

Working with supply side data in telecom

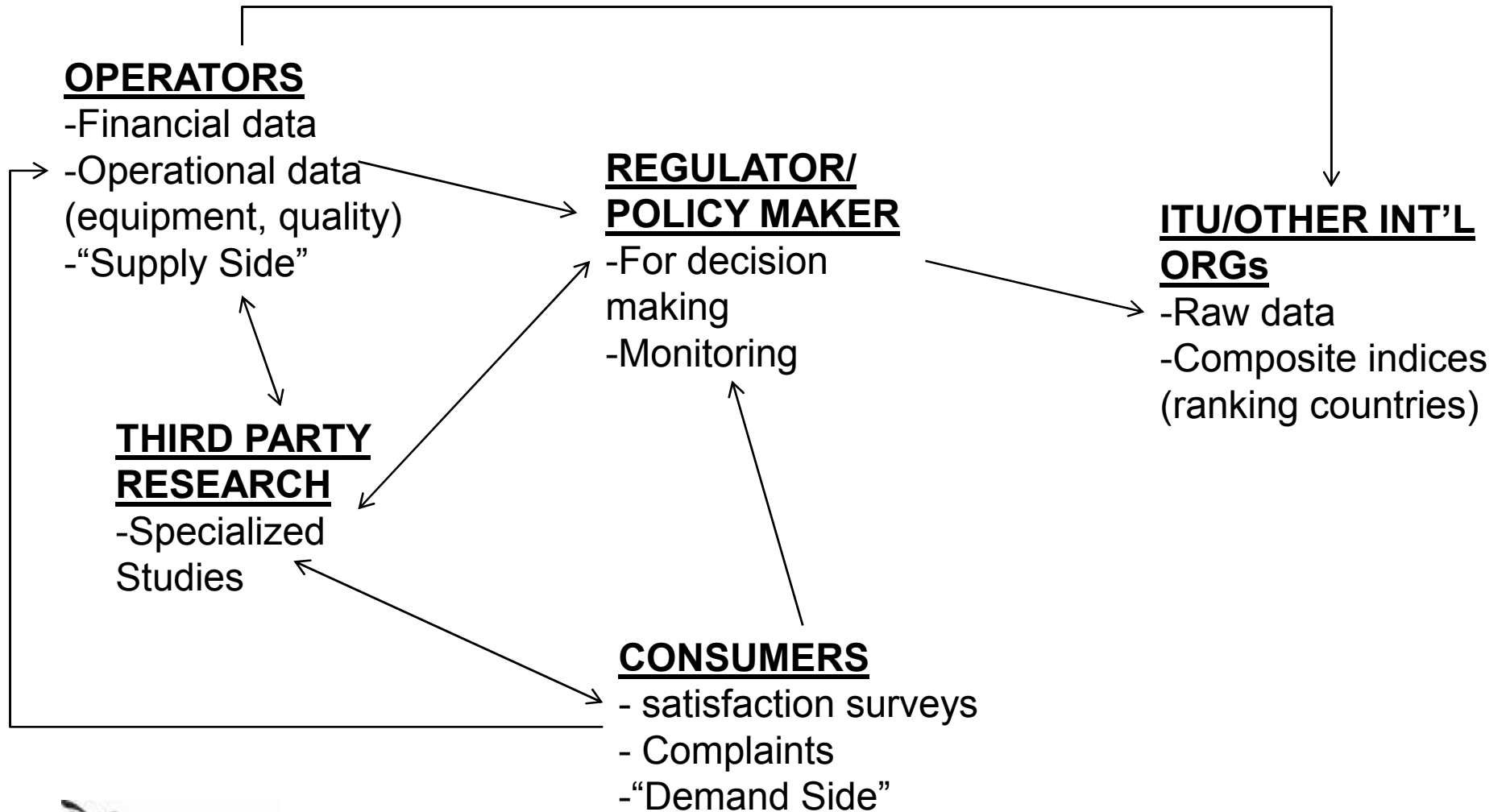
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CPR*south* 4 Tutorials
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5-6 Dec 2009



What are "supply side" indicators/data?

- Data about the SUPPLIERS of ICT services and those who work with them
 - Telecom operators, equipment manufacturers,...
- Collected and reported by SUPPLIERS themselves or regulators/policy makers, researchers, consultants
- Might be produced by those who work with them or regulate them
 - Telecom operators
 - Equipment manufacturers
 - Regulators
- As opposed to "demand side" indicators/data
 - About CONSUMERS of ICT services

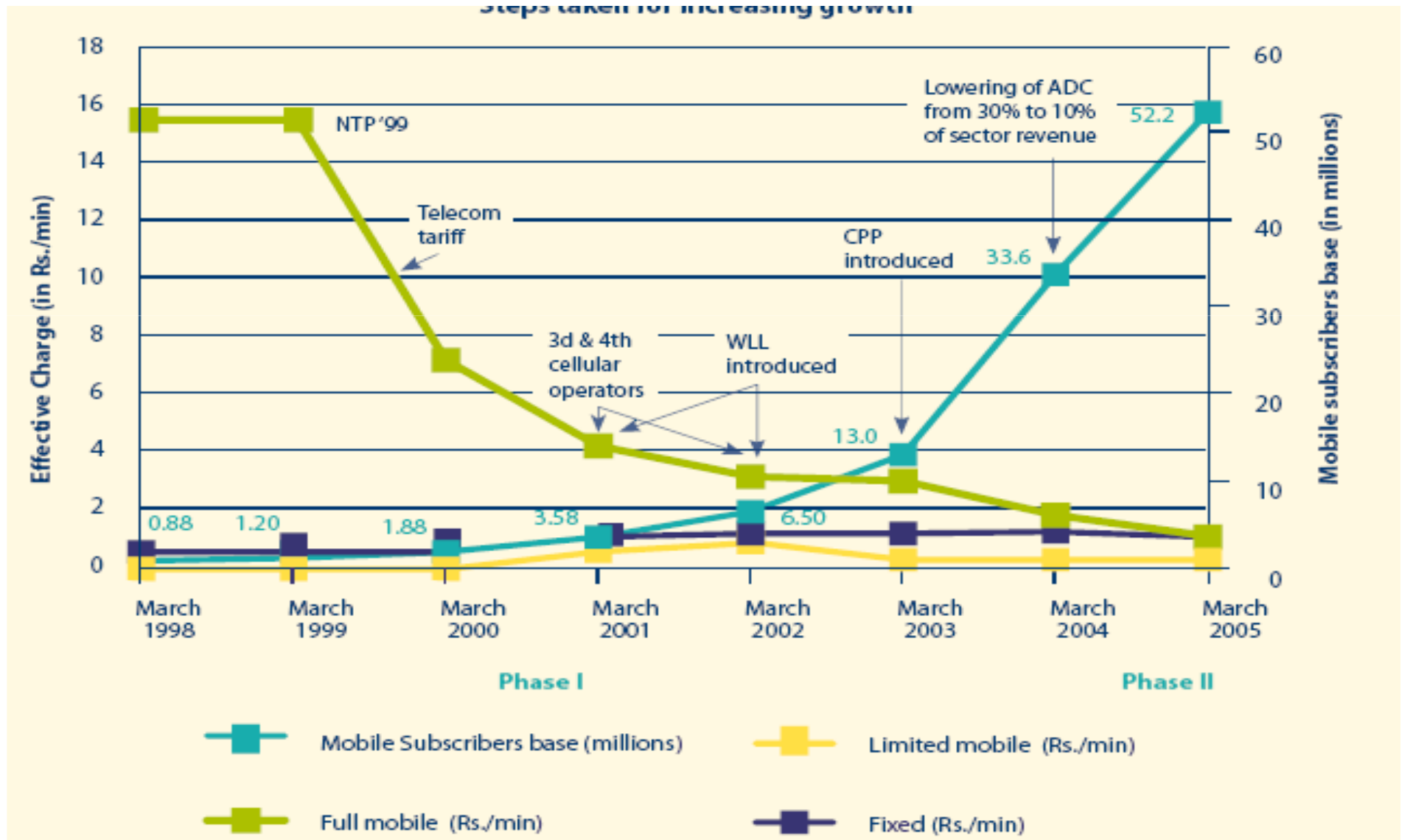
Where does data about the ICT sector come from?



There is a lot of supply side data – e.g. ITU collects and reports mainly supply side data

