



IT HR NEEDS STUDY: FINAL REPORT

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Study Funded by National ICT R&D Fund Co. Ltd.

Objectives of the Study

- □ The scope of the current report includes:
 - Classification of existing Information Technology related jobs in the formal and Informal sectors.
 - Determination of the number of professionals currently working in each of these job categories.
 - Projections for the IT HR required over the next 2-5 year timeframe.
 - Development of an HR baseline against which future growth may be measured.
- □ Specific outputs shall include:
 - Classification of the different IT jobs available in the country;
 - Number of people currently working in each category;
 - Side-by-side comparison of the different IT jobs based on qualifications, experience, salary, job availability and advancement potential;
 - Sector and category wise projection of jobs expected to be offered in next 2-5 years;
 - Projection of Cumulative Job Openings and Job Seekers over the Period of 2014-2018.
 - Detailed analysis of the findings and detailed projections of the sector growth for the next two and five years separately.

Challenges inherent in the undertaking

Two key challenges inherent in this undertaking:

- First, as illustrated above, currently there does not yet exist benchmark data for the total number of jobs being created and filled (as well as their breakdown) within the IT industry in Pakistan.
- Second, even if accurate estimates of current IT HR Needs existed, it would be difficult to predict jobs in the future.
- The proposed methodology draws upon three core elements:
 - Extraction of jobs and HR data posted on established job boards and third-party services (such as Indeed.com.pk) to create a classification and preliminary estimates of IT HR Needs in recent years;
 - Using Focus Groups of industry leaders, HR managers, and key employers along with comparative numbers from other sources to arrive a series of HR trends and drivers;
 - Running a Delphi-based expert opinion poll within industry to develop a consensus on key drivers and resulting HR projections

Methodology of the Study



Selection of Jobs Data Set for Analysis

- Publicly available data sources and jobs aggregators such as Indeed.com
- Picked the databases and aggregators with the best coverage and indexing of Pakistani and US Jobs
- A raw data base of 36,948 total jobs was refined and resulted in 33,496 Pakistani jobs between Jan 2010 and December 2012 (3 years) and 9000+ US Silicon Valley Jobs on which the analysis was carried out
- A bottom-up rather than top-down classification system seemed to work better

Classification System for Further Analysis

- Development of the methodology was preceded by:
 - Understanding the capabilities of various data sets
 - Experimenting with data to identify loopholes / bottlenecks
- Self-classification by advertisers often not complete, sometimes misleading
 - Resort to occurrence of certain terms in Job Descriptions
- □ The Classification development had 3 steps:
 - A commonsense sorting of various relevant terms
 - Identification of commonly used 'similar' terms based on an algorithm
 - Learning through repeated cycles ('trial-error-and-reflect')

The Bottom up Classification of IT Jobs

High Level Skills	Software Programming (Platforms)			Network	Security		Databases	Graphics Designing	Project Mgmt…	ERP	Others
Platform	Web	Mobile	Windows/ Server	Multiple	Network	Application	Multiple	Multiple	Multiple	Multiple	Multiple
Tools	PHP C#.Net VB.NET ASP ASP.Net CSS HTML HTML5 J2EE Java Ruby on Rails Perl Java Script JQuery JQuery .Net VB.NET Python RDF Visual Basic	Android iOS Blackberry Java Objective C	C C++ C#	Cisco RedHat Linux Broadband VOIP Cloud iptables Network, LAN,WAN,N etworking	Firewall Nessus Metaspolite Air crack Snort TCP Dump Brup suite Nikto W3AF Pros Proxy CyberSecurity Information Security.	Nessus Metaspolite W3AF Pros Proxy Citrix Security	Sql Hadoop Nosql Pig MongoDB Cassandra RDBMS	Corel Adobe Omnigraffle Photoshop Logo Dreamweaver Illustrator	PMP Prince2 MS Project QTP / Selenium Primavera JIRA puppet	SAP Oracle Dynamics Seibel Peoplesoft Salesforce	Social Media SEO Facebook Twitter Analytics Big Data R-Studio R E-Business Content Management Middleware Business Intelligence BPO Call Center IT Helpdesk
	Visual Basic			Skills	s — Platfa	orms <mark>- To</mark>	ols				TT Helpdesk CMM/ITIL

Preliminary Data Snapshots: Jobs by Education Level



Y-Axis is Percentage of Jobs Posted

In Platforms, Web Jobs are most sought after ... Mobile is fastest growing



Y-Axis is Percentage of Jobs Posted

Among other high level categories, Security experienced highest job growth....

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Timeline

Y-Axis is Percentage of Jobs Posted

Pakistani market demands traditional skills....



Among platforms, Pakistani jobs show greater specialisation....



Y-Axis is Percentage of Jobs Posted

Cloud is the fastest growing emerging area with Social Media and Big Data following...





