics for international comparison in an area of considerable policy importance because of deregulation and technological change.)

⁶ ITU, World Telecommunication/ICTs Development Report: *Measuring ICTs for Social and Economic Development*, (Geneva, 2006) at 11. [hereinafter referred to as “WTDR”]

⁷ B. Keith Fulton, AOL Time Warner Foundation: Extending Internet Benefits To All (Symposium - Bridging the Digital Divide: Equality in the Information Age), 20 *Cardozo Arts & Ent. L.J.* 181 (2002).

“..differences due to geography, race, economic status, gender and physical ability in access to information through the Internet, and other information technologies and services, as well as in the skills, knowledge and abilities to use information, the Internet and other technologies.”⁸

In the above definition the word ‘difference’ refers to divide and the very gap determines an area of opportunity. Given that access to ICTs is a prerequisite for participation in the Information Society, countries have directed their efforts in providing, and measuring the access of the ICTs to their citizens. Assessing the access to ICTs has received major attention from regional and international organizations over the last few years. The Geneva Plan of Action⁹ (GPA) and the Tunis Agenda for the Information Society¹⁰ (TAIS) underlines the need for more comprehensive and reliable statistical information to track the digital divide.

Appropriate indicators and benchmarking, including community connectivity indicators, should clarify the magnitude of the digital divide, in both its domestic and international dimensions, and keep it under regular assessment.¹¹

Various regional efforts are launched to bridge this digital divide. For example, in the Asia Pacific region, Asia Pacific Telecommunity¹² (APT) in its Asia-Pacific Summit on the Information Society held in Tokyo in November 2000 adopted the Tokyo Declaration, entitled “Asia-Pacific Renaissance through ICT in the 21st Century.”¹³ In the Tokyo Declaration, the member countries vowed to “strive to give every citizen access to communication tools, so that the opportunities and benefits brought by ICT can be shared by all and individuals can be given new ways to demonstrate their creative abilities.”¹⁴ Coincidentally, in November 2000, the members of Association of Southeast Asian Nations¹⁵ (ASEAN) also entered into an e-ASEAN Framework Agreement in Singapore to promote cooperation for developing, strengthening and enhancing the competitiveness of the ICT sector in ASEAN.¹⁶

In order to narrow the gap between the digital haves and have-nots, progressive national ICT policies/e-strategies¹⁷ need to be designed keeping in view the local and national level of

⁸ <http://www.iconnect-online.org/Stories/Story.import5191>

⁹ Plan of Action, World Summit on the Information Society, Geneva 2003

<http://www.itu.int/wsis/docs/geneva/official/poa.html>

¹⁰ http://www.itu.int/wsis/documents/doc_multi.asp?lang=en&id=2266|2267

¹¹ WTDR, *supra note* 6, at 11 (quoting WSIS Tunis Agenda for the Information Society, paragraph 113 and WSIS Geneva Plan of Action, paragraph 28b.).

¹² All the six countries under study, i.e. India, Indonesia, Pakistan, Philippines, Sri Lanka, and Thailand, are members of the APT. See <http://www.aptsec.org/member/members.html#member>

¹³ <http://www.aptsec.org/Program/ICT/Declaration.htm>

¹⁴ Id. Para 2.

¹⁵ The Association of Southeast Asian Nations or ASEAN was established on 8 August 1967 in Bangkok by the five original Member Countries, namely, Indonesia, Malaysia, Philippines, Singapore, and Thailand. <http://www.aseansec.org/64.htm>

¹⁶ Article 2, e-ASEAN FRAMEWORK AGREEMENT signed at The Fourth ASEAN Informal Summit 22-25 November 2000, Singapore. See <http://www.aseansec.org/6267.htm>

¹⁷ E-strategy refers to a plan of action –typically a strategy document written by state leaders– illustrating how ICTs are to be developed and used to achieve the economic, social, development objectives of a country. See Global Trends and Policies (The World Bank, 2006) page 88.

development and priorities.¹⁸ This requires “an understanding and analysis of the current situation in each country with regard to ICTs” so that achievable targets could be set for the future.¹⁹ This understanding is gained through ICT indicators. Only recently developed countries have agreed on a common definition of ICTs to have a meaningful assessment of the impact of ICTs on the economic and social lives.²⁰

Thus, to reap the benefits offered by the latest ICTs and to narrow the digital divide, effective national ICTs policies and regulations need to be designed, whose design in turn is dependent on comparable and reliable ICT indicators.

Over the last few years, a number of regional and international composite indices are developed to measure and benchmark telecom/ICT sector performance. Composite indices “are useful in measuring complex concepts such as digital opportunity and human development as they can be used to measure different aspects and combine these measurements together in an aggregate index.”²¹

Some of those indices developed are listed below in the table.

¹⁸ ITU, World Information Society Report, (Geneva, July 2006) at 12. [hereinafter “WISR”]

¹⁹ Id. at page 13.

²⁰ Id. at pp 25-26

²¹ ITU, Technical Notes.