Series Name					
1	% automatic main lines	36	Internet subscribers (Dial-up)	71	Population of largest city
2	% digital main lines	37	Internet subscribers (Total broadband)	72	Price of a 3-minute fixed telephone local call (off-peak rate)
3	% female Internet users	38	Internet subscribers (Total broadband) per 100 inhabitants	73	Price of a 3-minute fixed telephone local call (off-peak rate)
4	% of homes with a Personal Computer	39	Internet subscribers (Total)	74	Price of a 3-minute fixed telephone local call (peak rate - U
5	% of homes with Internet	40	Internet subscribers (Total) per 100 inhabitants	75	Price of a 3-minute fixed telephone local call (peak rate)
6	% of households with a radio	41	Internet users (estimated number)	76	Public pay phones
7	% of households with a telephone	42	Internet users per 100 inhabitants	77	Public pay phones per 1000 inhabitants
8	% of households with a television	43	ISDN Channels	78	Radio equipped households
9	% of main lines in urban areas	44	ISDN subscribers	79	Radio sets
10	% of telephone faults cleared by next working day	45	Main telephone lines (fixed lines) in operation	80	Residential monthly telephone subscription
11	% residential main lines	46	Main telephone lines (fixed lines) per 100 inhabitants	81	Residential monthly telephone subscription (US\$)
12	Average annual exchange rate per US\$	47	Main telephone lines in largest city	82	Residential telephone connection charge
13	Business telephone connection charge	48	Mobile cellular - price of 3-minute local call (off-peak - US\$)	83	Residential telephone connection charge (US\$)
14	Business telephone connection charge (US\$)	49	Mobile cellular - price of 3-minute local call (off-peak)	84	Revenue from fixed telephone service
15	Business telephone monthly subscription	50	Mobile cellular - price of 3-minute local call (peak - US\$)	85	Revenue from fixed telephone service (US\$)
16	Business telephone monthly subscription (US\$)	51	Mobile cellular - price of 3-minute local call (peak)	86	Revenue from mobile communication
17	Consumer price index (1995=100)	52	Mobile cellular connection charge	87	Revenue from mobile communication (US\$)
18	Coverage of population (%)	53	Mobile cellular connection charge (US\$)	88	Staff (female telecommunication staff)
19	Faults per 100 main lines per year	54	Mobile cellular monthly subscription	89	Staff (Total full-time telecommunications staff)
20	Fixed telephone service investment	55	Mobile cellular monthly subscription (US\$)	90	Telecommunication equipment (Export) (US\$)
21	Fixed telephone service investment (US\$)	56	Mobile cellular telephone subscribers - (Total)	91	Telecommunication equipment (Import) (US\$)
22	Gross domestic product (GDP) - local currency	57	Mobile cellular telephone subscribers - prepaid subscriber	92	Television equipped households
23	Gross domestic product (GDP) (US\$)	58	Mobile cellular telephone subscribers (Digital)	93	Television receivers
24	Gross Fixed Capital Formation (GFCF) - local currency	59	Mobile cellular telephone subscribers per 100 inhabitants	94	Television receivers per 100 inhabitants
25	Gross Fixed Capital Formation (GFCF) (US\$)	60	Mobile communication investment	95	Television subscribers (cable)
26	Home satellite antennas	61	Mobile communication investment (US\$)	96	Total annual investment in telecom
27	Households	62	Mobile communications staff	97	Total annual investment in telecom (US\$)
28	International incoming telephone traffic (calls)	63	Number of local telephone (calls)	98	Total capacity of local public switching exchanges
29	International incoming telephone traffic (minutes)	64	Number of local telephone (minutes)	99	Total national telephone traffic (calls)
30	International Internet Bandwidth (Mbps)	65	Number of national long distance telephone (calls)	100	Total national telephone traffic (minutes)
31	International outgoing telephone traffic (calls)	66	Number of national long distance telephone (minutes)	101	Total revenue from all telecommunication services
32	International outgoing telephone traffic (minutes)	67	Personal computers	102	Total revenue from all telecommunication services (US\$)
33	International telephone circuits	68	Personal computers per 100 inhabitants	103	Total telephone subscribers (fixed + mobile)
34	Internet subscribers (Cable modem)	69	Population	104	Total telephone subscribers (fixed + mobile) per 100 inhab
35	Internet subscribers (Dial-up)	70	Population - Urban population (%)	105	Waiting list for main lines

The right data, presented well, can tell a great story (and help make decisions)

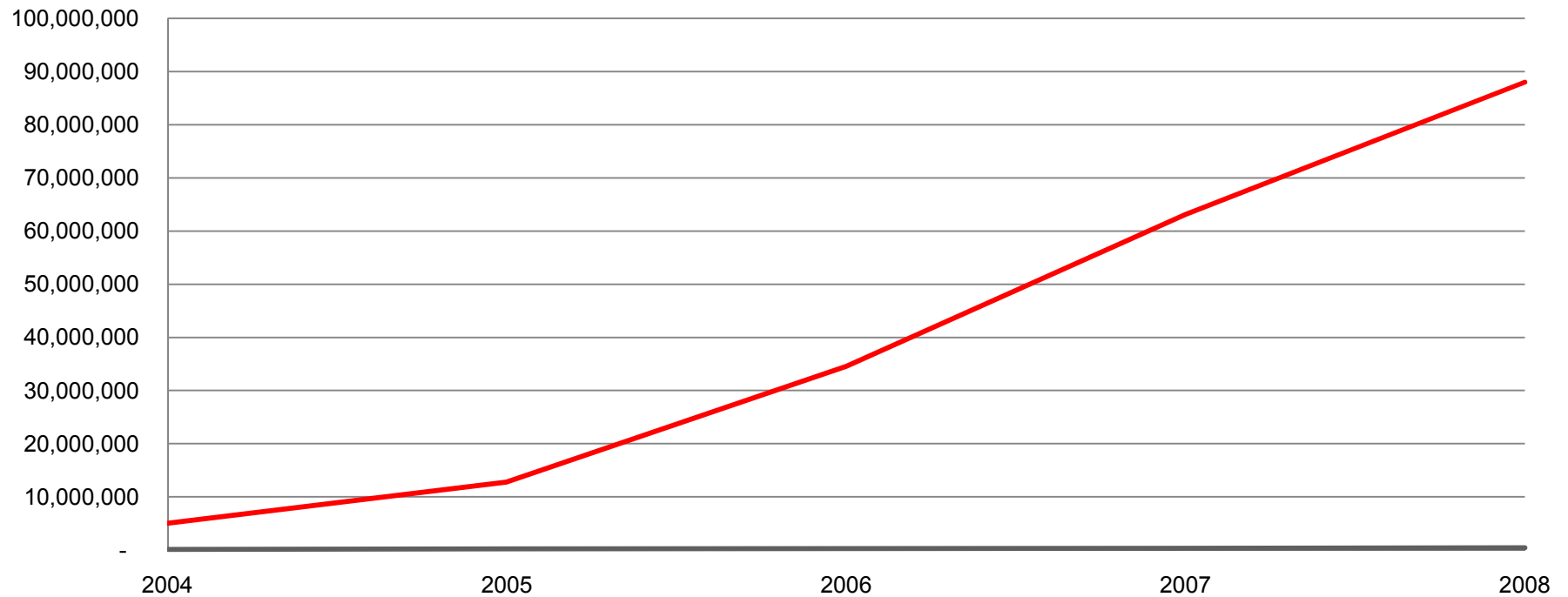


How do you know regulator reforms have been successful in your country?

- What are the goals of reform?
 - Increased access
 - Increased choice
 - Increased quality
 - Decreased prices
- Have these things happened?
 - How do you know?

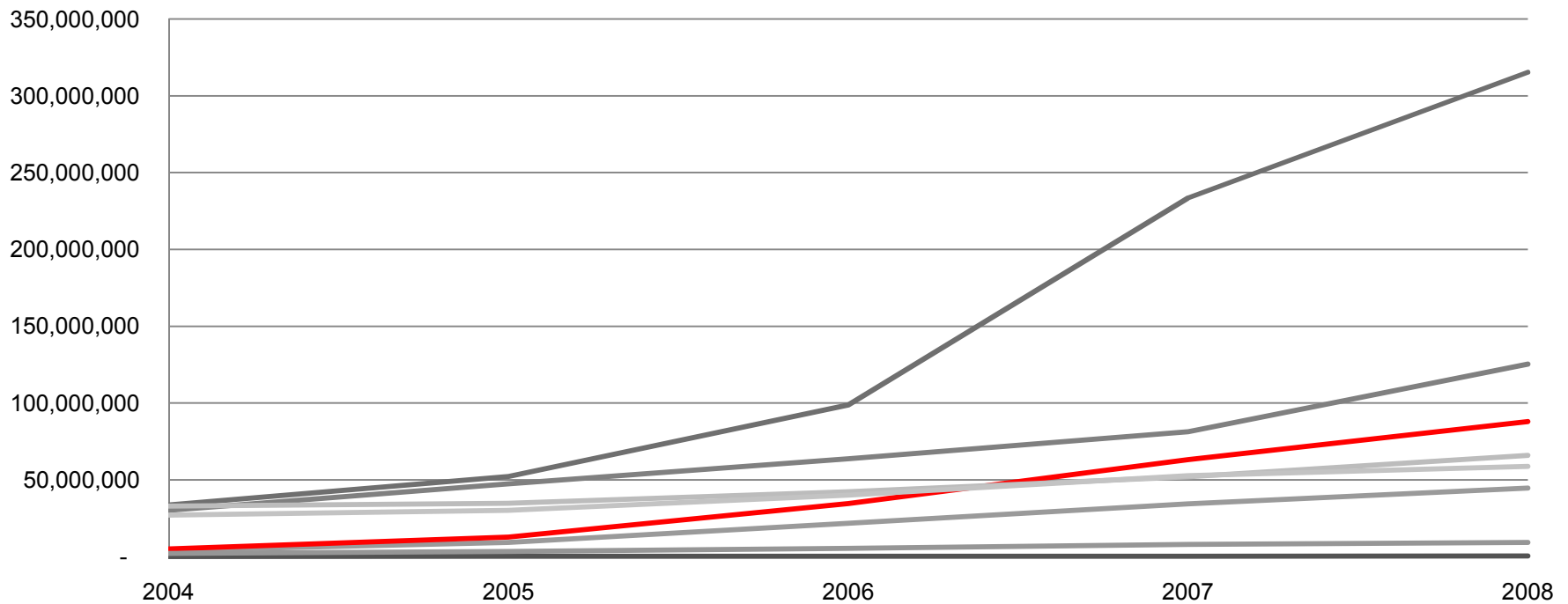
e.g. Is connectivity increasing? Look at access paths over time

