Information: The oxygen of regulation

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20 August 2013

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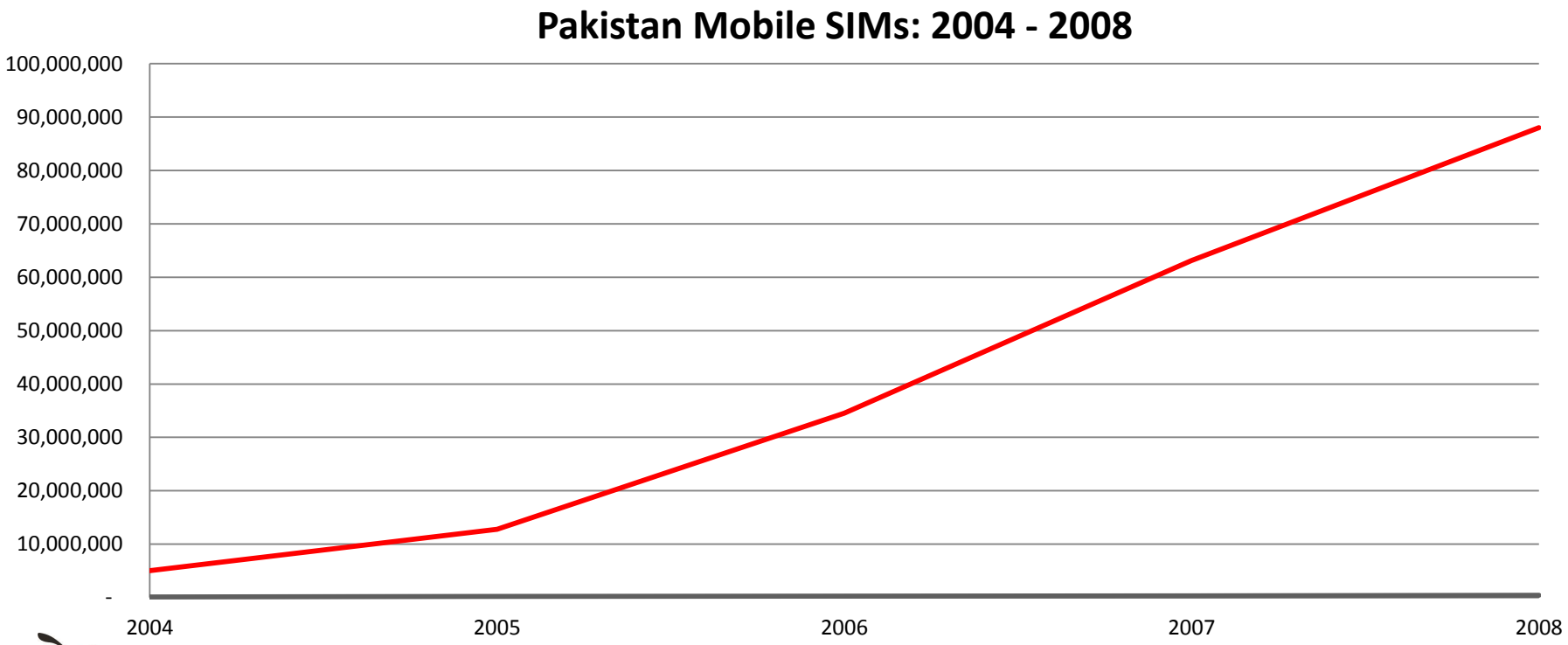
Why?

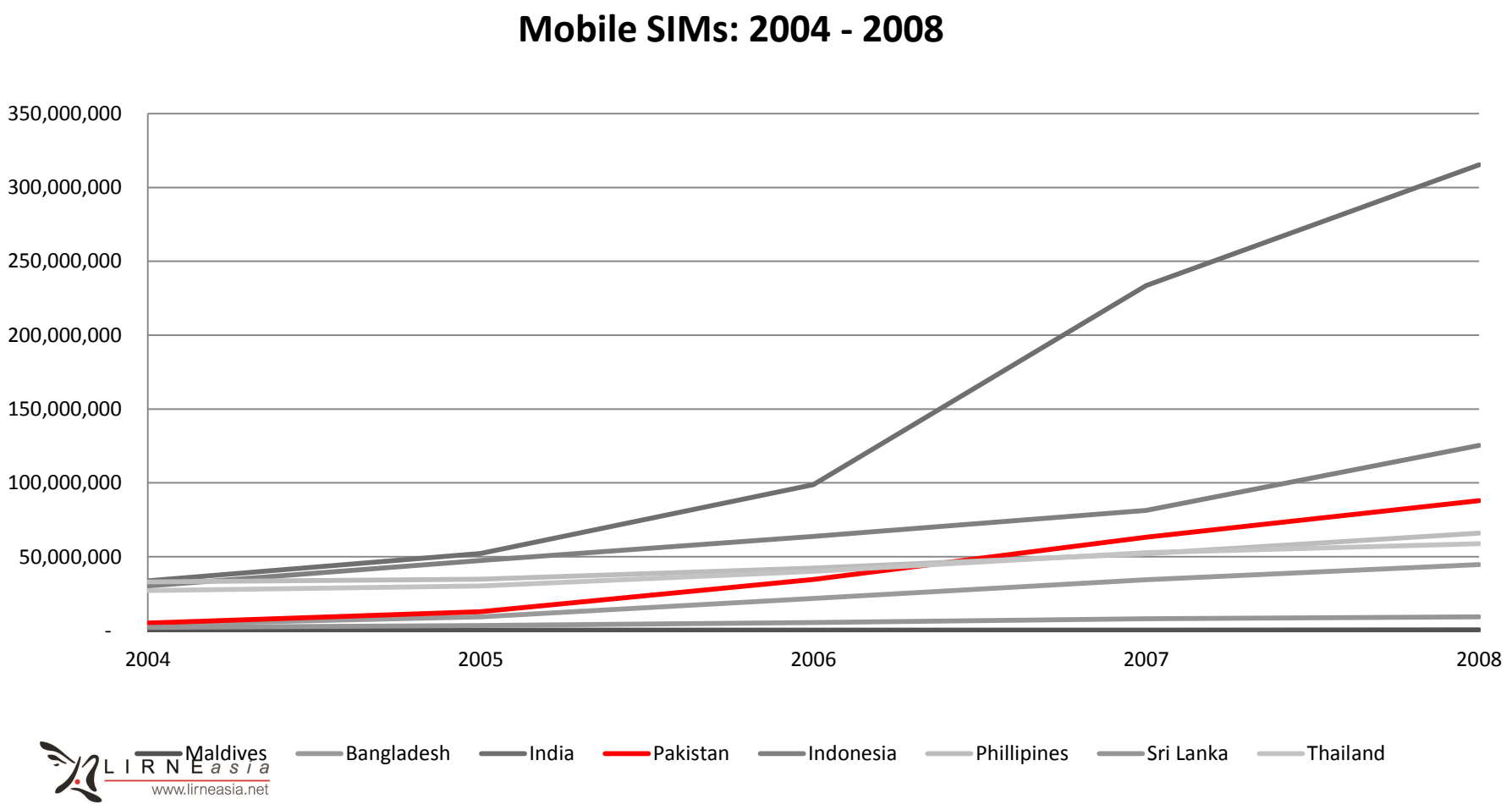
- Minimum need: to see if license conditions (roll-out) are being met
- More importantly: To see if goals of sector reform are being met
  - Increased access, choice, quality
  - Lower prices
- Strategically: to keep all stakeholders happy (or equally unhappy during transformation phase)
  - Consumers, Operators, “Country”
  - To show off to the world?

How do you know you are achieving these goals?