Table 1.1: Summary of the main composite indices for measuring Digital Opportunity

<i>Name of index (organisation)</i>	<i>Number of economies</i>	<i>Number of indicators</i>	<i>Latest data</i>	<i>Comments</i>
Digital Opportunity Index (ITU/UNCTAD/KADO) ²⁰	180	11	2004/05	Three clusters: <i>Utilization, Infrastructure and Opportunity</i> (see Chapter two).
ICT Opportunity Index (ORBICOM/ITU) ²¹	139	17	2003	Compares ' <i>Infostates</i> ', ' <i>Infodensity</i> ' and ' <i>InfoUse</i> ' against an imaginary economy called ' <i>Hypothetica</i> '.
ICT Development Index (UNCSTD) ²²	180	8	2003	Four clusters: <i>Access, Connectivity, Usage and Policy</i> .
Informational Society Index (IDC) ²³	52	15	2004	Only sparse methodological data is disclosed.
E-Readiness Index (EIU/IBM) ²⁴	68	31	2004/05	Six clusters: <i>Connectivity, Business environment, Adoption, Legal and policy environment, social and cultural environment, Supporting e-services</i> . Uses a mix of quantitative and survey data.
Network Readiness Index (<i>InfoDev</i> /WEF/INSEAD) ²⁵	102	48	2003	Three clusters: <i>Environment, Readiness, Usage</i> . Uses a mix of survey, qualitative and quantitative data.
Digital Access Index (ITU) ²⁶	179	8	2002	Five clusters: <i>Infrastructure, Affordability, Knowledge, Quality, Usage</i> .
Mobile/Internet Index (ITU) ²⁷	171	26	2001	Three clusters: <i>Infrastructure, usage, market conditions</i> .
Technology Achievement Index (UNDP) ²⁸	71 (full data)	8	1998-2000	Four clusters: <i>Creation of technology, Diffusion of recent innovations, Diffusion of old innovations, Human skills</i> .

Source: ITU Research.

Source: ITU, World Information Society Report, 2006, page 15

Of the above indices, Digital Opportunity Index (DOI) and E-Readiness Index seem to have the latest data. The DOI is structured around three categories: Opportunity, Infrastructure, and Utilization. DOI allows for comparisons of countries' rankings, in overall DOI scores, different categories (Opportunity, Infrastructure and Utilization) and individual indicators. This enables policy-makers to compare a country's performance with global and regional averages and also with its peers so as to gauge its strengths and weaknesses in different areas.²²

This paper provides an overview of the digital opportunities available in Pakistan, by looking at the various indicators. It gives a snap shot of the legal instruments and policy documents

²² WISR, *supra* note 18, at 60.

that have potential impact on different elements of DOI, and compares the DOI score of Pakistan with other countries in the region.

II. IT Policy of Pakistan

In 2000, the Government of Pakistan formed its first IT Policy. The vision was “to harness the potential of Information Technology as a key contributor to development of Pakistan.” The mission was to rapidly develop the infrastructure while at the same develop excellently trained human resource capacity.

The objectives laid out in the policy are to:

1. Make the Government a facilitator and an enabler to provide maximum opportunities to the private sector to lead the thrust in development of IT in Pakistan.
2. Develop an extensive pool of trained IT manpower at all levels to meet local and export requirements.
3. Provide business incentives for both local and foreign investors to ensure the development of Pakistan's IT sector (including the software, hardware, and service industries) and the use of its products
4. Develop an enabling legislative and regulatory framework for IT related issues.
5. Revitalize, emphasis, and support the country's dormant manufacturing and research and development (R&D) potential.
6. Establish an efficient and cost-effective infrastructure that provides equitable access to national and international networks and markets.
7. Set up national databases that are reliable, secure, upto-date and easily accessible. These would be open databases.
8. Promote widespread use of IT applications in government organisations and departments for efficiency improvement and transparency in functioning and service provision, and to organise and facilitate access to public information.
9. Promote extensive use of IT applications in trade, industry, homes, agriculture, education, health, and other sectors with widespread use of Internet.
10. Encourage and promote the development of quality software that can capture export markets.
11. Develop a tradition of electronic commerce for both national and international transactions.
12. Encourage expatriate IT professionals to return to Pakistan and establish software houses or extend assistance to the local industry in the form of assignments from abroad.

A. DOI MEASURES

The DOI is measured by using indicators in three different categories, which are:

- i. Opportunities (O) : Identifies the areas of development that have/haven't been tapped
- ii. Infrastructure (I): Relates to the pervasiveness of the technology vis-à-vis infrastructure
- iii. Usage (U): It refers to the actual versus potential benefits achieved

The above policy objectives when viewed from the point of DOI categories could be summarized as below:

1. Building Human Capacity and Generating Jobs in a Knowledge-based economy (O)

Naturally government sponsored programmes require funds. Although the resources committed do not correlate directly with the results achieved, some money must be forthcoming to pay for what is largely public good. For instances, a huge increase from US \$2 million to US \$ 100 million in the Pakistan government's budget devoted to ICT development (of which 75% goes to education and human resources), enabled a nearly six-fold expansion of IT training for 'PC literacy' from 1.8 million in 2000 to 10 million or more, today.

2. Infrastructure and access (I)

Pakistan lags behind in infrastructure capabilities. Operators under the APC and USF as well as license requirements are bound to contribute to its development. However, Government should subsidize alternative technologies and software, to overcome barriers to access to information resources, such as in KU-band satellite hookups, third generation wireless internet and others.

3. Intellectual Property, Legal Issues and Security (O)

The drafting of cyber laws should occur in consultation with various ministries, due to wide ranging impact of such legislation. For example, internet usage has affected 140 laws in Pakistan.

4. Role of Technology: Relevant Content (U)

Poor people's information needs are vastly different from those of the existing cohort of Internet users in Pakistan.

5. Dissemination and Outreach (I)

Mechanism for IT poverty eradication in rural areas can be dealt by the private sector through educational institutes, radio and television and others. Pakistan has issued several licenses to FM radio stations to this intent.