Pakistan Mobile SIMs: 2004 - 2008



But you may think you are doing well, until you compare yourself with others

Mobile SIMs: 2004 - 2008

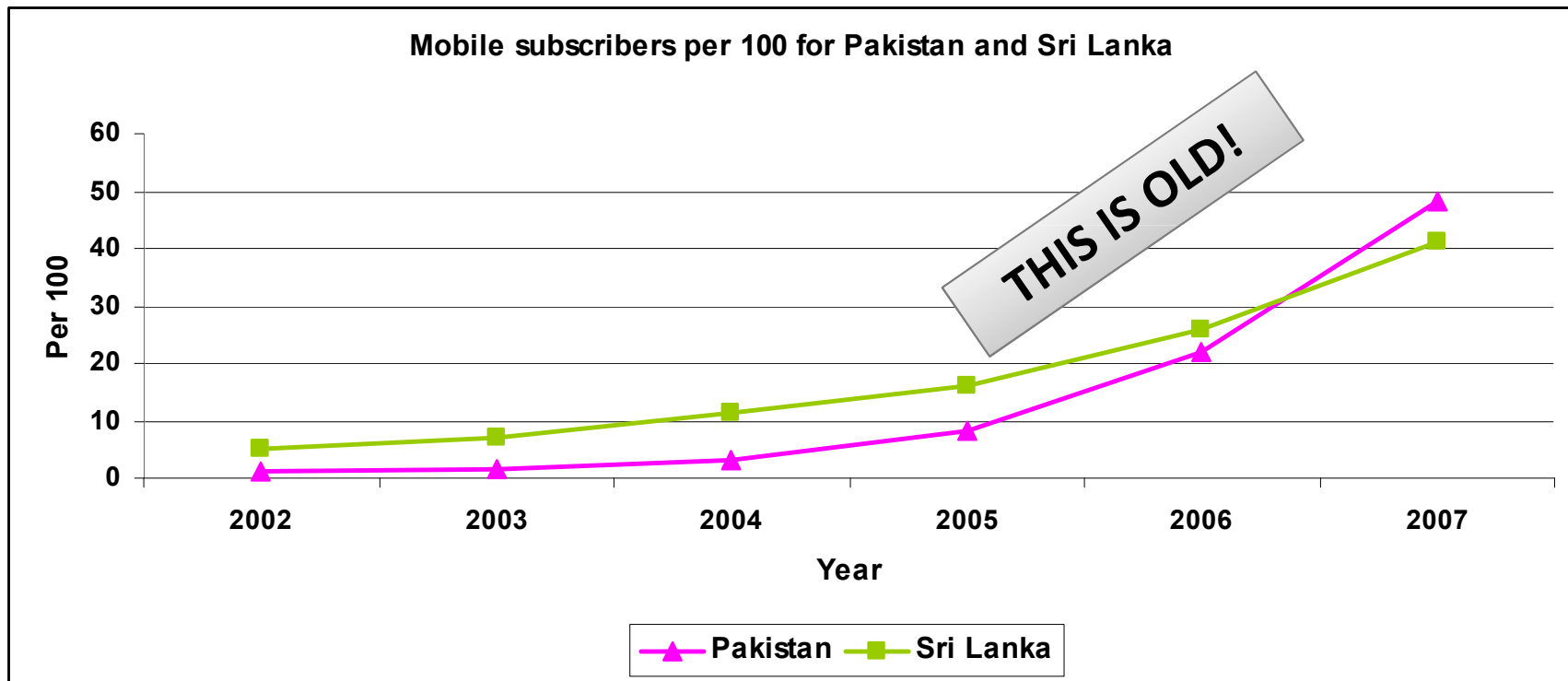


Maldives Bangladesh India Pakistan Indonesia Phillipines Sri Lanka Thailand

Benchmarking is an effective way to measure performance.

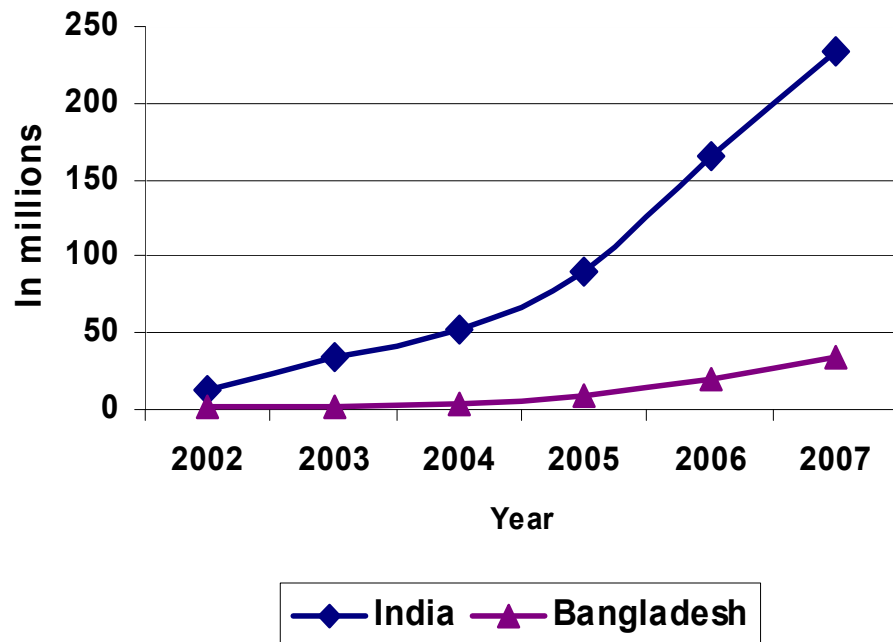
- Benchmark = target/goal to be achieved
 - Static : e.g., “aim to pass 75 fixed access paths per 100 people”
 - Moving: e.g., “aim to be below OECD average price” etc.
- Data: the primary requirement for good benchmarking
 - Comparable (same definition? same time period? same collection/sampling method?)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

Data change fast. The latest are needed.

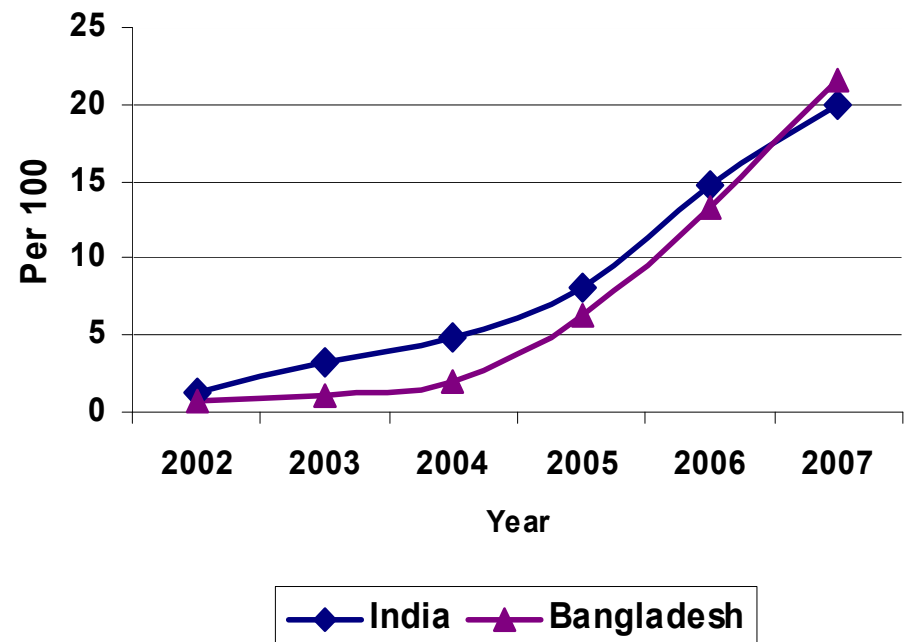


Different indicators can tell different stories. Right one for the purpose?

Total number of mobile subscribers in India and Bangladesh



Mobile subscribers per 100 in India and Bangladesh



Before you benchmark: are the data comparable? E.g. How do you reconcile different financial years?

- Many countries Jan – Dec (calendar year)
 - E.g., Sri Lanka
- But many others differ
 - India: Apr – Mar
 - Pakistan : Jul – June
- So “total fixed access paths in 2008” reported by IN not comparable the same for PK
- Having quarterly data eliminates problem to a great extent

Whose data do you use?

Year	# of internet subscribers (millions), India			Difference between...	
	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%

Some supply side indicators that you will use/need

In studying the telecommunications/telecom regulation

Connectivity Indicators

How many people are connected? Via what technology?

Useful Indicators to measure connectivity

FIXED

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

MOBILE

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

FIXED + MOBILE

- Number of telephone connections per 100 inhabitants

DIGITAL DIVIDE

- Number of urban telephone connections per 100 inhabitants

ICT

- Number of rural telephone connections per 100 inhabitants
- Total number of Internet connections
- Number of broadband Internet connections

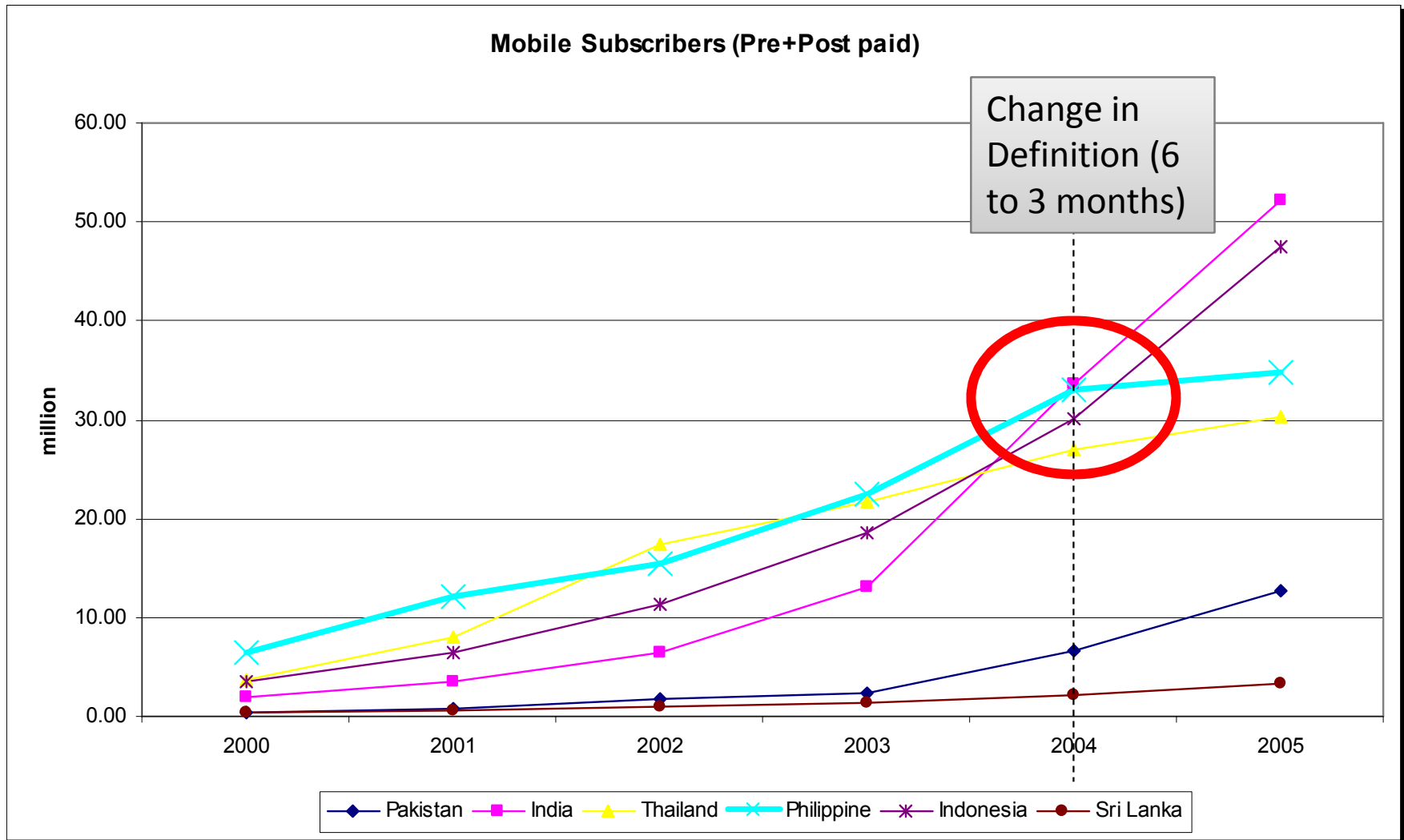
IN-COUNTRY ACCESS GROWTH

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

Are you counting mobile users? Subscribers? SIMs?