- E.g., is connectivity increasing? look at connections over time



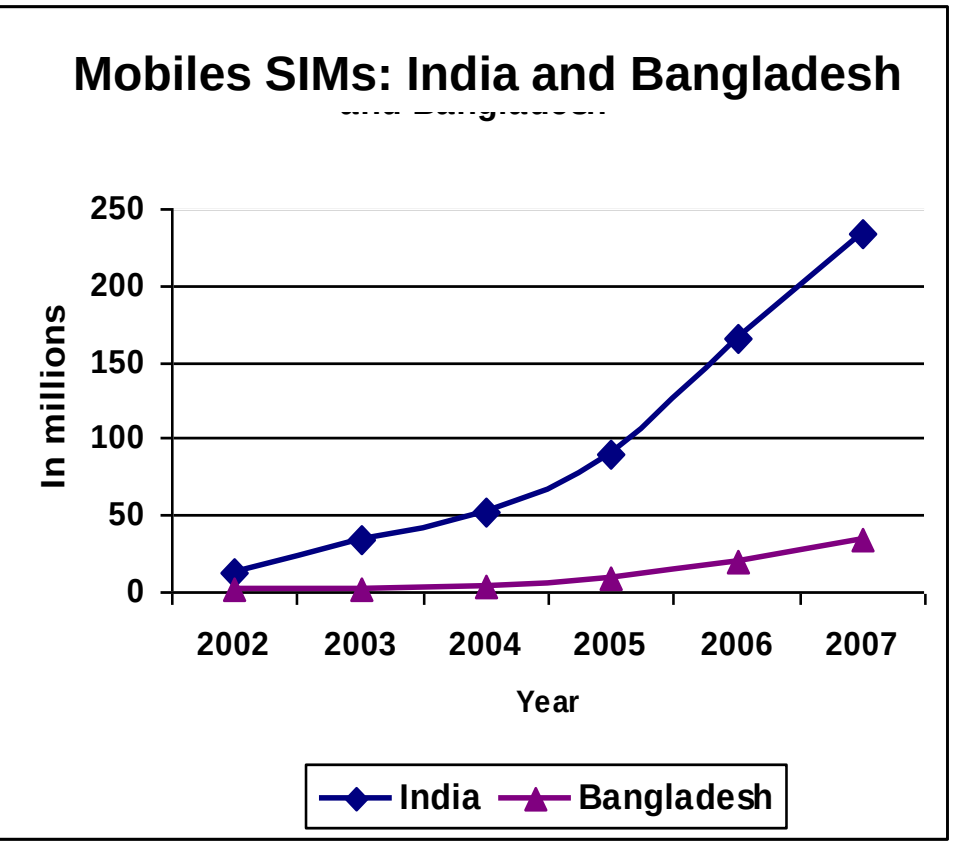
But is it increasing fast enough? You may think you are doing well until …

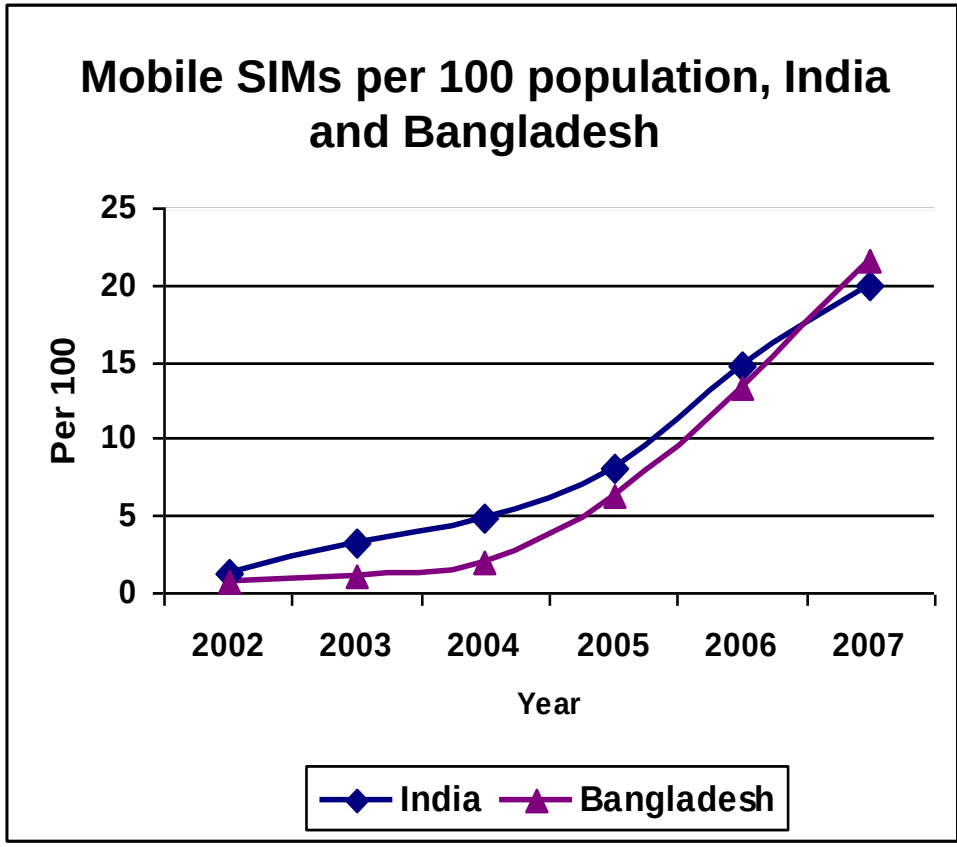


Benchmarking is an effective way to measure performance

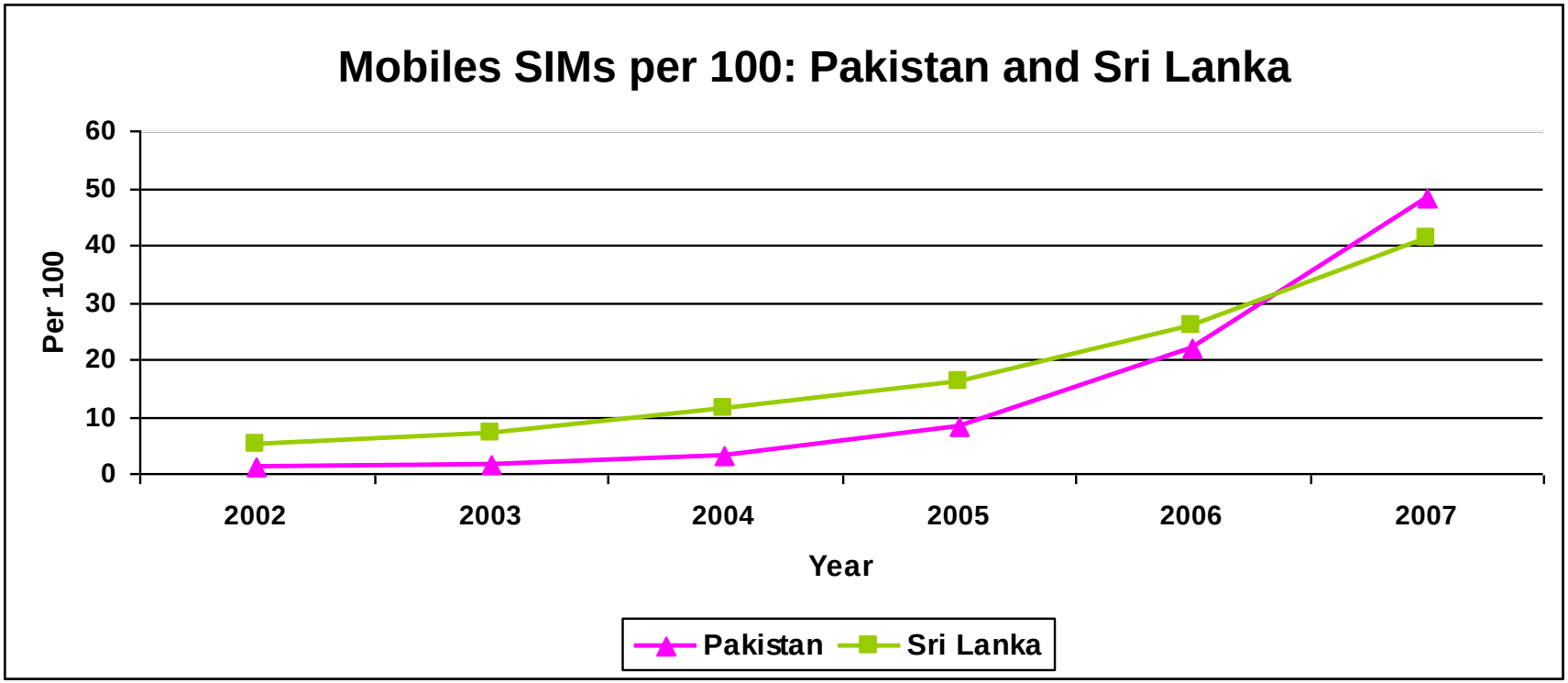
- Benchmark = target/goal to be achieved; a point of comparison
  - Static : e.g., “aim to pass 75 fixed access paths per 100 people”
  - Moving: e.g., “aim to be below ITU average price basket” etc.
- Data: the primary requirement for good benchmarking
  - Comparable (same definition? same time period? same collection/sampling method?)
  - Accurate; up to date

Different indicators can tell different stories. Pick the right one for the purpose





Data change fast. The latest are needed



How do you reconcile different financial years? Does annual data even make sense?

- Many countries Jan – Dec (calendar year)
  - E.g., Sri Lanka
- But many others differ
  - India: Apr – Mar
  - Pakistan : Jul – June
- Having quarterly data eliminates problem to a great extent
- In a fast changing sector, latest data needed
  - Collect and report quarterly

And whose data do you use?