Broadband services are limited at the moment, merely 30,000 subscriptions of which 15000 are DSL subscribers out of cable, satellite, wireless and other options. The broadband policy was announced in 2004, main aim of which was to offer affordable, high speed broadband services to corporate, commercial and residential areas. According to the Economic Survey published by Government of Pakistan in 2004, there are currently about 1.7 million active Internet users in the country thereby enabling access for about 1.16% of the population²³. Pakistan does not have a very impressive broadband penetration ratio. It is estimated to be at

²³ Annual Report of Pakistan Telecommunications and Authority 2005

1.6% according to an approximation in 2004, this too is restricted to three metropolitan cities of Pakistan. The barriers to growth have been identified as:

- Price: 1600 times higher than Korea
- Last Mile Access: poor copper wire infrastructure, allocation of frequency
- Content: localised and customised applications in all sectors vis-à-vis online activity²⁴

This DOI indicator must rise to attain maximum potential. The policy initiative is burdened with infrastructure incapacity. As failure to implement a pervasive broadband technology, will have negative impact on economic growth²⁵.

6. Cost of hardware (O)

While internet accessibility has expanded, the hardware required for access is beyond the purchasing power of the low-income communities. A typical computer costs between Rs. 15-25k, whereas government should introduce low cost computers.

7. E-Government Readiness (I)

Delivering e-government services require high penetration of internet services in homes, or presence of large number of public kiosks. Already 120 kiosks have been established, as well as national initiatives such as electronic ID cards and passports with enabling biotechnology have been issued to approx. 70% of the population.

8. ICT for Crisis Prevention and Recovery (O/U)

Geographic Information System and appropriate communications infrastructure, play a role here. The recent natural disaster saw massive relief efforts contributed by the society and the international community and Government. In this effort Government facilitated licensed operators (especially WLL) and NGOs to bypass the *regulatory fees* in order to deliver services to inaccessible areas. This policy should be taken into consideration under ordinary circumstances to encourage operators and NGOs to serve the consumers in rural and remote areas.

III. DOI for Pakistan

A. DOI Calculated Using World Bank and PTA DATA

<i>Pakistan</i>	2000	2001	2002	2003	2004	2005	2006
DIGITAL OPPORTUNITY INDEX	(0.09)	(0.02)	0.10	0.19	0.26	0.30	0.34
Opportunity	(0.30)	(0.11)	0.25	0.48	0.67	0.77	0.81
Percentage of population covered by mobile cellular telephony	0.03	0.07	0.16	0.22	0.45	0.49	0.52
Internet access tariffs as a percentage of per capita income	0.59	0.64	0.72	0.79	0.87	0.91	0.95

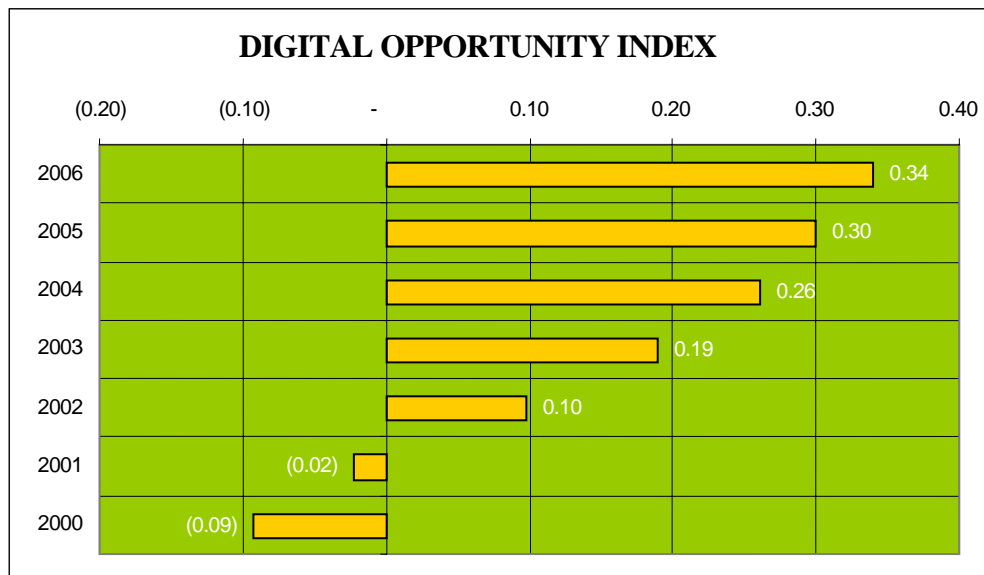
²⁴ Broadband Policy for Pakistan 2004, Ministry of Information Technology (IT & Telecom Division), Government of Pakistan