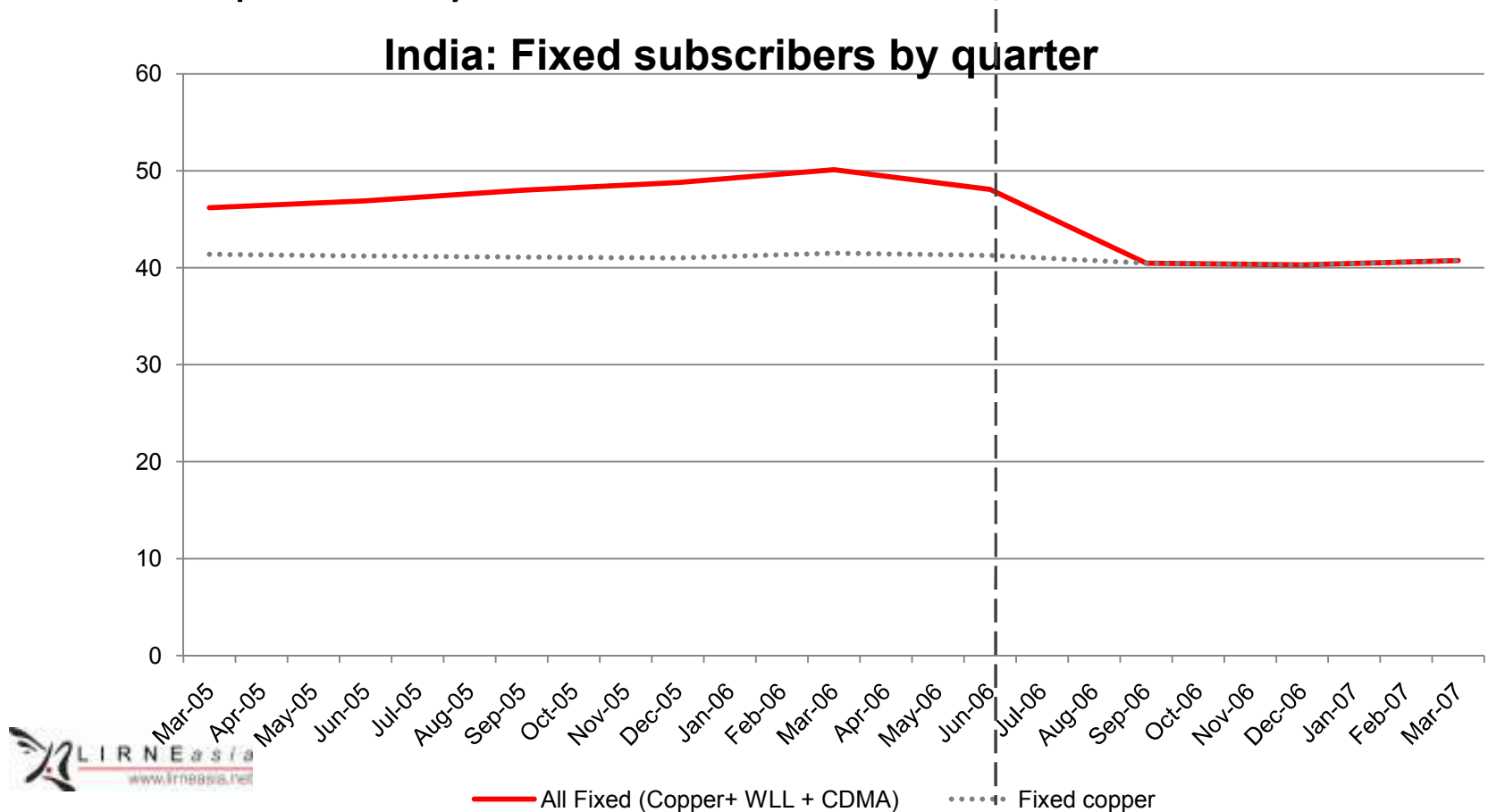
- One phone, used by many.
 - How do you users?
- One person, owning multiple SIM cards
 - How do you count subscribers?
- Nearly always, operators only count SIMs issued
 - Not number of people who are customers
 - Nor number of users of those SIMs
- Can we count subscribers?
 - Under strict SIM registration rules
- ITU has finally stopped saying user

Are the SIMs that are counted active? If not, how long have they being inactive?



Is WLL/CDMA fixed or mobile?

- ITU + many countries: fixed
- India: previously said fixed. Since Jun 2006 counts under mobile.



Do we know penetration by region?

- “120% mobile penetration in Delhi”
 - What does this mean?
 - How do we know?
- “Indian rural teledensity is ~15%”
 - SIM/subscriber debate
 - Fixed/mobile debate
 - Owning more than one phone/SIM debate

What are the incentives of those who are reporting data?

- India: amount of spectrum based on # of subscribers
 - Under/over report?

Economic Impact of Industry

How important is the telecom/ICT sector to the country? To foreign direct investment?
What about taxes?

Why do we care?

- Telecom growth sector in most countries
 - Often fastest growth
 - Significant foreign direct investment
 - Huge contributor to government tax
- To argue against policies that may make sector less attractive to investors and less affordable to consumers
 - E.g., sector-specific taxes on profits, customs duty on equipment

Useful indicators

- Total annual investment in the telecom sector
 - Investment into expansion of network services
 - Going towards public services (not private)
 - 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) into the sector
 - 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

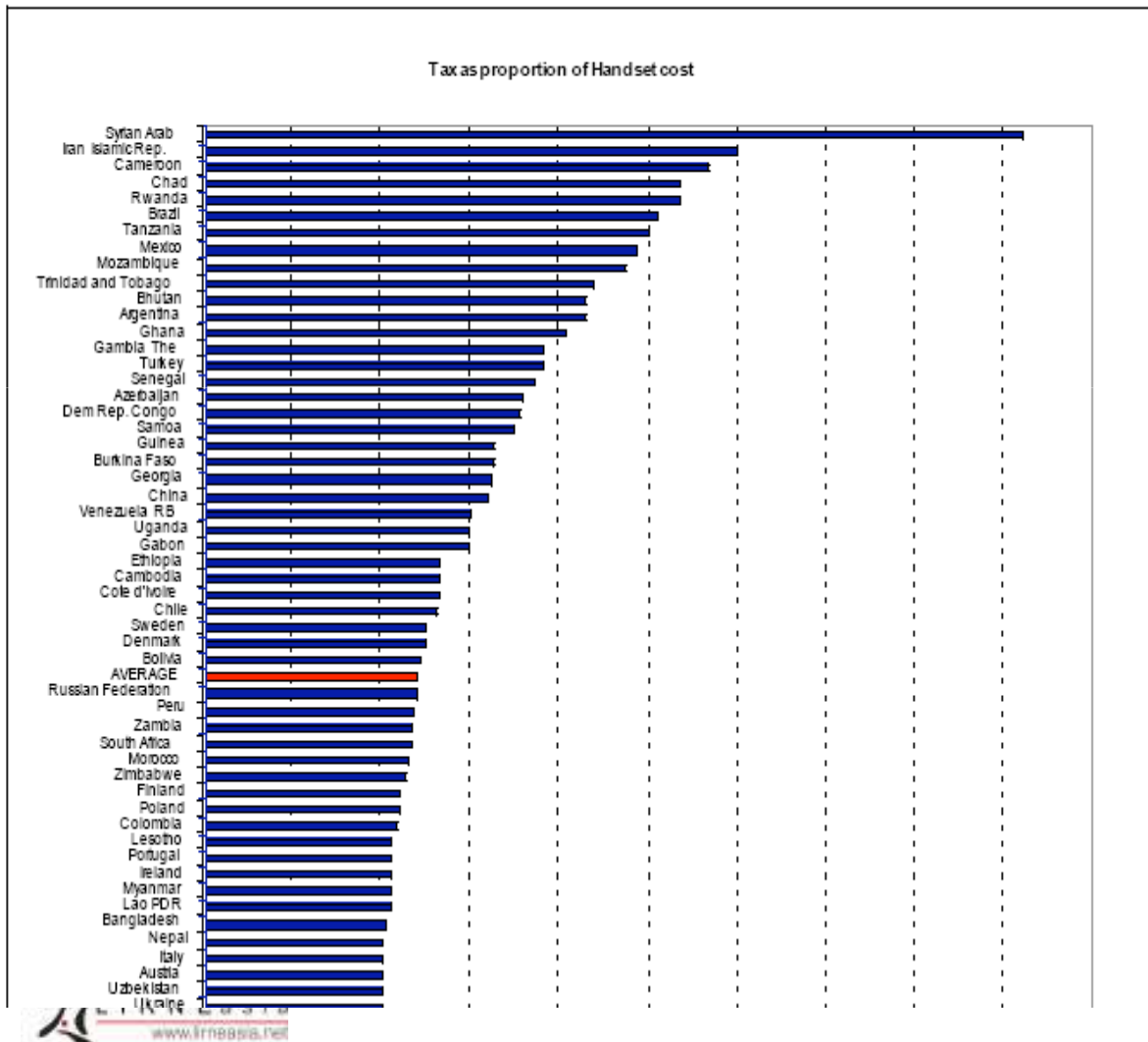
Telecom contributes significantly to government revenue

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

Understanding taxes on telecom is useful.....