	# of internet subscribers (millions), India			Difference between…	
Year	NASSCOM data	TRAI Data	Ministry of Statistics & PI	NASSCOM & TRAI numbers	TRAI & Ministry numbers
1999	0.35		0.23	-	-
2000	0.65	0.95	0.943	**-46%**	1%
2001	1.13	3.04	2.909	**-169%**	4%
2002	1.763	3.42	3.239	**-94%**	5%
2003	3.661	3.64	3.5	1%	4%
2004	4.403	4.55	4.05	-3%	11%
2005	6.674	5.55	5.3	17%	5%
2006		6.94	5.556	-	**20%**

Note: Based on Financial Year – e.g. "2000" refers to April 1999 – Mar 2000

Source: NASSCOM Strategic Review 2005; TRAI; Ministry of Statistics and Program Implementation, Govt. of India

WHAT INDICATORS ARE IMPORTANT (WHAT DATA SHOULD YOU COLLECT)?

A basic set of indicators should enable you to track, measure and benchmark…

- Connectivity
- Industry Structure
  - market shares, market concentration/power
  - Revenue, profitability
- Economic Impact
- Price and Affordability
- Quality of Service
- Usage

CONNECTIVITY INDICATORS

Useful Indicators

MOBILE

- Number of mobile SIMs
- Number of mobile SIMs – prepaid
- Number of mobile SIMs – postpaid
- Total mobile subscribers per 100 inhabitants

INTERNET

- Total internet subscriptions by technology, of speeds greater than/equal to 256 kbps
  - mobile SIMs with access to data communication above 256 kbps
  - WiMax
  - xDSL
  - Cable
  - Satellite
  - FTTx etc.
- Total international internet bandwidth
- Total domestic bandwidth
- Total broadband internet subscriptions peer 100 inhabitants

ICT

- Number of public access internet kiosks/ telecenters
- Estimated number of internet users

IN-COUNTRY ACCESS GROWTH

- Backbone map for a country
- Mobile coverage map per operator
- Base station map per operator

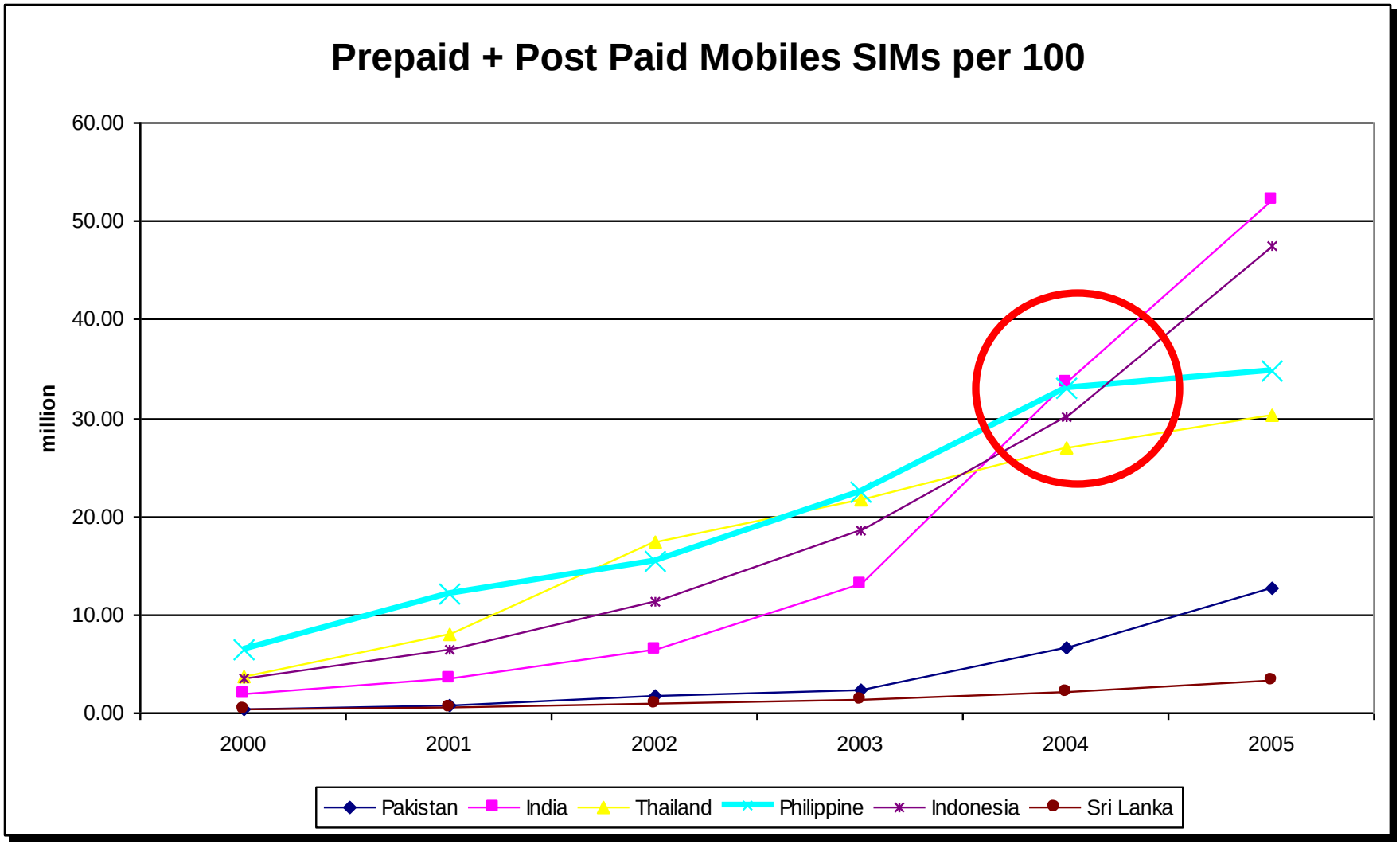
FIXED

- Number of fixed lines
- Number of fixed wireline phones
- Number of fixed wireless phones
- Total fixed line subscribers per 100 inhabitants

Counting SIMs. Not subscribers.

- With very strict SIM registration rules, you MIGHT know number of subscribers
  - Assuming strict compliance by agents
- But mostly, you will only know number of SIMs issued by operators
  - Soon, many subscribers may own more than one SIM

Counting active SIMs, not all SIMs issued. What is the definition of ‘active’?



ECONOMIC IMPACT OF INDUSTRY

Economic Impact Indicators

- Telecom growth sector in most countries
  - Often fastest growth
  - Significant foreign direct investment
- To argue against policies that may make sector less attractive to investors
  - E.g., sector-specific taxes
- To lobby for position in the govt. pecking order?

Useful indicators

- Total annual investment in the telecom sector
  - Investment into expansion of network services
  - Going towards public services (not private/internal firm consumption)
  - Not include money injected by firms acquiring a management interest in telco [track M&A money separately]
- Investment disaggregated by origin
  - Foreign Direct Investment (FDI) vs. locally generated
- Revenue generated by sector
  - Fees (e.g. spectrum charges, license fees) + tax
- Total tax paid by the sector
  - Paid by consumer
  - Paid by corporates
- Total employment in the telecom sector (direct, indirect?)

Telecom sector attracts significant FDI

Pakistan: Foreign Direct Investment (FDI into Telecoms

Year	Total FDI (USD millions)	FDI in Telecom Sector (USD millions)	Telecom Sector's Contribution to Total FDI (%)
2001-02	484.7	6.1	**1.3**
2002-03	798	13.5	**1.7**
2003-04	979.9	207.1	**21.1**
2004-05	1524	494.4	**32.4**
2005-06	3521	1905.1	**54.1**
2006-07	5124.9	1824.3	**35.6**
2007-08	5152.8	1438.6	**27.9**

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Source: Wilson J. Telecom Regulatory and Policy Environment in Pakistan (Available at http://lirneasia.net/wp-content/uploads/2009/07/TRE_Pakistan-Final_2009Jan22.pdf

Telecom contributes to GDP, GDP growth and government revenue

- **Sri Lanka** : Telecom sector largest contributor to **GDP *growth***, 2009
  - 11.7% of GDP growth due to telecom
- **Sri Lanka**: Telecom Regulator (SLTRC) accounted for 50% of **revenue from SOEs** in 2009
  - Even higher in the past

Maldives: Telecom Sector's contribution to GDP

Sector	% contribution to GDP		
	2006	2007	2008
Tourism	27.4	27.8	27.4
Government Administration	14.8	15.8	17.6
Communication	**8.9**	**9.1**	**9.6**
Transportation	9.6	9.7	8.7
All other sectors	39.4	37.6	36.7

Source: 1) Galpaya H., Broadband in Sri Lanka: Glass half full or half empty? In Infodev Broadband Strategies Toolkit. (available at http://www.infodev.org/infodev-files/resource/InfodevDocuments_1113.pdf)
2) Galpaya, H., Telecom Regulatory Environment in the Maldives (available at http://lirneasia.net/wp-content/uploads/2009/07/TRE_Maldives_2008Dec29.pdf)

Understanding taxes on consumers is useful…..