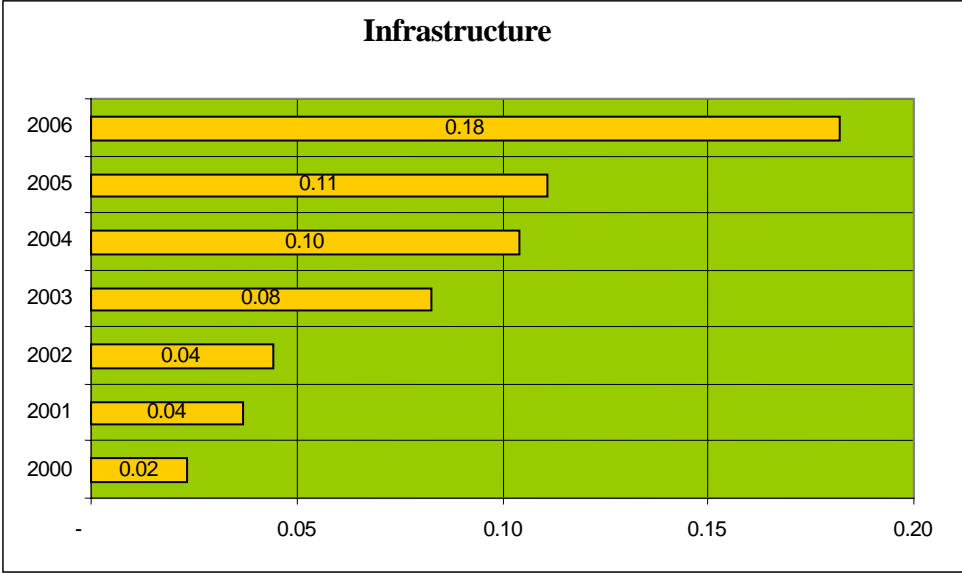
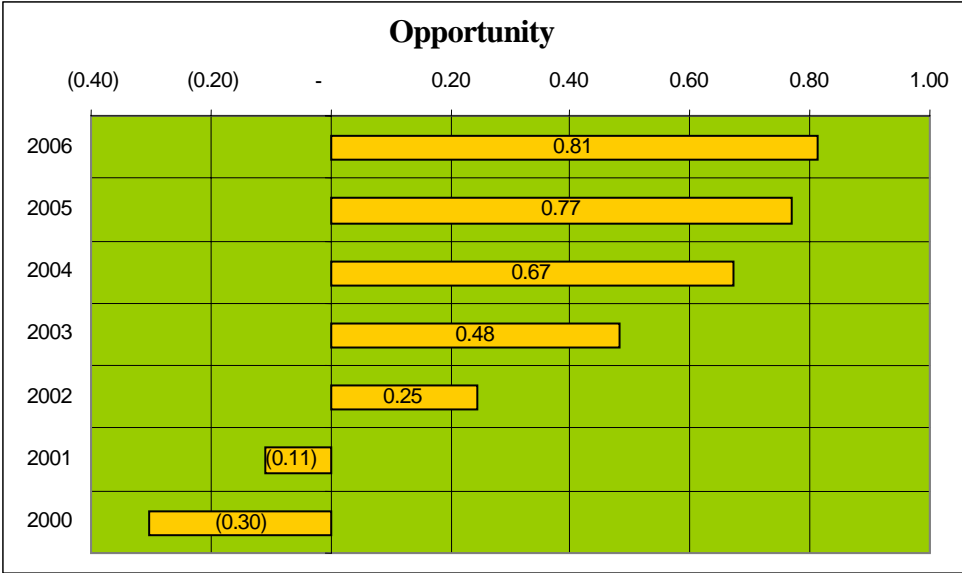
²⁵ A Brookings Institution report estimating that “failure to improve broadband performance could reduce U.S. productivity growth by 1% per year or more”

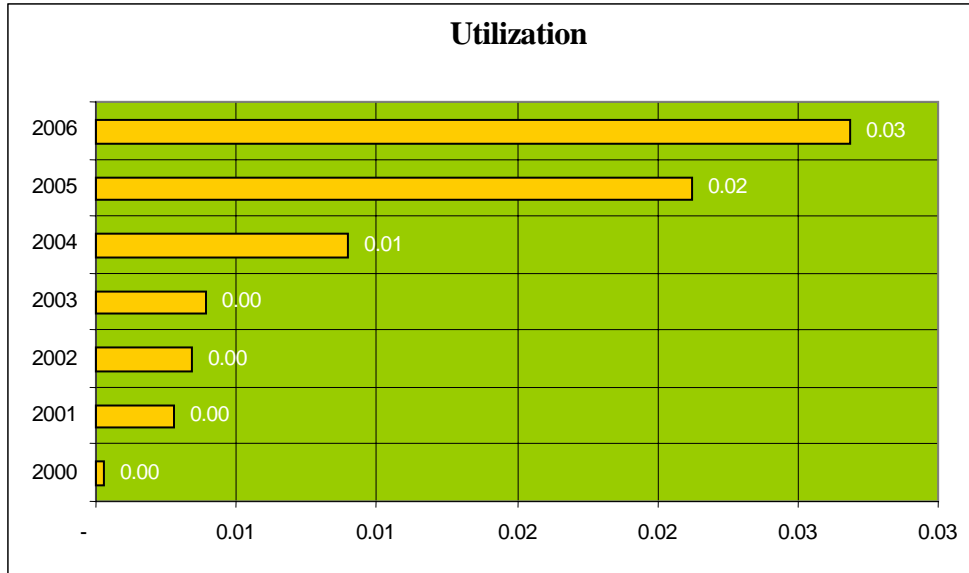
**DRAFT: NOT FOR ATTRIBUTION
WITHOUT THE AUTHORS CONSENT**

Mobile cellular tariffs as a percentage of per capita income	(1.53)	(1.04)	(0.15)	0.44	0.70	0.91	0.97
Infrastructure	0.02	0.04	0.04	0.08	0.10	0.11	0.18
Proportion of households with a fixed line telephone	0.11	0.12	0.13	0.14	0.17	0.09	0.07
Mobile cellular subscribers per 100 inhabitants	0.00	0.01	0.01	0.02	0.04	0.08	0.18
Proportion of households with Internet access at home	0.01	0.02	0.03	0.05	0.06	0.10	0.30
(Mobile) Internet subscribers per 100 inhabitants	-	-	-	0.00	0.00	0.01	0.01
Proportion of households with a computer	0.00	0.04	0.05	0.21	0.25	0.28	0.35
Usage	0.00	0.00	0.00	0.00	0.01	0.02	0.03
Number of individuals that used the Internet	0.00	0.01	0.01	0.01	0.01	0.05	0.06
Ratio of Broadband Internet subscribers to Internet subscribers	0.00	0.00	0.00	0.00	0.01	0.02	0.02
Ratio of Broadband mobile subscribers to mobile subscribers	-	-	-	-	-	-	-