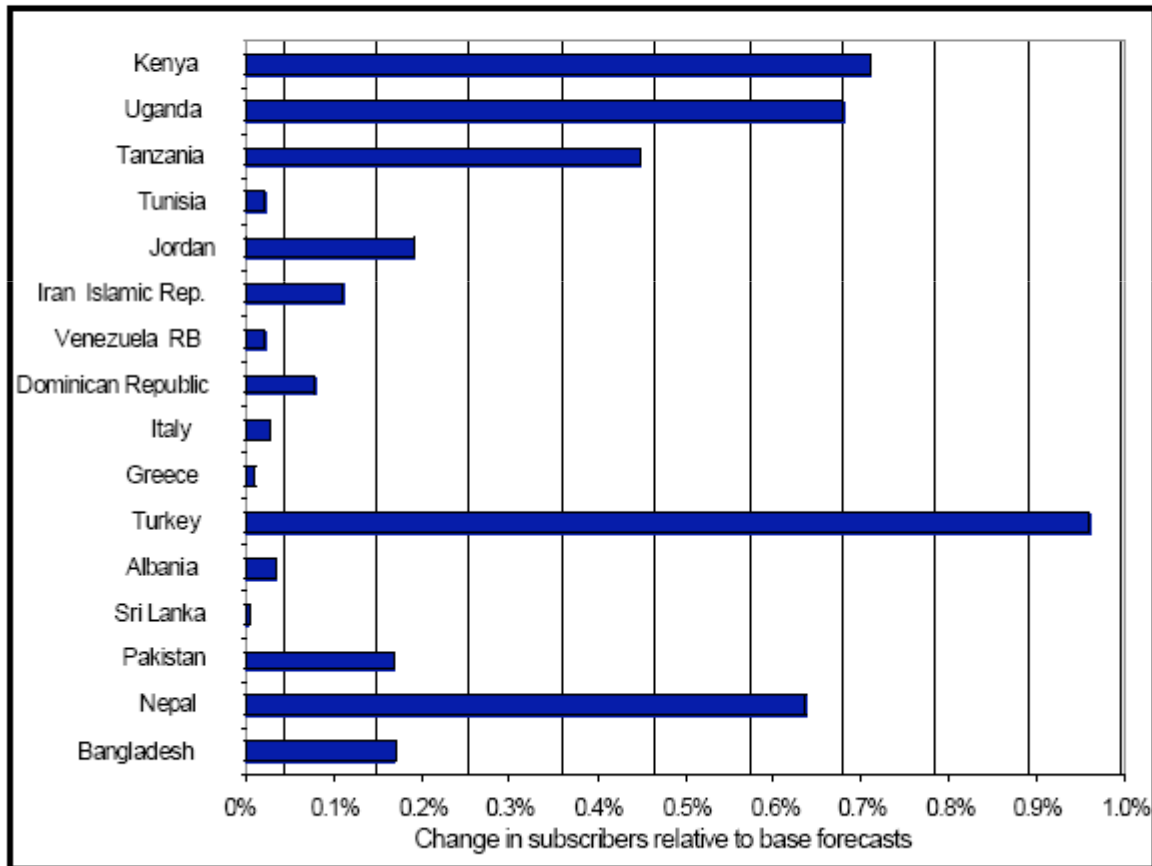
Figure 11: Tax as a percentage of handset cost



- As per GSM Association
 - 65% of African countries charge consumers above average taxes in cost of mobile ownership
 - 63% of African countries charge consumers above average taxes in Mobile Services cost
 - 50% of African countries charge consumers above average taxes in handset cost

..in order 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

But taxes and fees vary. Benchmarking requires in-depth understanding

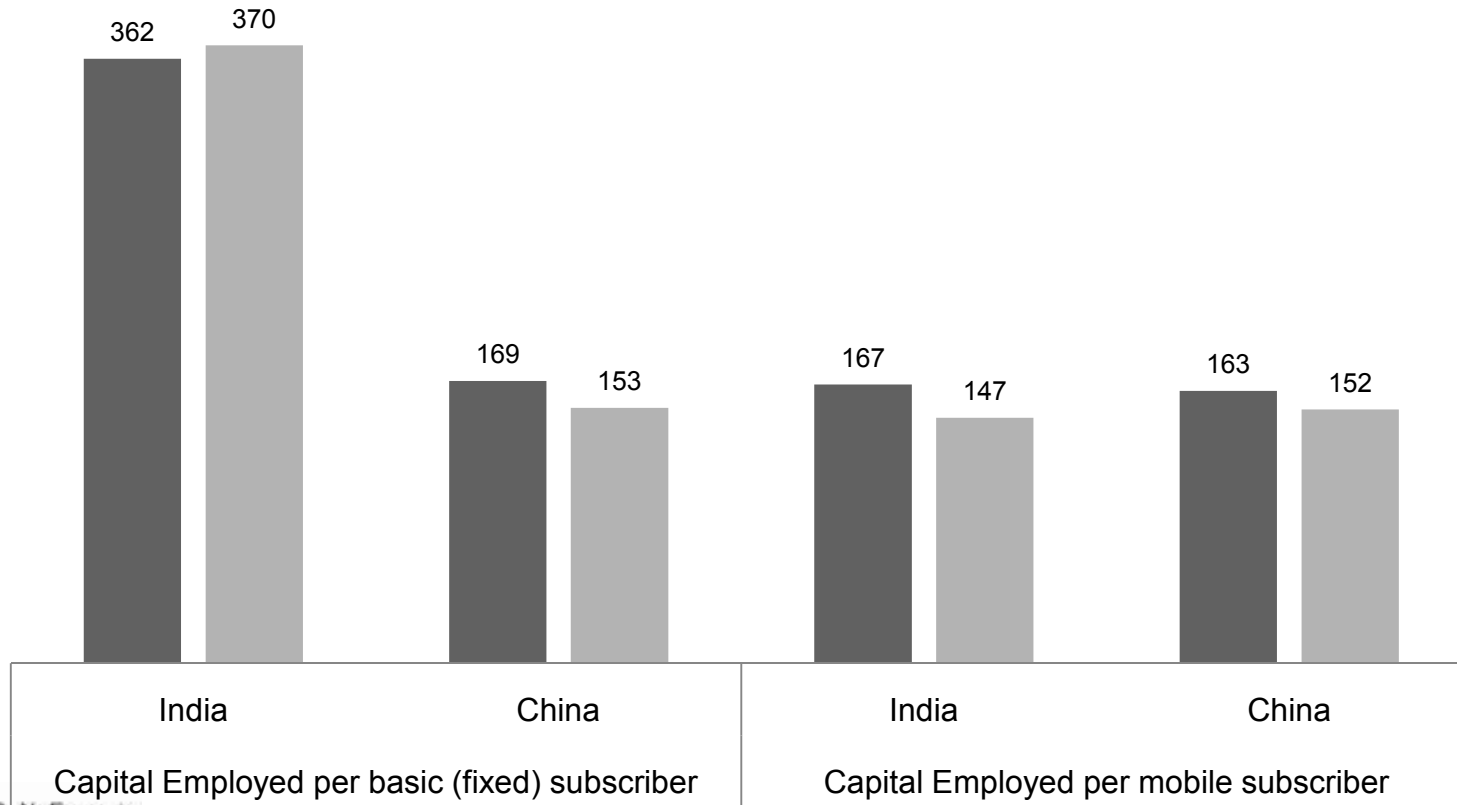
	Pakistan	Sri Lanka	China	India
<u>Regulatory charges</u>	<u>%age of revenue</u>	<u>%age</u>	<u>%age of revenue</u>	<u>%age of revenue</u>
Service Tax, GST	GST	VAT	3%	8%+ GST
License Fee	0.5% + 0.5% R&D	0.3% turnover (t.o.) + 1% of capital invested (inv)	Nil	5~10%
Spectrum Charge	Cost recovery	~ 1.1% of t.o.	~ 0.5%** (China Mobile)	2~6%*
USO	1.5%	Nil (only on ISD calls)	Nil	Incl In license fees
<u>Total Regulatory charges</u>	2.5% +GST+ cost recovery	=1.3% t.o.+1% inv+ VAT	~ 0.5 % + 3% (Tax)	15% ~ 24% + GST

Source: TRAI, 2005

Many other useful investment-related indicators..

Productivity of Capital, India vs. China

■ 2004 ■ 2005



Indicators to measure Industry structure

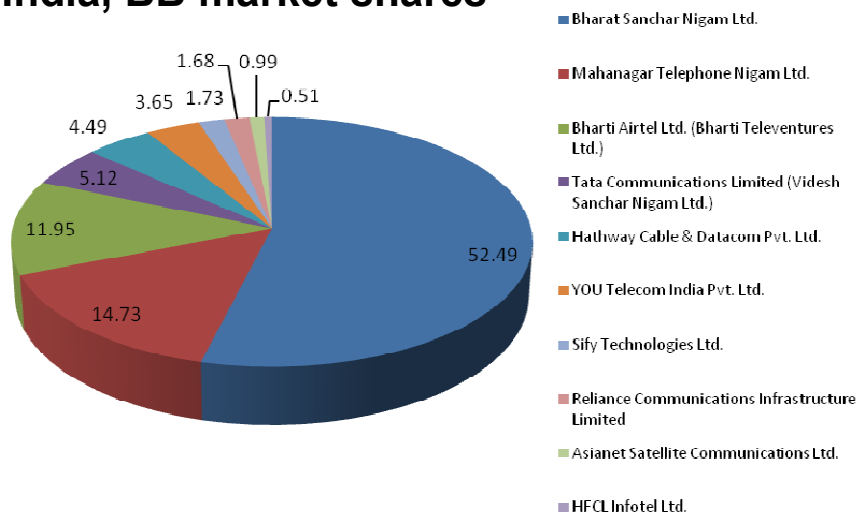
Is the industry getting more competitive? What are the bottlenecks in resources?

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?
- $HHI = (M_1)^2 + (M_2)^2 + (M_3)^2 + \dots + (M_n)^2$
- US Dept of Justice says...
 - Greater than 1800 → concentrated market
 - Between 1000-1800 moderately concentrated
 - Less than 1000, unconcentrated
 - M&A activity increasing HHI by 100+ and HHI > 1800 → automatic review (etc.)