Ranking	Country	Tax as a proportion of TCMO 2011	2007 Ranking	Increase/Decrease compared to 2007
1	Turkey	48.23%	1	Increased
2	Gabonese Republic	37.20%	48	Increased
3	Pakistan	31.61%	66	Increased
4	Greece	30.44%	9	Increased
5	Dem. Rep. of Congo	29.14%	26	Increased
6	Madagascar	28.33%	56	Increased
7	Uganda	28.17%	3	Decreased
8	Croatia	27.93%	NA	NA
9	Tanzania	27.80%	2	Decreased
10	Dominican Republic	27.68%	7	Increased
11	Zambia	26.23%	6	Decreased
12	Brazil	25.15%	4	Decreased
13	Sweden	25.00%	13	Increased
14	Norway	25.00%	NA	NA
15	Denmark	25.00%	12	Increased
16	Hungary	25.00%	31	Increased
17	Rwanda	24.47%	23	Increased
18	Italy	24.38%	16	Increased
19	Sierra Leone	23.82%	91	Increased
20	Jordan	23.40%	41	Increased

- Taxes paid by consumer including
  - VAT + GST on airtime and handset
  - Customs, exercise duty on handset
  - Fixed or airtime taxes
  - Tax on handset rental
  - Etc.

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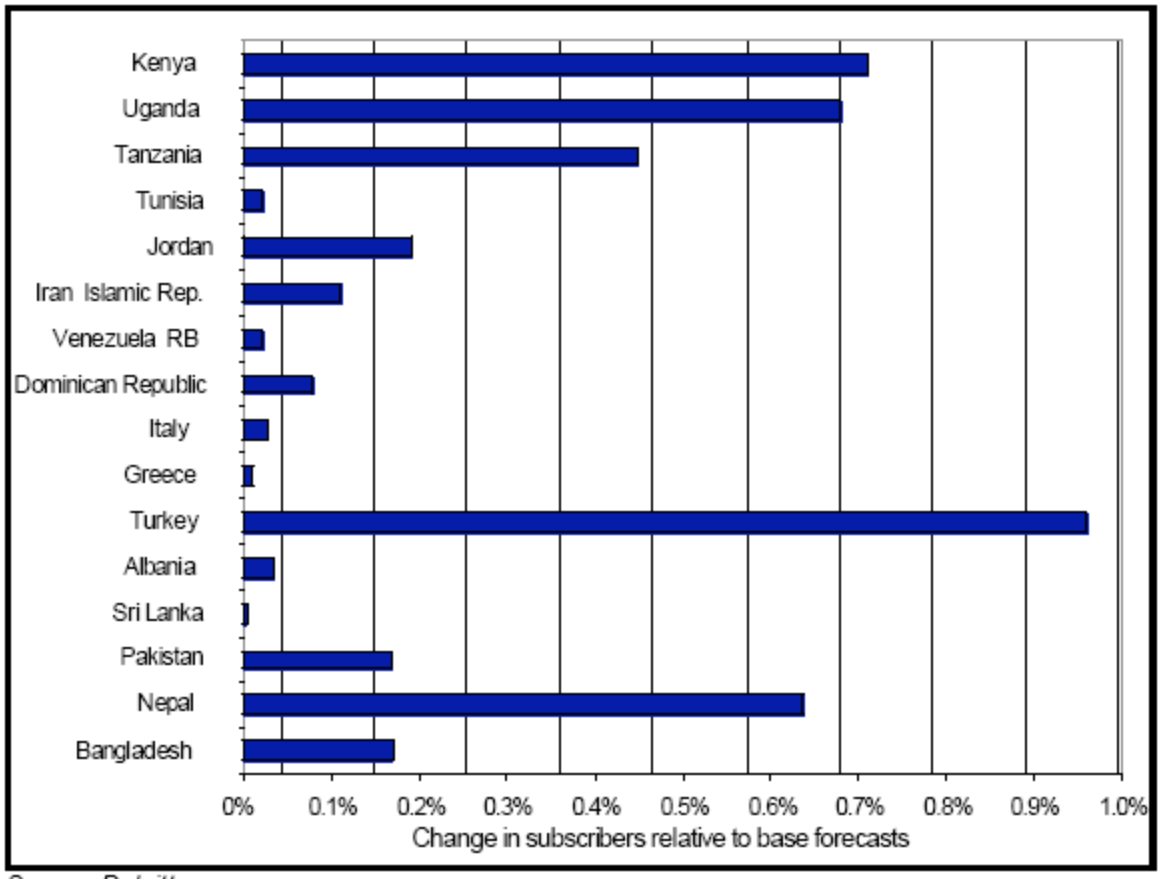
Source: GSMA 2011 tax study (http://www.gsma.com/newsroom/gsma-global-benchmark-study-into-mobile-specific-taxation-shows-consumers-pay-more-today-than-in-2007)

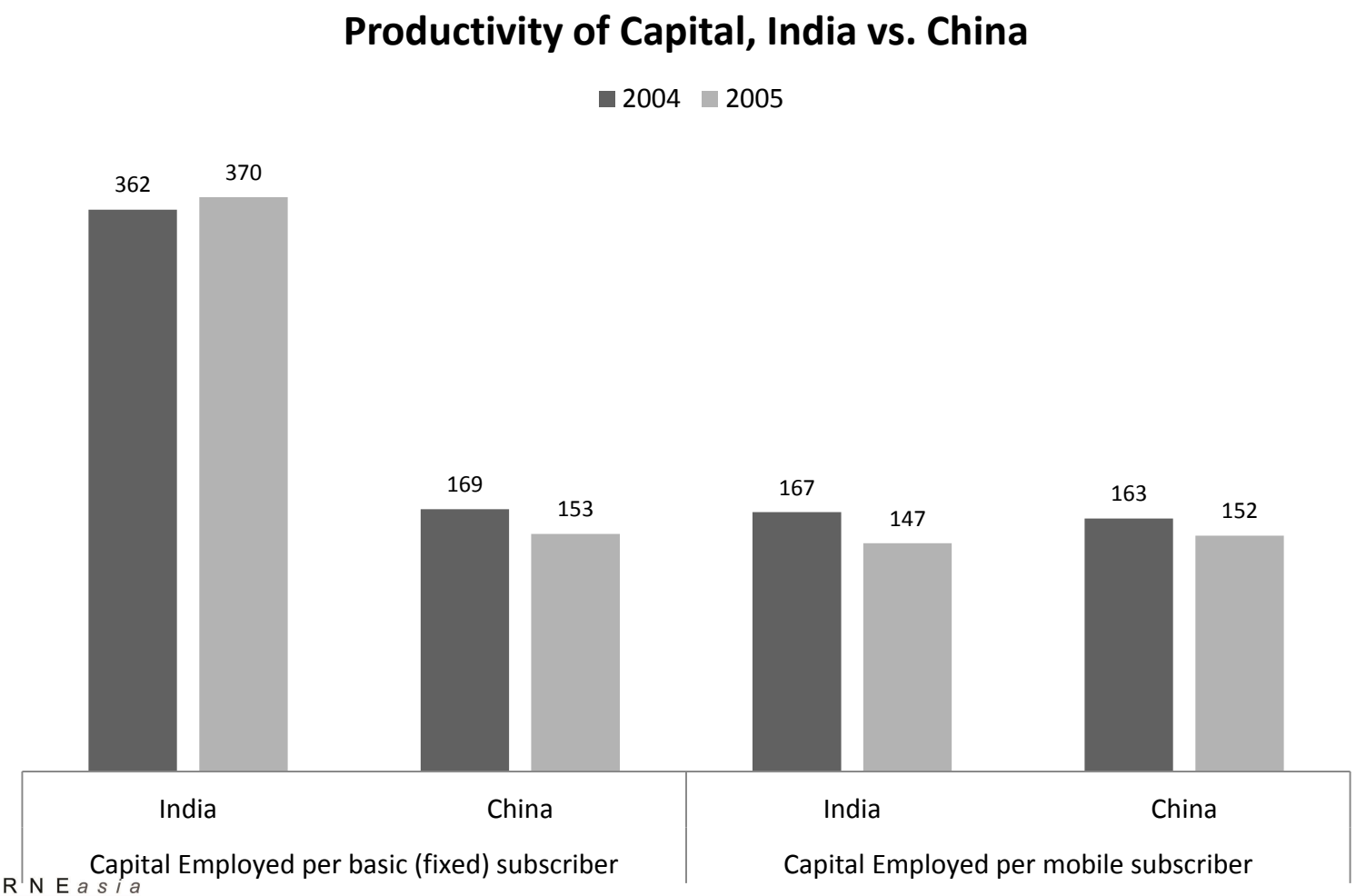
To understand impact of tax changes (e.g. GSMA calculations)

Figure 21: Percentage change in subscribers from base case in 2010 following the removal of telecoms specific taxes



Source. Deloitte

Many other useful investment-related indicators..