The DOI above shows rapid improvement from 0.09 DOI in 2000 to 0.30 in 2005. This development in large is owed to IT policy, broad-band and mobile cellular policies launched and implemented by the Government of Pakistan.







B. DOI Calculated Using ITU DATA

<i>Digital Opportunity Index 2005</i>					
	<i>Opportunity</i>	<i>Infrastructure</i>	<i>Utilization</i>	<i>DOI</i>	<i>World Rank</i>
<i>Economy</i>	<i>2004/2005</i>	<i>2004/2005</i>	<i>2004/2005</i>	<i>2004/2005</i>	<i>2004/2005</i>
Pakistan	0.77	0.10	0.01	0.26	128
Thailand	0.95	0.18	0.07	0.40	80
Philippines	0.93	0.13	0.03	0.36	94
Iran	0.89	0.16	0.03	0.36	95
Indonesia	0.89	0.06	0.04	0.33	105
Sri Lanka	0.90	0.06	0.03	0.33	106
India	0.80	0.04	0.04	0.29	119
Pakistan	0.73	0.05	0.00	0.26	128
Bangladesh	0.60	0.01	0.00	0.20	139

The figures in red above are calculated using the World Bank and PTA data. The DOI remains unchanged, however the values for opportunity and utilization indices are slightly different from those calculated by the ITU data.

C. Comparison of Pakistan's DOI with other countries in the Region

One of the most useful features of the DOI for policy analysis purposes is that it allows for comparisons of countries' rankings, in overall DOI scores, clusters (Opportunity, Infrastructure and Utilization) and individual indicators. This enables policy-makers to compare a country's performance with its peers and to understand in which areas it is doing well and areas where its performance is not so competitive. The table above highlights the results obtained for Pakistan when a country-level analysis is used. Overall,

Pakistan scores 0.26 on the DOI, which gives it a ranking of 128th in the index, ahead of neighbor Bangladesh (139th), but behind Iran (95th), Sri Lanka (106th) and India (119th).

D. Reasons for Low-Ranking of Pakistan's DOI

1. Broadband Policy's Impact on DOI

One of the reasons why DOI of Pakistan ranks so low as compared to other Asian economies is because the infrastructure and utilization of broadband, fixed and mobile services is really low. Broadband services are limited at present to merely 30,000 subscriptions of which 15000 are DSL subscribers out of cable, satellite, wireless and other options²⁶. Recently, in 2004, Pakistan formed its Broadband Policy with the objective to offer affordable, high speed broadband services to corporate, commercial and residential areas. The policy initiatives are, however, marred with the lack of proper infrastructure.

2. Cellular Broadband

Although cellular usage has shown phenomenal growth over the years in Pakistan, there is yet a need to deploy third generation high speed (broadband) internet over a cellular network. Mobile networks Operator services in Pakistan currently work as:

- i. 2nd-generation cellular network operator
- ii. GSM network operator
- iii. 2.5G cellular network operator
- iv. EDGE network operator
- v. GPRS network operator

While GPRS (General Packet Radio Service) and WAP (Wireless Access Protocol) are the most commonly used networks available at the moment, new entrants, Warid Telecom and Telenor, have promised to deploy second and third generation cellular networks and thus broadband internet for its subscribers in 2006. The spectrums for such technologies to operate have already been laid out in the Mobile Policy 2004, which encourages adoption of new technologies.

Thus, owing to the late adoption of new technologies by the cellular operators the indicator *ratio of broadband mobile subscribers to mobile subscribers* remains negligible. Moreover, there is no data available on *mobile internet subscribers* in the public domain. Cellular operators maintain their own data. Therefore, data gathering of sub-indicators at each scale needs to be in congruity with DOI, which is often not the case. There needs to be an ITU guideline for national regulators to maintain such indicators, if DOI is to be given efficacy.

²⁶ PTA Annual Report, 2005; (Compare to Thailand that has a subscriber base of 200,000 broadband users, estimated in 2003. IT for Poverty Reduction: Sample Cases from Thailand. ECTI-21, NECTEC 2003).

3. Broadband Services

The indicator for broadband services carries 22% weight in calculation which makes the outlook for developing countries seem bleak. If this indicator was excluded, the DOI for Pakistan would be near 1. Low DOI could fairly be attributed to the late adoption of broadband technology and absence of necessary legal framework for it. Broadband Policy was introduced in 2004, which provides last mile access to all consumers. For this very purpose, Pakistan Telecommunications Authority (PTA) has lowered the tariffs for broadband service providers. Currently, the infrastructure of Pakistan is considered an impediment to expansion of such technology, since the current copper wire technology for fixed telephone lines is often faulty and disorganised. Digital Subscriber Line (DSL), which is considered as a part of broadband service, is thus not efficient for all cities and/or areas. Universal services obligation (USO) is considered to bring about this objective in the un-served and underserved areas in Pakistan, however such an obligation is not imposed on the incumbent service provider, *i.e.*, the PTCL. The reason of such inconsistent application of the USO is the economic cost attached to it so as to enable the PTCL to provide service without investing in the faulty infrastructure available. Also, since PTCL is not obligated to make contributions to USF it was asked to provide appropriate infrastructure that would ease the installation, spread and usage of such technology.²⁷ Since then, very few interconnection agreements have been signed between the incumbent and the service providers and even in presence of them, there are huge concerns of *quality of service* that need to be addressed by PTA on complaint of the customer. Although, this is a part of Interconnection Dispute Resolution Regulation (IDR) 2004, very few disputes have been settled by PTA to this concern. Moreover, cable broadband service providers also rely on the optic fibre cable infrastructure much of this investment is borne by the investor which would then require act an impediment to investment in such a technology.