Timeline

2013

Y-Axis is Percentage of Jobs Posted

2011

Timeline

Skills: Comparisons with United States

2012

2013

2013

WWW

Moble

Desktop





Y-Axis is Percentage of Jobs Posted

Emerging Skills: Comparison with United States

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Timeline Y-Axis is Percentage of Jobs Posted



Timeline

Key Trends: Pakistan's IT HR Needs (1)

- The battle for the dominant mobile platform has been neck to neck with the demand for Android only barely edging past iOS in the last 12 months and the demand for the latter seems to be falling sharply.
- Cloud and Big Data are growing areas even though we cannot yet see the kind of exponential growth in demand for these skills in Pakistan as we have seen, lately, in the Silicon Valley.
- Several other 'emerging' areas, such as Social Media and Game Development, do not show the kind of job growth expected of them.
- Demand for IT Certifications is small and declining in Pakistan's IT Industry.
- Clear and definite differences between hiring trends in Silicon Valley and in Pakistan

Key Trends: Pakistan's IT HR Needs (2)

- Web is the dominant programming platform right now but mobile is growing faster even though it has a lot to catch up before it can threaten Web's dominance
- Mobile is certainly the hot new skill 'area to watch' showing an unambiguous increase in Pakistan (about 500% increase over the last 3 years).
- Demand for skills in IT Industry, generally, shows a secular increase over the 3 years across a range of different skill-sets and platforms such as databases, ERP, networks, and security with the latter two experienced greatest growth (more than 100% over 3 years).
- There is often a leading platform / tool that dominates each of these areas, namely, Linux (Security and Networks), Oracle (ERP), MySQL (Databases), and Adobe (Graphics), with the exception of web development where there is fierce competition for dominant skill-set / tool-kit between Java, PHP, and HTML5, etc.

Delphi Exercise validated trends and projected IT HR jobs data...

- Delphi exercise entails polling a group of experts who anonymously reply to questionnaires and subsequently receive feedback in the form of a statistical representation of the "group response," after which the process repeats itself. The goal is to reduce the range of responses and arrive at something closer to expert consensus
- Three Delphi rounds were carried out:

- Pre-Delphi Round Focus on validating Trends and Drivers
- Delphi Round 1 Focus on identifying Parameters and future projection
- Delphi Round 2 Focus on enhancing accuracy of future projection
- Delphi Round 3 Confirmation of Estimates

Delphi Round 1 and 3...

		akistan IT HR	Needs Ass	essment Stud	Y			
		(Delphi Exercis	se instrumen	t - iteration 1)				
Name:		Organisatio	on:			Mobile Contact:		
21: Please make an educated guess about the t data point or pule-of-thumh or personal eve	otal number of 11 and erience (niese state th	ITES JODS created	d in Pakistan dence in vou	r in the past, las r prediction) Plu	t year, this year, ease provide voi	, next year, and in 3 and 6 years time. You may base ur hest quess and not hesitate in making an error. T	this estimate on som he Delphi process sha	
help you sync with other colleagues and elin	inate your error and l	plases in the sub	sequent pha	ises.		ar best gaess and not nestate in making an error.	ie beipili process site	
		_	Predictions	1		Reasons	_	
	laseline (all current Last y	ear This year	Next Year	Over 3 years	Over 6 years	Please Describe the Data Point(s) Underlying You	r % Confidence in	
	jabs) (201	3) (2014)	(2015)	(2015-2017)	(2015-2019)	Predictions	Prediction	
otal Number of Jobs Created in IT and ITES							3-year 6-year	
IT Total Technical (IT) Job								
Total Service (TES) Job	5							+
								1
		_						1
lease identify TOP-3 DRIVERS of job grow	th in Pakistan (e.g. so	cial media, big a	data, mobile,	, or web) that ye	ou're most certa	in about + 2 WILDCARDS that you're not certain ab	out but that may mak	e a big
npact if they happen. Not the difference b	etween a DRIVER is so	mething you kno	ow about wit	th fair degree of	certainty and a	WILD CARD is something that may happen but is u	ncertain.	
	Manian Manufacture	he Malatana	No. of John				-	•
	Created Annually o	uer Created An	nually over	What Indicator	s / Data Points I	what Future Indicator / Milestone / Data Point	if % Confidence this	
Drivers of Job Growth in Pakistan	6 yrs (2015-20)	6 yrs (20	15-2020)	your Predict	ion based on?	it happens, could derail your prediction?	event will happen	
Driver 1 (Write here)								e.g. 10%
D2 Driver 2 (Write here)								
D3 Driver 3 (Write here)								
W1 Wildcard 1 (Write here)								
wz wilocaro z (write nere)								1
lease take ATLEAST 10 JOB CLASSIFICATIO	NS that you know the	most about (ba	sed on doma	ain knowledge, p	previous hiring,	etc.) and provide projections for 1, 2, and 6 year job	growth in each? Plea	se also
provide data points, or refernces, where po	sible, and your degre	e of confidence i	in the project	tion?				
					1			
							% Confidence in	
ed to Estimates of Jobs Created by Job	Estimated Current St	ock Jobs Crea	ated Next	Jobs Created in	Jobs Created i	in Reference or Data Point(s) on which this estima	e Prediction	+
Programmers	of Jobs (-2014)	Year	(2015)	3 yrs (2015-17)	6 yrs (2015-20	is based (if any)?	3-year b-year	+ +
Web Developers								
Database Manager / Administrator								<u> </u>
Mobile Developers								
Game Developers								
Animators Graphics Designers								
Data and Analytics								
Payment Systems								
Social Media								
Search Engine Optimisation								
Quality Assurance								
Call Center Agents								
Content Writers								
Hardware								
Embedded Software								
Business Analysts								
System Analysts								▲
Project Managers								+
		-		1	1	-	-	+
		_			-			

Key Skillsets: Projected Jobs (2015-2020)

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- Median expert believes that currently there is a stock of 100,000 IT and equal no of ITES jobs...