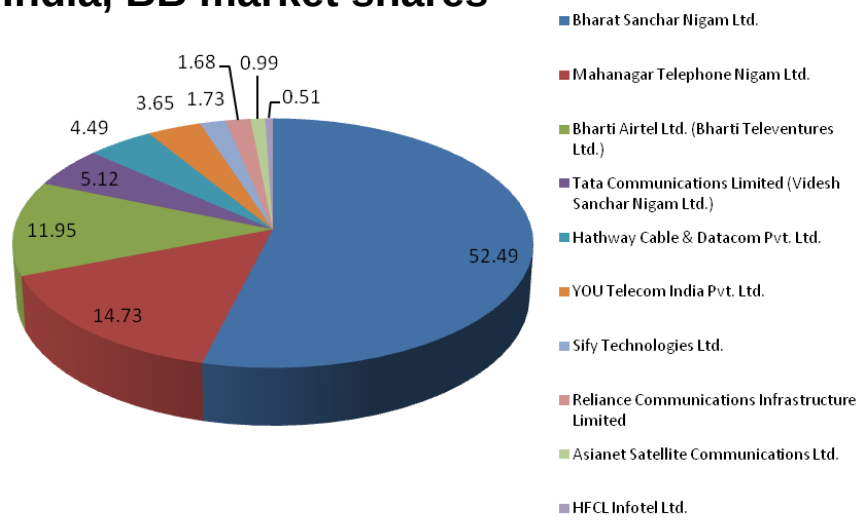
INDUSTRY-STRUCTURE INDICATORS

HHI (Hirschman Herfindahl Index) is basic measure of market concentration

- Define Market
  - Fixed? Mobile? Voice telephony (fixed and mobile)? Internet Services?
  - Identify market share of each operator M1, M2, M3….
  - Subscriber share, revenue share, minute share?
- HHI = $(M_1)^2$+ $(M_2)^2$, $(M_3)^2$+…+$(M_n)^2$
- US Dept of Justice says…
  - Greater than1800 → concentrated market
  - Between 1000-1800 moderately concentrated
  - Less than 1000, concentrated
  - M&A activity increasing HHI by100+ and HHI >1800 → automatic review (etc.)

Market shares and HHI by segment

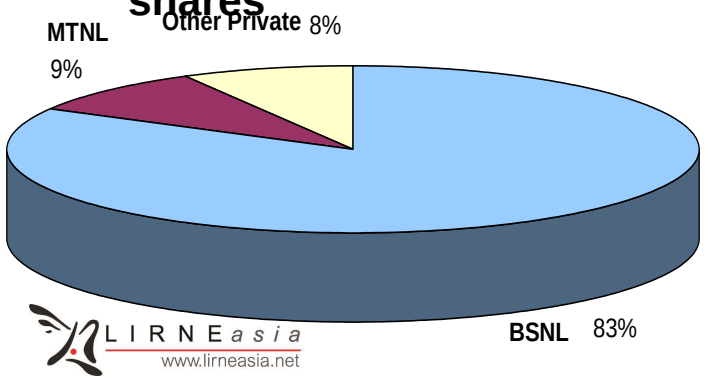
India, BB market shares



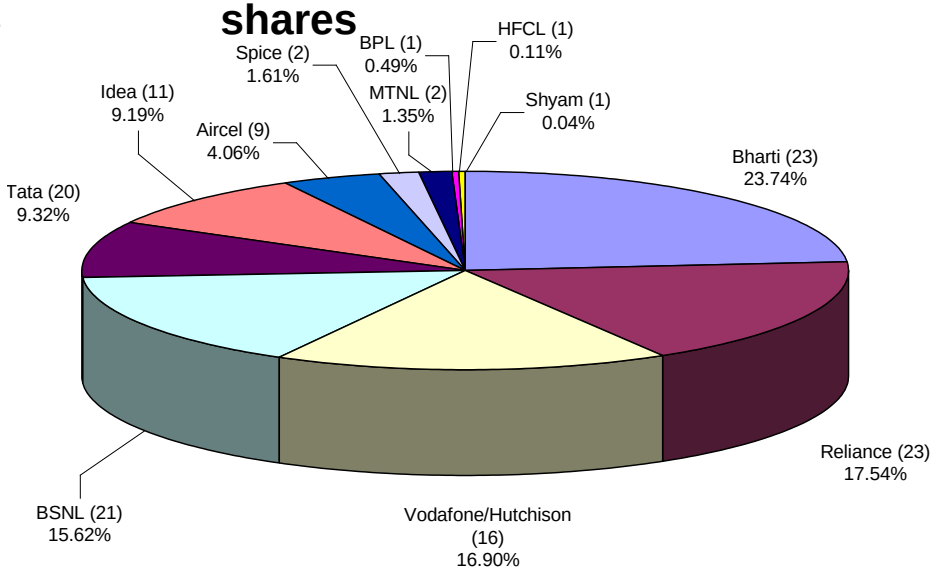
India, Mar 31 2008

- Mobile HHI = 1593
- BB HHI = 3171
- Fixed HHI = 7034

India, fixed market shares



India, mobile market shares



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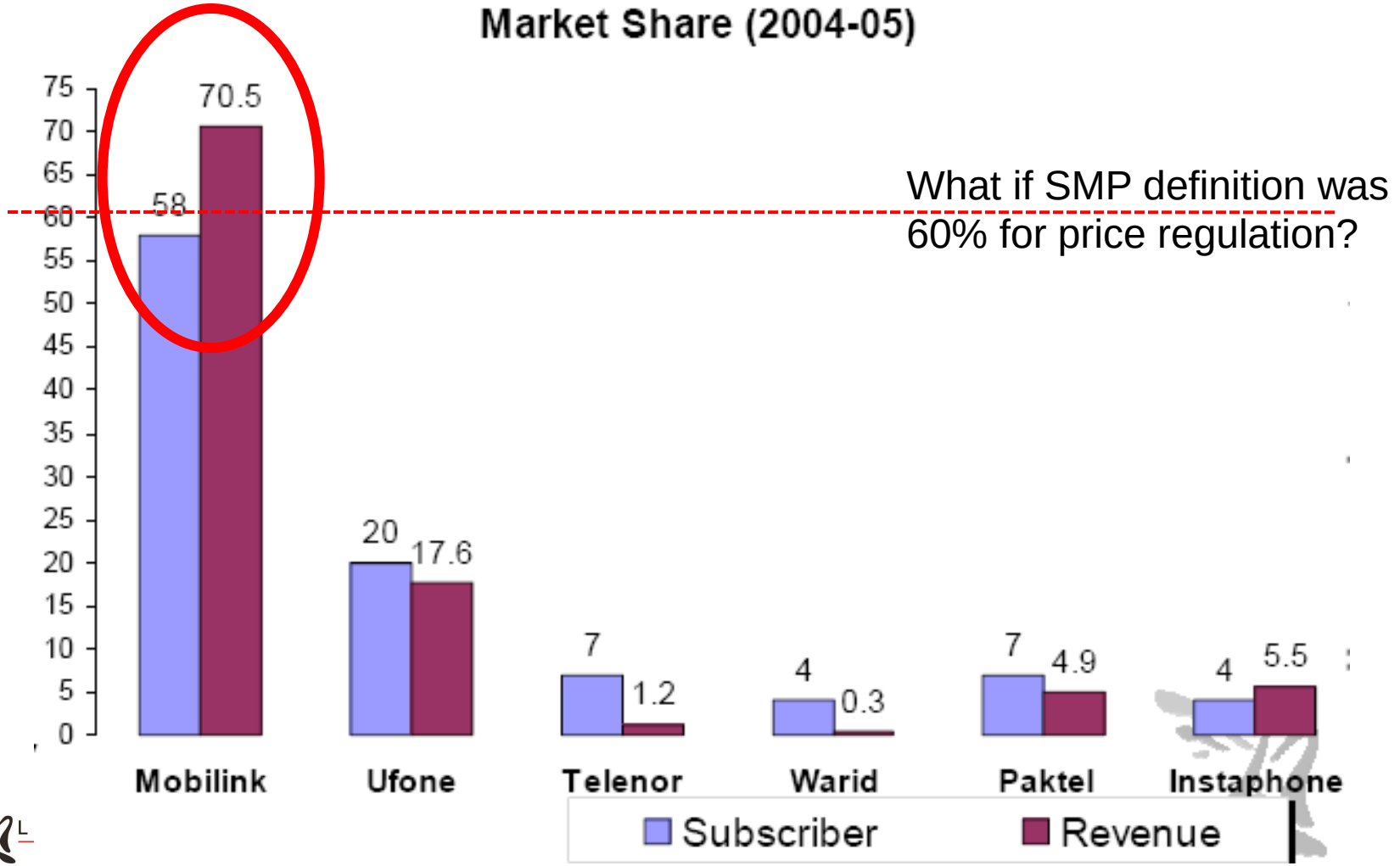
Market share based on SIMs? Revenue? Minutes?