PTA needs to bind PTCL, to its obligations to make the services more transparent rather than just issuing and revoking licenses to potential investors. Currently, broadband services are limited to urban cities of Pakistan which makes the usage of it much lower since many of the services are not economical for an average home consumer. Recently Wateen Telecom, a UAE entity, has undertaken the task to lay out a country-wide infrastructure developing an optic fibre backbone for its third generation services. This advancement is a result of government policies of opening up telecom services to competition and of encouraging new players in the field. By providing level-palying field and equal opportunity to smaller players to compete, it is hoped that broadband access will become cheaper and thus accessible. As present the price of broadband services in Pakistan is 1600 times higher than South Korea.²⁸

²⁷ National IT Policy, 2000

²⁸ Broadband Policy for Pakistan 2004, Ministry of Information Technology (IT & Telecom Division), Government of Pakistan

IV. Barriers to Determination of DOI

The availability of accurate and up-to-date data is a major barrier in calculating DOI. The non-availability of reliable data has plagued many developed countries including the USA. The measurement challenges are identified as Productivity Paradox of information by Robert Solow's famous quip: "we see computers everywhere but in the productivity statistics."²⁹

Pakistan in its effort to obtain reliable and accurate data has launched Research and Development Fund Operations Manual in 2006, with the consulting support National University (FAST), Pakistan and MIMOS Berhard, Malaysia. The Policy states:

*To transform Pakistan's economy into knowledge based economy by promoting efficient, sustainable and effective ICT initiatives through synergic development of industrial and academic resources.*³⁰

The fund would contribute to an enabling ICT environment, human resource development, by increasing industry demand and building a knowledge-based ICT industry for value added products and services and facilitate research. Key focus areas include building ICT infrastructure, secure cyber space environment along with ICT expansion and consumption in an enabling regulatory regime.³¹

V. Pakistan: A Success Story

Despite low DOI, the constant growth rate in the DOI however portrays Pakistan as an emerging economy with substantial potential in the telecommunications industry. As of February 2006, the teledensity in the country stood at 18 %.³² And as of July, 2006 it has jumped to 22%, thanks in large to the spread of mobile telephone.³³ The mobile subscriber base is expected to grow from 27 million at present to 40 million by the end of 2006, predicted the chairman of the Pakistan Telecommunication Authority.³⁴

²⁹ Paper on 'Measuring Broadband's Economic Impact William' by H. Lehr Carlos A. Osorio Sharon E. Gillett; Massachusetts Institute of Technology, Marvin A. Sirbu Carnegie Mellon University. Presented at the 33rd Research Conference on Communication, Information, and Internet Policy (TPRC) September 23-25, 2005, Arlington, VA. Revised as of January 17, 2006

³⁰ Pg. 7, National R&D Fund Policy (Legal, Administrative & Financial Structure) 2006. Also visit: <http://www.pakistan.gov.pk/divisions/itandtelecom-division/media/2LegalAdministrativeandFinancialStructure4Apr2006.pdf>

³¹ The R&D fund will be operated by a R&D company managed under a Legal, Administrative and Financial Structure (LAFS). Pursuant to this, Research and Development Fund Administration Rules, 2006, have been enacted with immediate enforcement.

³² Teledensity Rises to 18 Pc in Pak: Shaukat, 2/11/06 Frontier Star; 2006 WLNR 2562233.

³³ http://www.pta.gov.pk/index.php?option=com_content&task=view&id=727&catid=92&Itemid=301

³⁴ Mobile Subscribers to reach 40 million by year end: Chairman PTA; http://www.pta.gov.pk/index.php?option=com_content&task=view&id=732&catid=92&Itemid=301

The regulatory policies of Pakistan and their implementation by the regulator has earned accolades to it. Recently, Pakistan has been awarded with Government Leadership Award by the Global System of Mobile Association for revolutionary growth in its mobile sector. Pakistan is the first country from the South Asai region to attain this award. Similarly ITU bestowed Pakistan with the Global Regulator's Exchange Award for the country's contribution in ITU activities.³⁵

Pakistan has realised the potential of ICT and the benefits it could bring to the society. PTA has liberalized the ICT sector and has issued various types of the licenses for the ICT services. The licenses currently being currently issued are: Local Loop (LL), Long Distance and International (LDI) and Wireless Local Loop (WLL). Frequency Allocation Board is preparing a Spectrum plan to allow Wi-Fi operatives in the region³⁶. Recently Value Added Class licenses³⁷ are being issued to include Audiotex /Premium Services, EIS and Card Pay Phone services. Commercially viable benefits were licensed in the VAS agreement, which includes Vehicle Tracking Services for fleet management, Video Conferencing services for corporations. Audiotex services have contributed to ICT particularly in infotainment domain. Trunk radio services and Data communication services have enabled commercial competitiveness.