Market shares and HHI by segment

India, BB market shares



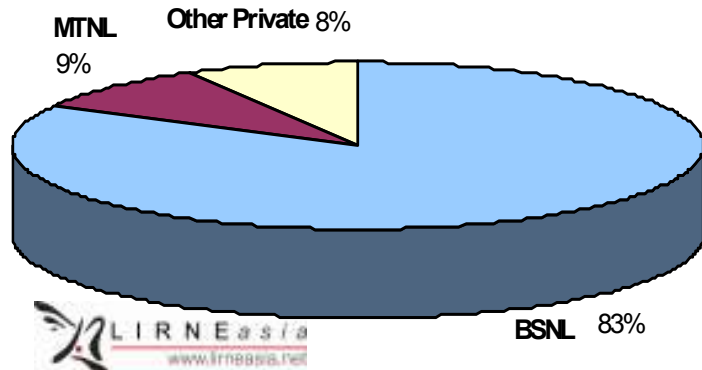
India, Mar 31 2008

- Mobile HHI = 1593

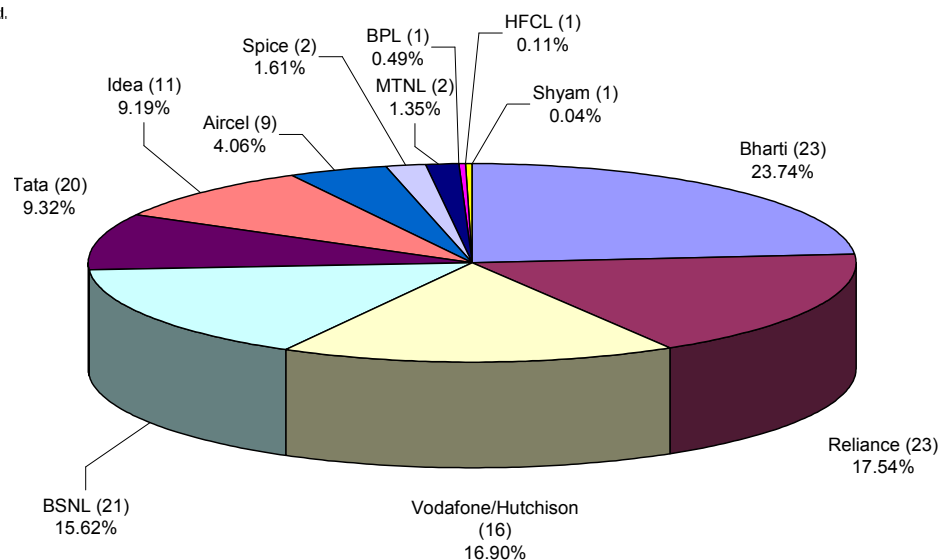
- BB HHI = 3171

- Fixed HHI = 7034

India, fixed market shares



India, mobile market shares

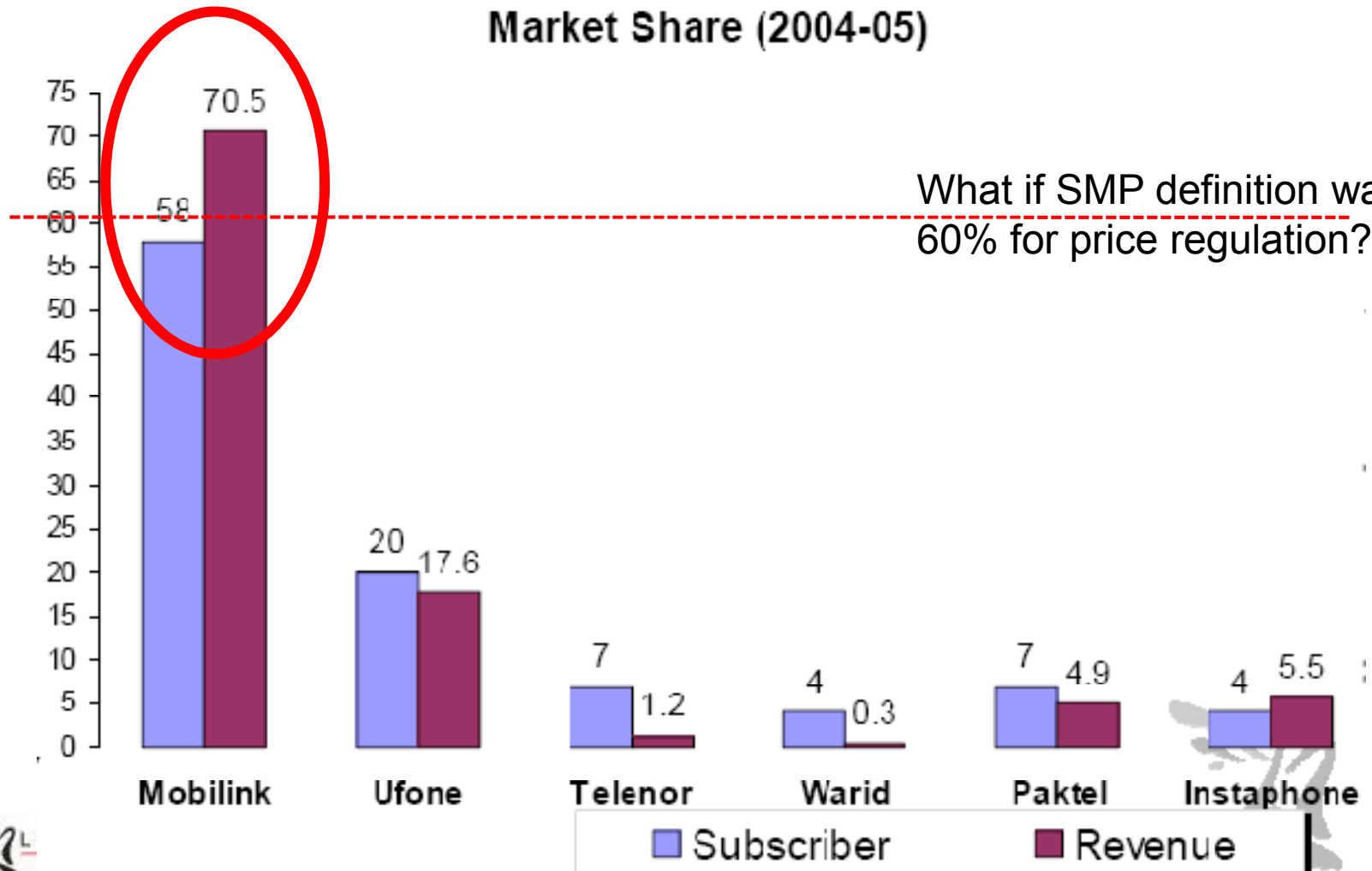


Important to operators, not just regulators.

- Investors look at company performance indicators
 - market share
- 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 share based on subscribers? Revenue? Minutes? Significant differences can be seen

Market Share (2004-05)



- You should look at all three, wherever possible
- Also, market segmented by wholesale vs. retail
 - E.g., Ofcom (UK) reports wholesale (BT dominated, HIGHLY concentrated) vs. retail (less concentrated)

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

- EBITDA primary profitability indicator for comparison purposes
 - Tax: varies by country
 - D : varies based on accounting rules (USGAAP vs. Europe vs. ...)
 - I: varies by company (cost of capital)
- But be careful of the impulse
 - tracking profits ~~→~~ regulate profits

Price and Affordability Indicators

Are prices coming down or going up? Are ICT services affordable? To all people?

The OECD mobile and fixed baskets: a realistic method of price comparison

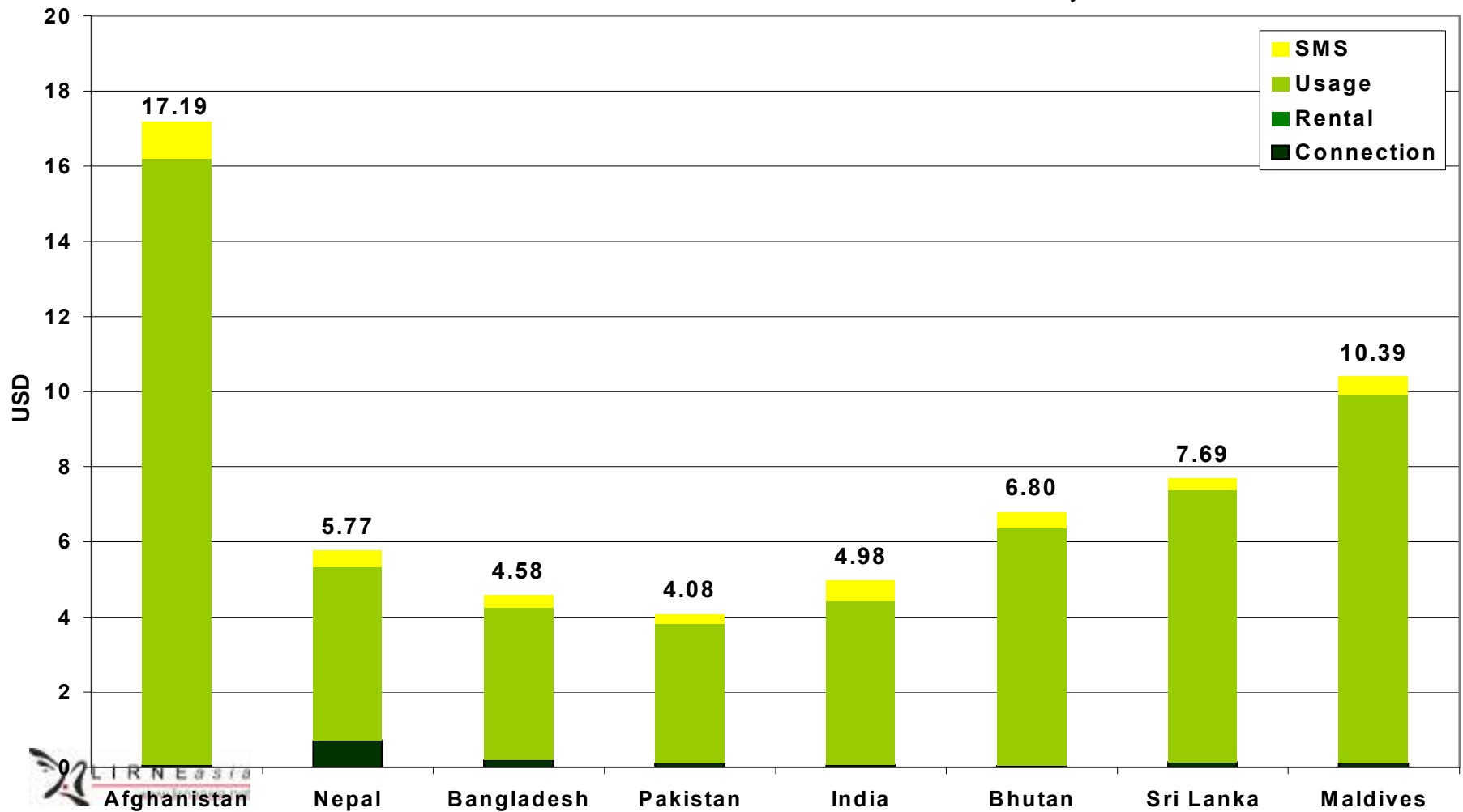
- ITU reported many micro-measures (till recently)
 - E.g., “price of a 3 minute on-net call”
- But in selecting an operator, consumers are likely to think about ALL costs
 - Connection charge, monthly charge, what’s given “free” (i.e. X SMSs per month and Y minutes per month included in package), cost 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...)
- The OECD includes basket many of the above and more (ITU finally agrees)