Important to operators, not just regulators

- Investors look at company performance indicators
  - market share (among other things)
- Valuations → stock prices impacted
- E.g. Investor reaction to Sri Lankan operator's loss of market share
  - "Declining share by subscribers" (analysts)
  - "But share of minutes increasing" (CEO)

- Market segmented by wholesale vs. retail
  - E.g., Ofcom (UK regulator) reports wholesale (BT dominated, HIGHLY concentrated) vs. retail (less concentrated, many ISPs including BT)

How are the companies doing? Revenue, profitability, margins, ratios

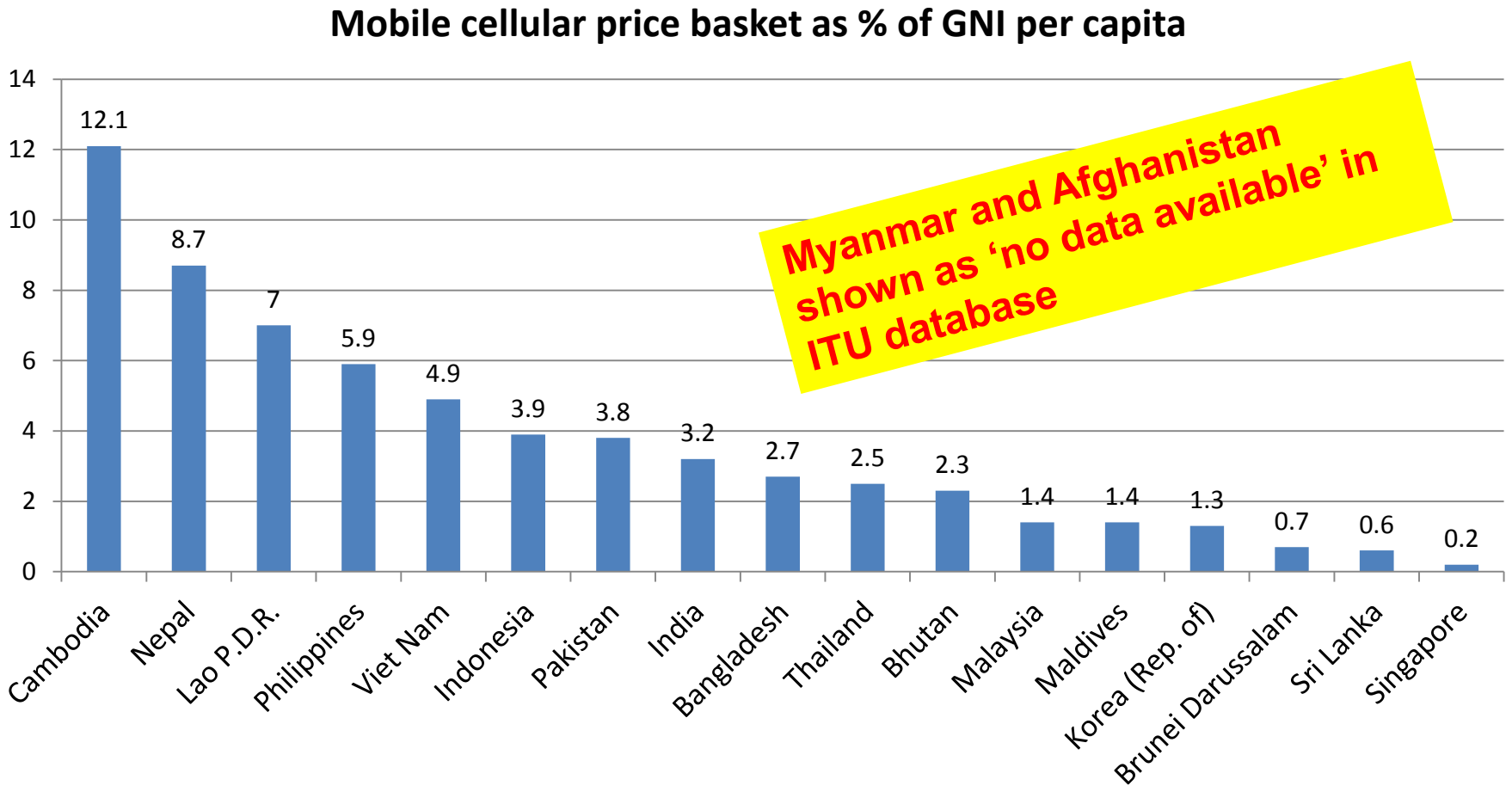
- For Int'l comparisons: EBITDA a good indicator
  - Tax: varies by country
  - D : varies based on accounting rules (USGAAP vs. Europe vs. …)
  - I: varies by company (cost of capital)
- But tracking profits ~~→~~ regulate profits (more or less)

PRICE AND AFFORDABILITY INDICATORS

The ITU mobile baskets: a realistic method of price comparison

- Takes into account many types of costs consumers are likely take into account when selecting an operator
  - Connection charge, monthly charge, what's given "free" (i.e. X SMSs per month and Y minutes per month included in package), cost of additional SMS or Cost of Minute
  - AND their own consumption patterns (e.g. total minutes of calling per month, more friends on the same network therefore…)

Presented as % of GNI, to give a sense of affordability



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Source:ITU

Variations across operators, across countries. Defining an 'average basket' of consumption may loose rich diversity

- Regional variations
  - E.g., Average minutes of use in SAARC= 164; OECD = 119
  - A regional basket more meaningful?
- "Average users" vary even among regional neighbors
  - Philippines vs. other SE Asian countries
- Variations across operators possible
  - One operator in Sri Lanka follows BOP strategy: poor, pre-paid only, low MOU, low ARPU

QUALITY OF SERVICE INDICATORS

Many useful Indicators. But tread gently initially

- Telephony Quality
  - Waiting list for main fixed lines
  - Faults per 100 main (fixed lines) per year
  - Percentage of telephone faults cleared by the next working day
  - Call drop rates
  - Percentage of connections with good voice clarity
  - Call success rate

- Broadband Quality
  - Broadband download speed (kbps/Mbps)
  - Broadband upload speed (kbps/Mbps)
  - RTT (mili-second)- Round Trip Delay
  - Jitter (mili-second)
  - Packet- Loss (as a percentage)
  - Broadband availability (as a percentage %)

Many ways to measure BB Quality

- Operator measures :
  - Operators measures → Reports to regulator
  - Only within operator network
- Regulator measures (e.g. Sri Lanka)
  - Resource intensive
- Users measure, coordinated by regulator
  - UK: users volunteer (using SamKnows hardware)
- Users measure, coordinated by third party
  - Arica: volunteers measure, upload to website
  - [previously, by LIRNEasia] Sri Lanka: volunteers download software measure, upload to website

OTHER DATA YOU NEED FOR GOOD BENCHMARKING

Mostly supplied by the National Statistics Office or equiv.

- Total Population of a country
- Number of households in a country
- Number of Urban vs. Rural Households
- Number of Urban vs. Rural population
- Average number of people per household
- GDP, GNI (from central bank or authoritative source)

STARTING POINT: PARTNERSHIP FOR MEASURING ICT FOR DEVELOPMENT

‘Core ICT Indicators’ list has definitions.

- All documents online
  - http://www.itu.int/en/ITU-D/Statistics/Pages/intlcoop/partnership/default.aspx
- Supply side : detailed definitions, ‘how to’ manuals
- Demand side: questionnaires, sampling and how to manuals (household surveys on ICT use)
- UN agencies + Private Sector + Civil Society
  - E.g. LIRNE*asia* multiple times as expert input (Broadband Quality of Service measurement, household ICT usage surveys)

ASK FOR DATA FROM OPERATORS. THEN WHAT?

First, see if you can/should ask for the full list..