With policies like ensuring the access to internet costs no more than a local phone charge, Pakistan's government sparked a rapid growth in internet growth to 1,700 locations, covering 90% of the country's population. Cellular usage grew 10 times to 2.5 million in few years; key driver was the shift from receiving party pays (RPP) to calling party pays (CPP). Prepaid cards costing less than US \$0.50 per month, rather than monthly subscription fees, meant that owning a cell phone was no longer beyond the reach of the masses. Handset prices fell from over \$ 300 to under a \$ 100.³⁸ Moreover cell phone users could keep their phone numbers even after their six-month, prepaid card expired, under the Mobile Number Portability Regulation 2005. If not made flexible, existing regulations could hamper introduction of new technologies as in the case of Malaysia.³⁹

³⁵ M. Mazhar Qayum Butt, *Liberalisation of the Telecom Sector: An Appraisal of the Past Two Years*, 6/3/06 Bus. Recorder (Pak.); 2006 WLNR 9550951.

³⁶ They should be aware that Sri Lanka introduced Wi Fi licenses making it onerous for very hotspot to register

³⁷ CVAL launched in Oct. 2005.

³⁸ UNDP-ADIDP, 2004.

³⁹ Id.

Annexures

Annex-A

Summary of Legal Instruments/Policy Documents With Potential Impact on DOI

<i>Policy Objective</i>	<i>Legal Instruments/Policy Documents</i>	<i>Potential DOI Impact</i>
<p>The objectives are to:</p> <ol style="list-style-type: none"> 1. Make the Government a facilitator and an enabler to provide maximum opportunities to the private sector to lead the thrust in development of IT in Pakistan. 2. Develop an extensive pool of trained IT manpower at all levels to meet local and export requirements. 3. Provide business incentives for both local and foreign investors to ensure the development of Pakistan's IT sector (including the software, hardware, and service industries) and the use of its products 4. Develop an enabling legislative and regulatory framework for IT related issues. 5. Revitalize, emphasis, and support the country's dormant manufacturing and research and development (R&D) potential. 6. Establish an efficient and cost-effective infrastructure that provides equitable access to national and international networks and markets. 7. Set up national databases that are reliable, secure, upto-date and easily accessible. These would be 	<p><i>IT Policy, 2000</i></p>	<p>Opportunity (1,2,3) Infrastructure(4 -8) Utilization (9, 10, 11)</p>

<p>open databases.</p> <p>8. Promote widespread use of IT applications in government organisations and departments for efficiency improvement and transparency in functioning and service provision, and to organise and facilitate access to public information.</p> <p>9. Promote extensive use of IT applications in trade, industry, homes, agriculture, education, health, and other sectors with widespread use of Internet.</p> <p>10. Encourage and promote the development of quality software that can capture export markets.</p> <p>11. Develop a tradition of electronic commerce for both national and international transactions.</p> <p>12. Encourage expatriate IT professionals to return to Pakistan and establish software houses or extend assistance to the local industry in the form of assignments from abroad.</p>		
<p>Quality of Service Better internet access</p>	<p><i>Internet Over Cable Regulation, 2001</i></p>	<p>Utilization (10, 11)</p>
<p>Legalizing electronic documents and verifying electronic signatures</p>	<p><i>The Electronic Transactions Ordinance 2002</i></p>	<p>Utilization (9)</p>
<p>To implement e-government initiatives</p>	<p><i>Electronic Government Directorate, 2002</i></p>	<p>Utilization (9,10)</p>
<p>Foster Infrastructure Development</p> <p>One country one rate Cellular Services were excluded</p> <p>Premium charged for APC</p>	<p><i>Access Promotion Contribution/ Universal Service Fund</i></p>	<p>Opportunity (2,3) Infrastructure(5, 6)</p>

<p>were contributed to Universal Service Fund 1.5% of gross revenue from all operators except PTCL</p>		
<ol style="list-style-type: none"> 1. Increase choice for customers at competitive and affordable rates 2. Promote infrastructure development – Teledensity 3. Increase private investment <ul style="list-style-type: none"> - Encourage Local Manufacturing - Encourage Service Industry 4. Expansion of telecom infrastructure to un/under served areas 	<p><i>Telecom Deregulation Policy 2003</i></p>	<p>Opportunity (1,2,3) Infrastructure(4 -8)</p>
<p>Access of incumbent Network</p>	<p><i>Interconnect Dispute Settlement Regulation, 2004</i></p>	<p>Opportunity (1,2,3) Infrastructure(4, 5, 6) Utilization (10, 11)</p>
<ol style="list-style-type: none"> 1. Spreading of an affordable, ‘always on,’ broadband high speed internet service in the corporate and residential sectors across Pakistan. 2. Encourage the entry and growth of new service providers while stimulating the growth of the existing ones at the same time. 3. Encourage private sector investment in local content generation and broadband service provision. 	<p><i>The Broadband policy, 2004</i></p>	<p>Opportunity (1,2,3) Utilization (10, 11)</p>
<p>To safeguard the interest of the consumers</p>	<p><i>Protection of Telecom Consumers Regulations, 2006</i></p>	<p>Opportunity (2,3) Infrastructure(4, 5, 6)</p>