The OECD basket includes

- Average minutes used per month
- SMS per month
- MMS per month
- All above separated by
 - On-net vs. off-net
 - Peak vs. off-peak

Calculated for low, medium and high users

SAARC Countries Medium User Price Basket, Feb 2009

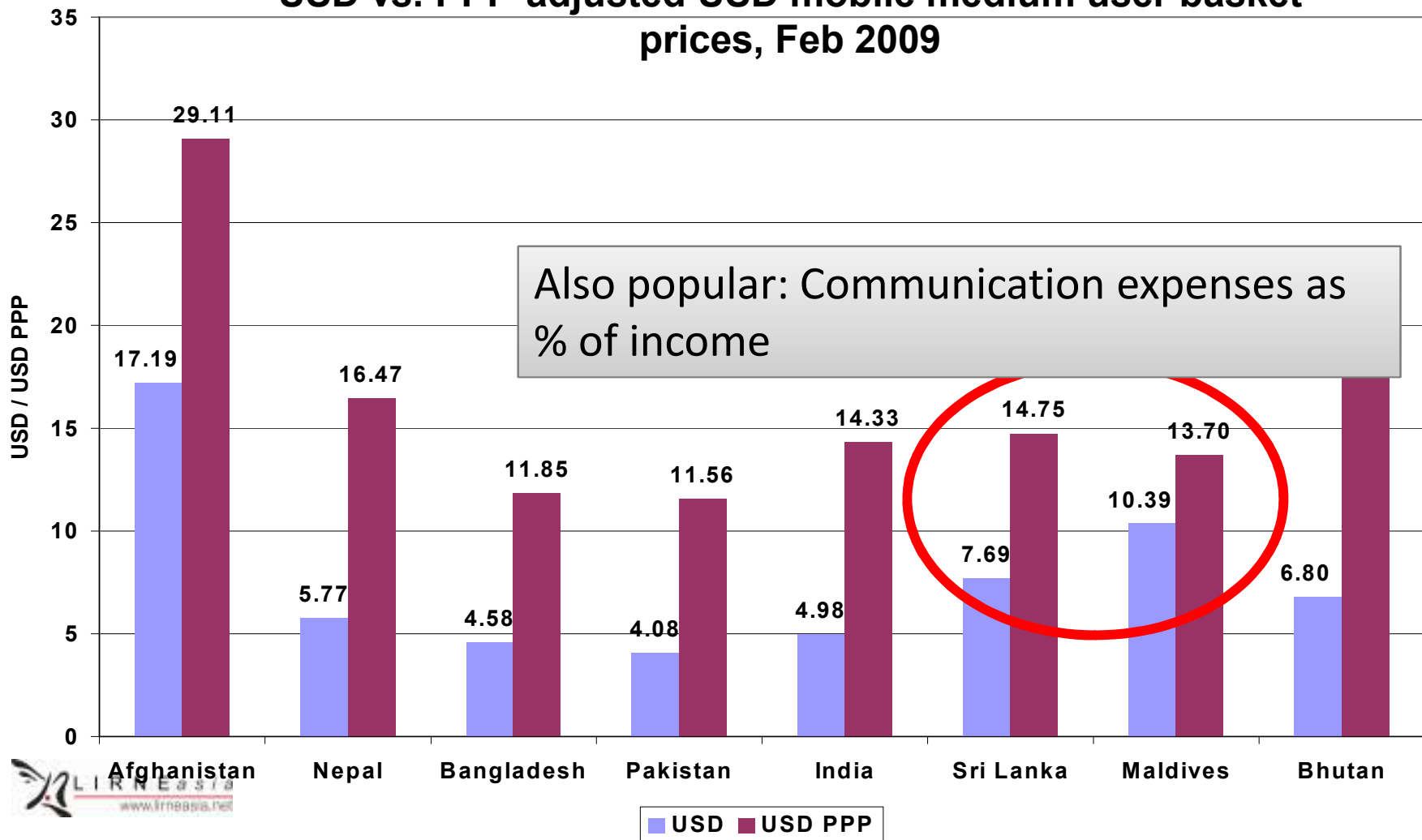


But not straightforward

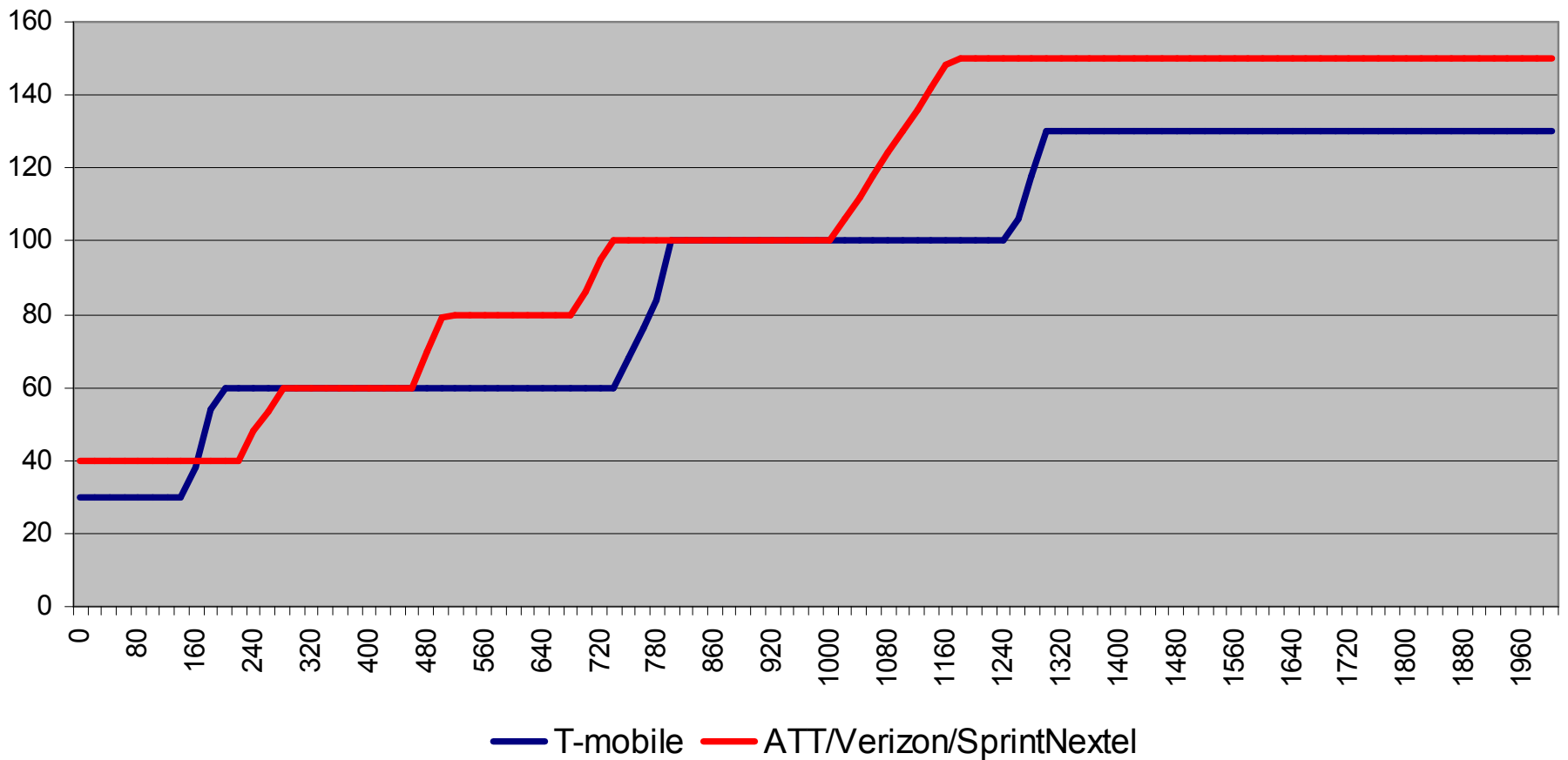
- Regional variations
 - E.g., Average minutes of use in SAARC= 164; OECD = 119
 - A regional basket more meaningful?
 - Or just stick to OECD
- “Average users” vary even among regional neighbors
 - Philippines vs. other SE Asian countries
- Not easy to get the data
 - Needs cooperation from operators
 - Best calculated by regulator