- Find the balance between having perfect information and imposing undue cost/burden on operators
- Consultation process if appropriate
  - E.g. LIRNEasia workshop in Maldives
- Prioritized (minimum) set of indicators and roadmap
  - And way forward (e.g. ‘in 2 years, quality of service indicators’)

Then, decide on level of granularity you will report data….

- In a 2 player market, operators could be sensitive about certain data becoming public
  - Mostly, sensitive about certain data being available to competitors
  - E.g. certain revenue numbers
- But in a 4+ player market, less problematic

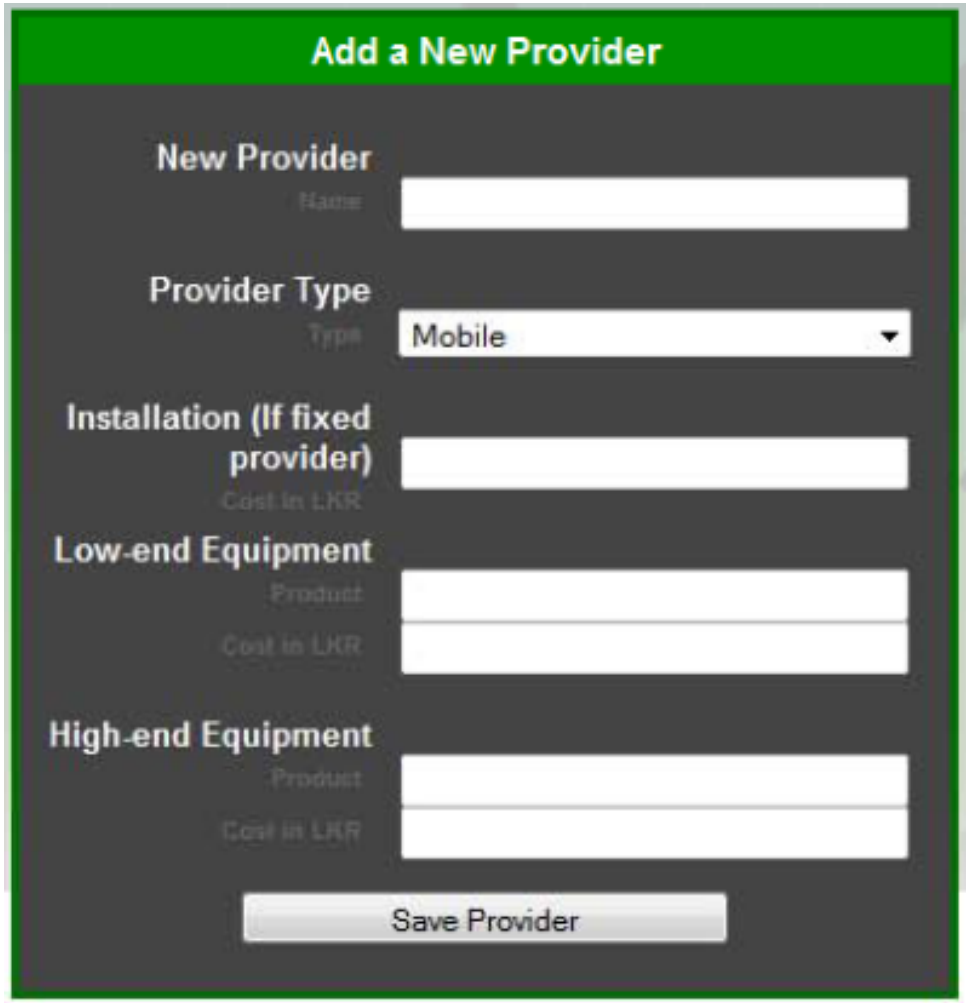
But after that, REPORT the data: WIDELY, FREELY and FREQUENTLY

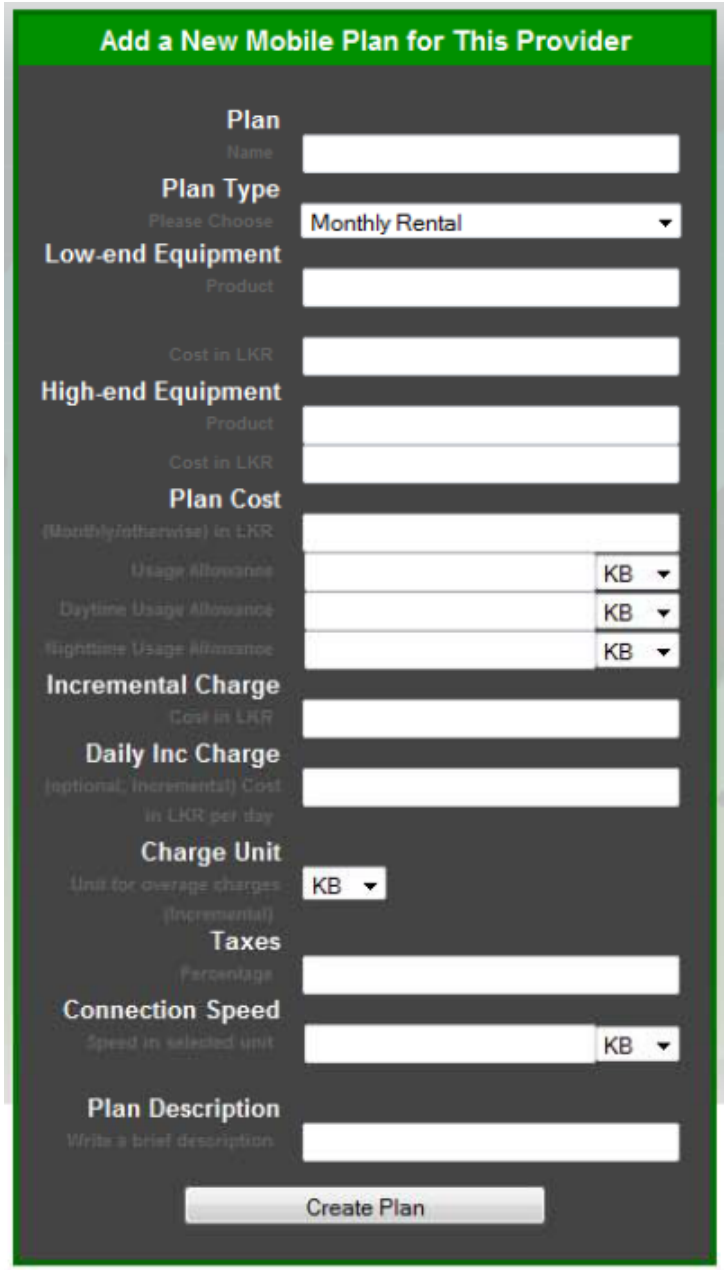
- Online if possible
- Be as accurate as possible in reporting ITU, others
  - Show you are no longer the bottom of the league tables
- If you don't give the right data
  - they will ignore MM (at best)
  - use inaccurate data to on MM (at worst)
- Because the benchmarking will continue, no matter what…

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

Make it useful for the users…tools, apps

- Soon, there WILL be more choice than users can make sense of
  - Multiple price plans by multiple operators
  - Difficult to compare for average user
- Create price comparison tool, put on your website
  - You populate it with data
  - Users insert their requirements use and software recommends best (cheapest) plan
- Get young software developers involved
- Use LIRNE*asia*'s free software for BB prices (developed in partnership with U of Michigan)
  - Being implemented in Bhutan, Mauritius


Add a New Provider
New Provider
Name
Provider Type
Type
Mobile
Installation (If fixed provider)
Cost in LKR
Low-end Equipment
Product
Cost in LKR
High-end Equipment
Product
Cost in LKR
Save Provider


Add a New Mobile Plan for This Provider
Plan
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Monthly Rental
Low-end Equipment
Product
Cost in LKR
High-end Equipment
Product
Cost in LKR
Plan Cost
(Monthly/otherwise) in LKR
Usage Allowance
KB
Daytime Usage Allowance
KB
Nighttime Usage Allowance
KB
Incremental Charge
Cost in LKR
Daily Inc Charge
(optional, incremental) Cost in LKR per day
Charge Unit
Unit for overage charges (incremental)
KB
Taxes
Percentage
Connection Speed
Speed in selected unit
KB
Plan Description
Write a brief description
Create Plan