Annex-B: Working DATA used to calculate DOI by us

<i>Pakistan</i>								
	2000	2001	2002	2003	2004	2005	2006	Note
Administrative data:								
Percentage of population covered by mobile cellular telephony	3.1	7.0	15.8	22.0	45.0	49.0	52.0	Source: World Development Indicator, 2004. Telenor Press release for 2003
Internet access tariffs (20 hours per month)	800.00	700.00	600.00	550.00	440.00	300.00	200.00	
Mobile cellular pre-paid tariff basket (OECD low user)	5,000.00	4,000.00	2,500.00	1,500.00	1,000.00	300.00	100.00	
Number of Internet subscribers (fixed)	500,000	800,000	1,000,000	1,600,000	2,000,000	2,100,000	2,500,000	Source: Economic Survey of Pakistan 2005-06 and PTA
Broadband Internet subscribers (fixed)	5	30	100	175	29,000	37,000	49,000	Source: World Development Index 2006
Mobile cellular subscribers	306,493	742,606	1,698,536	2,404,400	6,556,942	12,800,000	29,600,000	Source: Economic Survey of Pakistan 2005-06 and PTA
Mobile Internet subscribers	-	-	-	15,000	50,000	1,100,000	1,500,000	Estimate indicated by Head of products and services, Warid Cellular Network.
Broadband mobile subscribers	-	-	-	-	-	-	-	
Survey data:								
Number of individuals that used the Internet	133,900	1,200,000	1,500,000	1,770,000	2,000,000	7,500,000	10,000,000	2000-03 ITU database 2004, 2005 CIA FACT BOOK, Estimate:2006
Proportion of households with a computer	0.027	4.0	5.0	20.8	25.0	28.0	35.0	2000-06 Estimate
Proportion of households with Internet access at home	0.52	2.0	3.0	5.0	6.0	10.0	30.0	Estimate.
Proportion of households with a fixed line telephone	11.0	12.0	13.0	14.0	17.0	9.0	7.0	Estimate.
Reference data:								
Population	141,553,775	144,616,639	147,663,429	150,694,740	159,196,336	162,419,946	163,985,373	CIA Fact Book (Est. July 2006) and Internet World Stats
Households	20,072,000	20,517,000	20,971,000	21,000,000	22,500,000	22,990,000	23,150,000	Estimate.
Gross National Income per capita (US\$)	\$526	\$ 501	\$ 503	\$ 582	\$ 669	\$ 742	\$ 847	Source: Economic Survey of Pakistan 2005-06
Annual average exchange rate	45.0000	47.0000	52.0000	55.0000	60.0000	60.0000	60.2000	Approx. Rate, courtesy Oanda.com
Calculated data:								
Internet access tariffs (20 hours per month), in US\$	\$17.78	\$ 14.89	\$ 11.54	\$ 10.00	\$ 7.33	\$ 5.00	\$ 3.32	
Internet access tariffs as a percentage of per capita income	40.56	35.67	27.53	20.62	13.15	8.97	5.37	
Mobile cellular (OECD low user), pre-paid tariff basket, in US\$	\$111.11	\$ 85.11	\$ 48.08	\$ 27.27	\$ 16.67	\$ 5.00	\$ 1.66	
Mobile cellular tariffs as a percentage of per capita income	253.49	203.85	114.70	56.23	29.90	8.97	2.69	
Mobile cellular subscribers per 100 inhabitants	0.2	0.5	1.2	1.6	4.1	7.9	18.1	
Mobile Internet subscribers per 100 inhabitants	-	-	-	0.0	0.0	0.7	0.9	
Proportion of individuals that used the Internet	0.1	0.8	1.0	1.2	1.3	4.6	6.1	

Ratio of Broadband Internet subscribers to Internet subscribers	0.0	0.0	0.0	0.0	1.5	1.8	2.0	
Ratio of Broadband mobile subscribers to mobile subscribers	-	-	-	-	-	-	-	
DIGITAL OPPORTUNITY INDEX	(0.09)	(0.02)	0.10	0.19	0.26	0.30	0.34	
Opportunity	(0.30)	(0.11)	0.25	0.48	0.67	0.77	0.81	
Percentage of population covered by mobile cellular telephony	0.03	0.07	0.16	0.22	0.45	0.49	0.52	
Internet access tariffs as a percentage of per capita income	0.59	0.64	0.72	0.79	0.87	0.91	0.95	Note: If 2004 not available, 2003 used.
Mobile cellular tariffs as a percentage of per capita income	(1.53)	(1.04)	(0.15)	0.44	0.70	0.91	0.97	Note: If 2003 & 2004 not available, 2005 used.
Infrastructure	0.02	0.04	0.04	0.08	0.10	0.11	0.18	
Proportion of households with a fixed line telephone	0.11	0.12	0.13	0.14	0.17	0.09	0.07	
Mobile cellular subscribers per 100 inhabitants	0.00	0.01	0.01	0.02	0.04	0.08	0.18	
Proportion of households with Internet access at home	0.01	0.02	0.03	0.05	0.06	0.10	0.30	
(Mobile) Internet subscribers per 100 inhabitants	-	-	-	0.00	0.00	0.01	0.01	
Proportion of households with a computer	0.00	0.04	0.05	0.21	0.25	0.28	0.35	
Usage	0.00	0.00	0.00	0.00	0.01	0.02	0.03	
Number of individuals that used the Internet	0.00	0.01	0.01	0.01	0.01	0.05	0.06	
Ratio of Broadband Internet subscribers to Internet subscribers	0.00	0.00	0.00	0.00	0.01	0.02	0.02	
Ratio of Broadband mobile subscribers to mobile subscribers	-	-	-	-	-	-	-	

Annex-C : Graphic Representation of the Indicators