	Current	Last Year	This Year	Next Year	Next 3 Yrs.	Following 3
	Stock	(2013)	(2014)	(2015)	(2015-17)	Yrs. (2018-
						20)
IT Jobs	100,00	5,000	10,500	17,500	30,000	57,500
Growth	0					
ITES Jobs	97,500	20,500	10,000	20,500	30,000	60,000
Growth						

Within high-level skills, Desktop (Programming) leads current stock due to legacy investment in HR but Web and Mobile are growing ...

	Estimated Current Stock	Next Year (2015)	Jobs Created in Next 3 Yrs. (2015- 17)	Jobs Created in Next 6 Yrs. (2015-20)
Programming (Desktop/Servers)	30,000	2,250	8,000	17,500
Web Development	25,000	3,000	6,000	13,250
Hardware	17,500	3,250	5,500	9,000
ITES (BPO, Call Centres)	12,750	1,500	3,550	7,750
Mobile Development	4,500	1,000	4,000	7,000

Stable Core: Projected Jobs (2015-2020)

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- Apart from the mature key platform areas, we also find relative stability in key IT job sub-segments that constitute the 'core' of an IT operation.

	Estimated	Next Year	Jobs Created in	Jobs Created
	Current	(2015)	Next 3 Yrs.	in Next 6 Yrs.
	Stock		(2015-17)	(2015-20)
Project Management	3,000	500	1,100	2,500
Database Management	3,000	200	686	1,700
Business Analysts	1,000	200	650	1,750
System Analysts	1,450	1,040	2,620	3,240
Quality Assurance	4,000	400	1,500	4,000
Content Writers	1,000	100	325	700

With the exception of quality assurance, which shows a somewhat accelerating trend, all other subsectors that form the 'core 'of an IT operation show relatively stable growth prospects in both near (3 years) and longer-term (6-years) future, with one relatively minor exception, namely, systems analysts.

High Growth Sub-Sectors: Projected Jobs (2015-2020)

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These sub-sectors can be further divided into high growth areas (consistently above growth, doubling every six years) and areas ready for, potentially, explosive growth (far in excess of 30-50% per annum).

	Estimated	Next	Jobs Created in	Jobs Created in
	Current	Year	Next 3 Yrs.	Next 6 Yrs.
	Stock	(2015)	(2015-17)	(2015-20)
Game Development	2,500	750	2,800	5,750 (+225%)
Animation	1,000	6,075	10,225	25,450
				(+2500%)
Graphic Design	3,500	300	943	2,025 (+75%)
Analytics	375	75	325	650 (+200%)
Social Media	2,250	550	2,250	5,500 (+225%)
Payment Systems	500	100	200	800 (+160%)
SEO	1,000	350	843	1,575 (+150%)
Embedded Systems	3,000	3,100	1,800	3,100 (+100%)

Conclusions...

- There is a definite linkage between the IT job data in Silicon Valley with that in Pakistan and even though most have an intuitive sense that this should have been the case, this is the first study in Pakistan that formally tries to produce and utilise data to try to understand that linkage.
- There are sectors and sub-sectors within the ICT HR that have grown faster (or slower) than others over the time period in question and may thus benefit from or be deserving of public policy interventions.

Conclusions...

- There may be sectors that are anecdotally known as 'emerging' (or fast growing sectors) but the reality of actual job data does not support this.
- At the platform and tool-kit level, we see a greater degree of concentration (and specialisation) in Pakistan than we see in the Silicon Valley.
- There is the issue of quality of HR which is one of the most critical and hard to capture element of the HR demand situation in Pakistan and yet our study, by design, does not say much about it.

Policy Recommendations...

- Firstly, the Ministry of IT and Telecom (MOITT) and the National ICT R&D Fund may consider repeating and updating this analysis on at least annual basis and probably more frequently
- Secondly, we also recommend that a more detailed and longer-term and hence comprehensive analysis of IT jobs data be undertaken to better understand the correspondence (time lags, magnitudinal differences, etc.) between Pakistan and the Silicon Valley.
- Thirdly, while this study has addressed the demand side, there is a need for a comprehensive and definitive study on supply that may focus, in particular, on the issue of quality of HR because that is so central to the HR challenge that Pakistan faces today.
- Finally, in addition to supporting data collection activities elsewhere, the Ministry may also recommend that HEC and other relevant Ministries collect data on IT, CS, MIS, EE, and CE programmes at Universities to help improve data-driven policymaking in Pakistan.