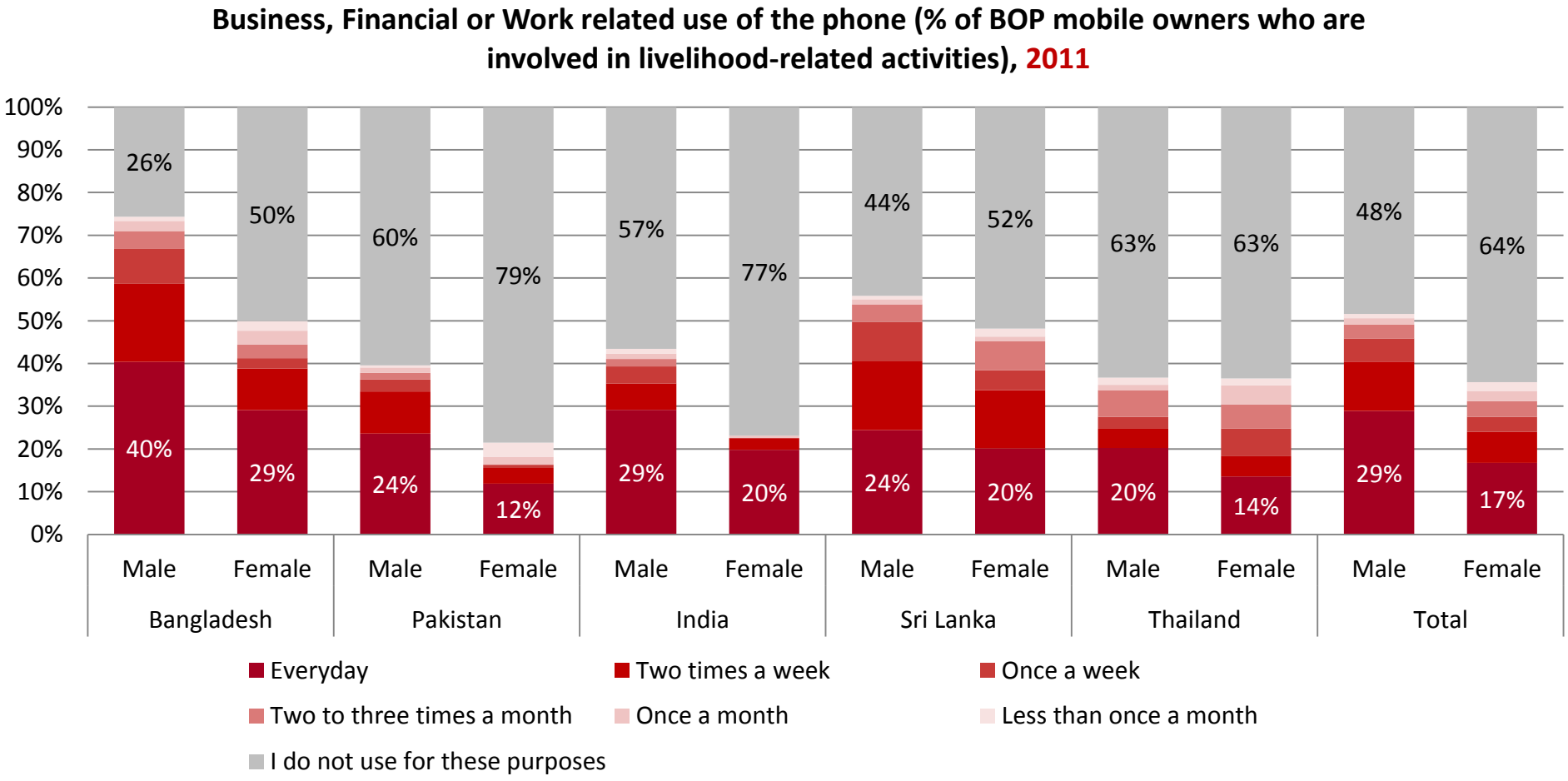
Type of search	Functions	Options
Default search	Graphs expenditures by usage level of the various plans available in a country	Country, equipment, provider type (mobile, fixed)
Custom usage search	Graphs expenditures for alternative plans that offer a user-specified data throughput	Usage level (custom, pre-defined), country, equipment, provider type
Custom usage search, country comparison	Graphs expenditures for different plans in US$, converted at the exchange rate	Usage level (custom, predefined), type of provider, plan (mobile, fixed), equipment
Comparison by speed	Graphs plans of the same download speed in different countries in US$	Usage level (custom, predefined), speed, country, equipment

START THINKING BEYOND SUPPLY SIDE DATA

Road to digital inclusion…

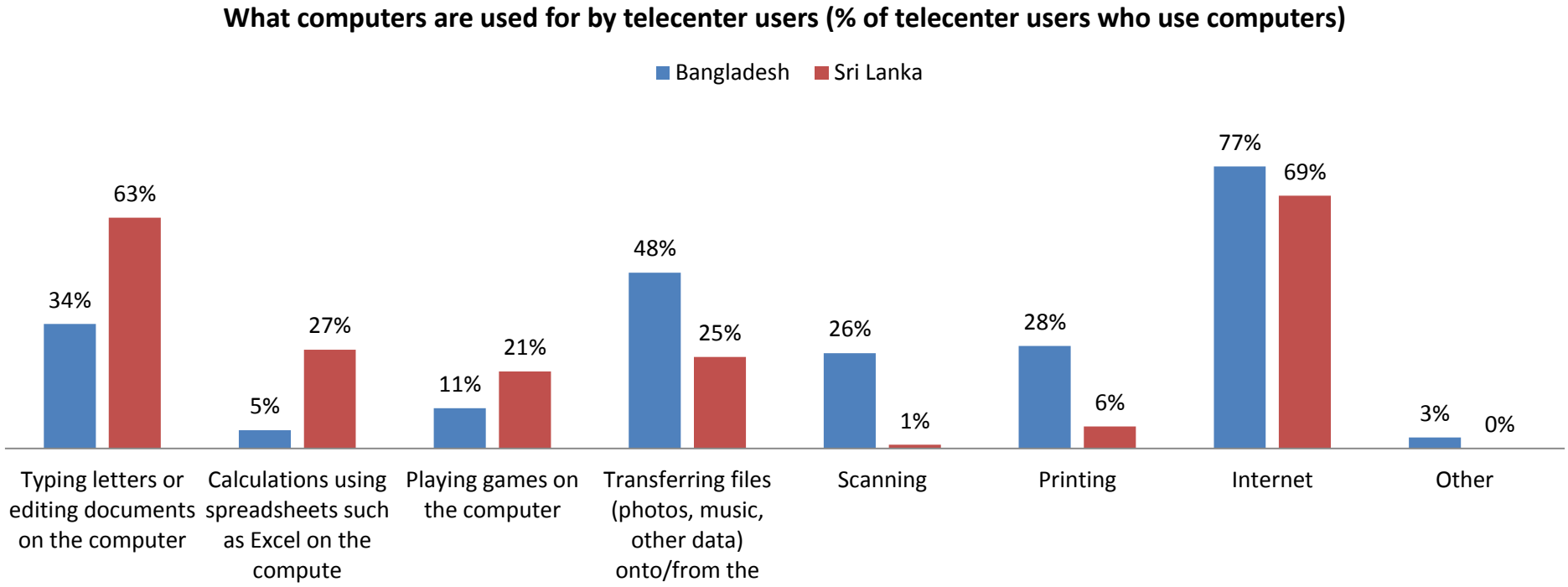
- Today: is there access? How much?
  - Basic voice, SMS, internet connectivity
  - Have or don't have (1 or 0)
- Tomorrow: How much access? Where? By whom?
  - How many hours of use?
  - At telecenters? At a home computers? On a mobile phone?
  - By women? By the youth? By the disabled?
- In the near future: what kind of digital participation?
  - To find employment? To do their business better? To keep in touch with friends/family? To access government services? To read the news?

Do people use their mobiles for work? E.g. from LIRNEasia survey of over 10,000 'poor' tele-users



Source: LIRNEasia Teleuse@BOP survey. Representative sample of SEC D and E tele-users. A tele-user = someone who has used a phone (to make/receive a call/SMS in the 3 months prior to the survey; SEC = socio-economic classification, based on the job and education level of head of household. Detailed methodology and results at http://lirneasia.net/projects/2008-2010/bop-teleuse-3/

What do people do at public access centers? E.g. from LIRNEasia survey poor people living within 5km of telecenters



- Biggest uses of the Internet are:
  - BD - Watching movies, TV, music, etc; email; voice/chat (e.g., Skype); social networking
  - LK - Education/learning; voice/chat (e.g., Skype)

Source: Delivering Public Services to the Bottom of the Pyramid: Different modes for different folk. LIRNEasia, 2013. World Bank project ID 7162586

From supply side only → Supply + Demand-side

- Today: data from operators is 'easily' accessible
- But prepare yourself to collect traditional demand-side data
  - User surveys are expensive; if you can afford it, great.
  - Can you insert just 1 question (or short module) into your census?
- Emerging: the combination of deep supply side data mining, combined with small user studies
  - Big data
  - Beyond telecom to other sectors (roads; govt services)
  - Tread with caution

THANK YOU

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