But price is not affordability. USD vs. PPP adjusted USD

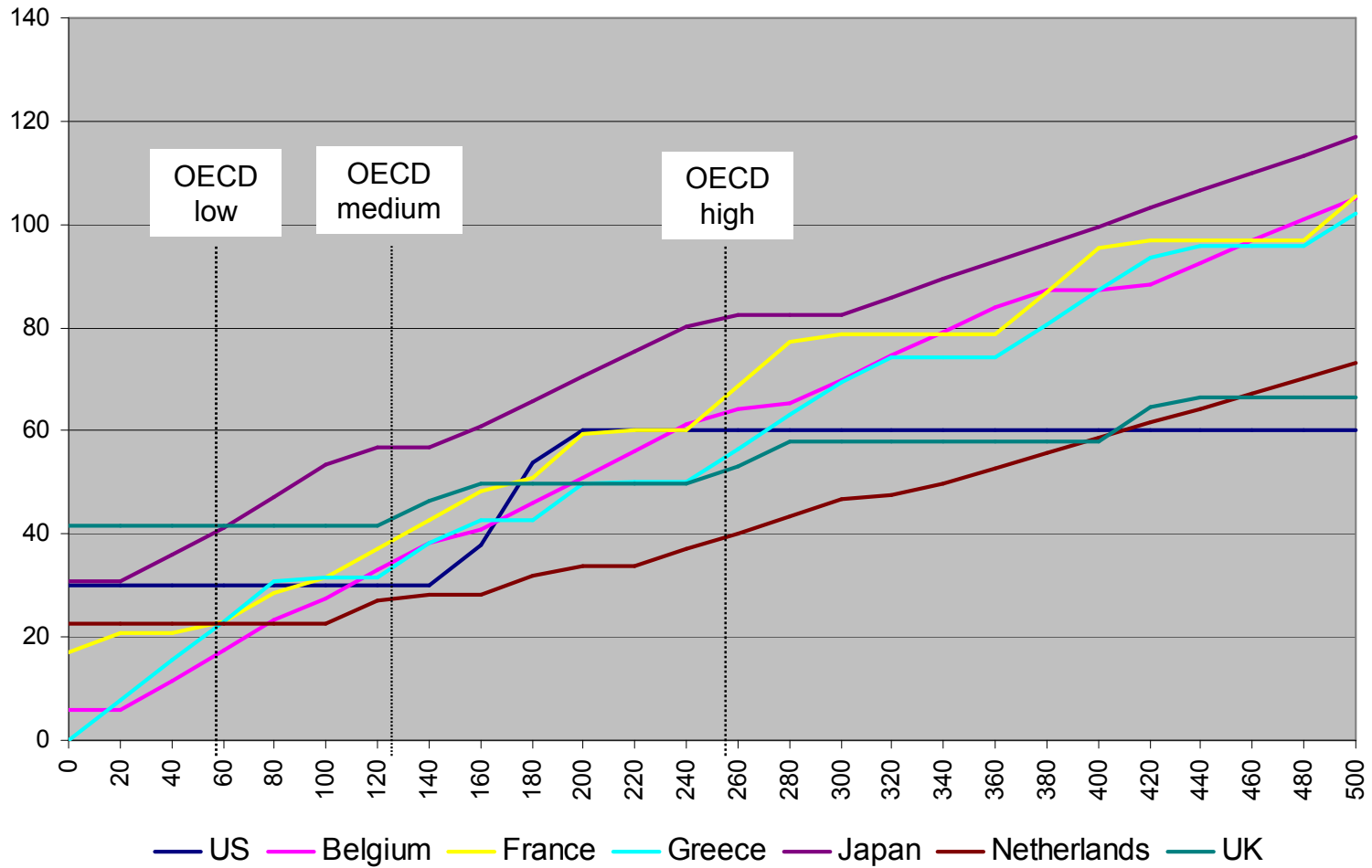
USD vs. PPP-adjusted USD mobile medium user basket prices, Feb 2009



Another Approach based on baskets: Lowest Cost Frontier (Michigan State; Bauer, Kim)

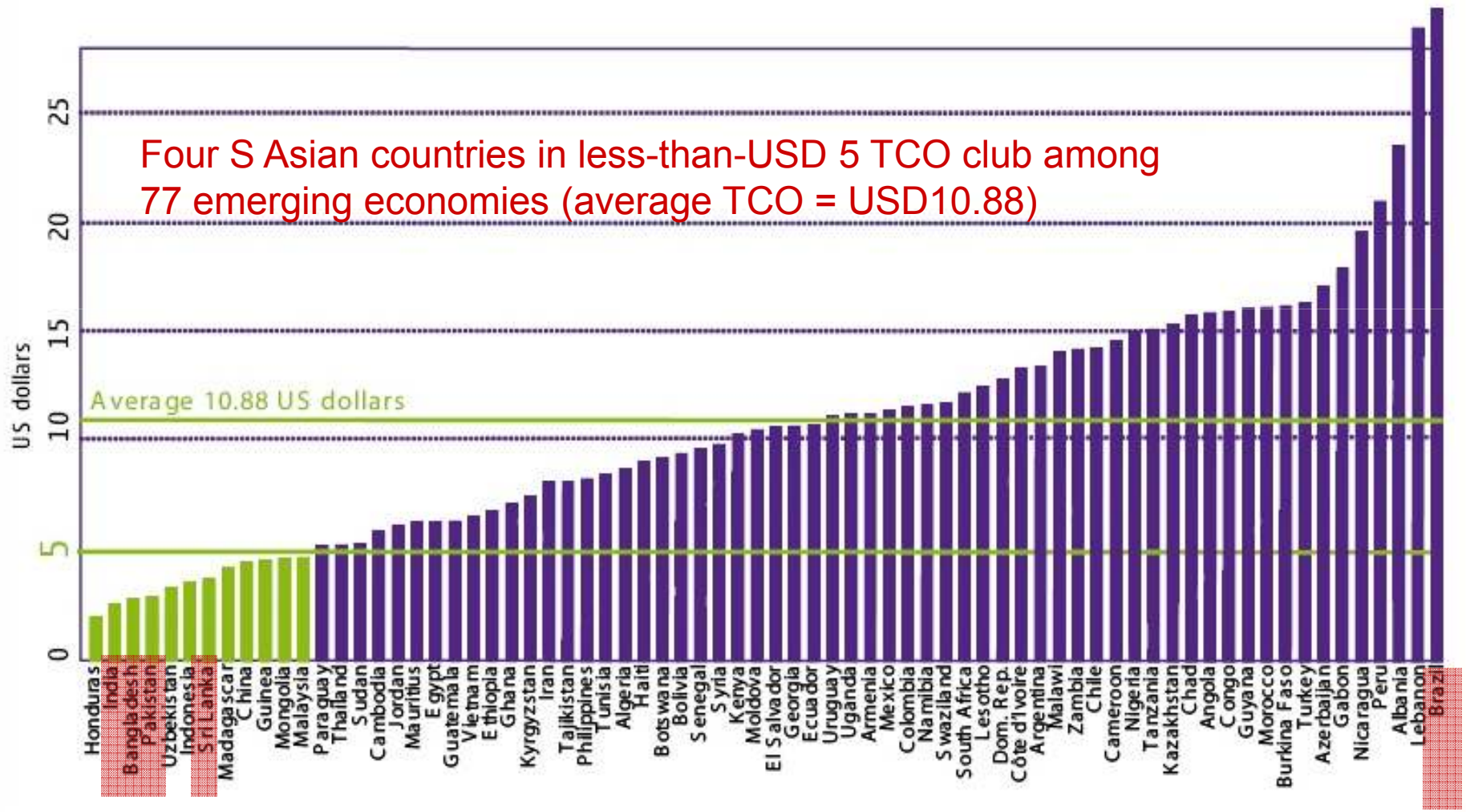


2007, cross country example



Total Cost of Ownership – includes not just usage, but handset prices (Nokia)

Monthly TCO by country



Source: Nokia Research 2009

What about other prices? E.g. BB, wholesale & retail?

Oct 2009

Table 1- Broadband Prices in Emerging Asia in USD²

Country ³	Annual cost, 2Mbps, 2km DPLC (tail cost)	Annual cost, 2Mbps, 100km DPLC ⁴	Annual cost, 2Mbps Broadband business connection (unlimited download)	Annual cost, 256kbps Broadband business connection (unlimited download)	Annual cost, 256kbps Broadband residential connection (unlimited download)	Price per GB, for 2Mbps, 5-10 GB data limit (Business)	Price per GB, for 256kbps, 5-10 GB data limit (Business)	Price per GB, for 256kbps, 1-4 GB data limit (Residential)	Price per GB, 1Mbps speed, 1GB data limit mobile internet	Value of 1 USD in local currency as at September 20, 2009 ⁵
South Asia										
Afghanistan	6	7	11,700 ⁸	4,200 ⁹	4,200 ¹⁰					50.10
Nepal	11	12	1,423 ¹³	230 ¹⁴	230 ¹⁵					78.43
Bangladesh	786 ¹⁶	3,502 ¹⁷		598 ¹⁸	256 ¹⁹					70.25
Pakistan	56 ²⁰	2,807 ²¹	289 ²²	116 ²³	116 ²⁴		3 ²⁵		2 ²⁶	83.11
India	348 ²⁷	3,607 ²⁸	899 ²⁹	147 ³⁰	147 ³¹	3 ³²		6 ³³	8 ³⁴	48.93
Sri Lanka	4,656 ³⁵									
Bhutan	999 ⁴²									
Maldives	15,865 ⁴⁶									
East Asia										
Philippines	392 ⁵⁶		753 ⁵⁷	250 ⁵⁸	199 ⁵⁹					47.82
Indonesia	3,025 ⁶⁰	8,520 ⁶¹		741 ⁶²		21 ⁶³		8 ⁶⁴	16 ⁶⁵	9718.17
Mongolia	(2880) ⁶⁶	(2880) ⁶⁷	5880 ⁶⁸	1200 ⁶⁹	1200 ⁷⁰				3 ⁷¹	1418.61

With 71 footnotes in the most recent publications we did

www.linacis.net

When comparing prices...

- Are installation charges included or not?
- Are taxes included?
- Are one-time/special discounts included?

Quality of Service

Useful Indicators

- 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 %)

But measured by users?

- Today QoS data gathered by:
 - operators → regulator (long time lag, questionable data?)
 - Regulator (costly, resource heavy)
- But user experience is what matters in the end
 - BB QoS approach of LIRNEasia (Nilusha, before lunch)
 - “*user driven regulation*”?

Composite Indices

- Many
 - ICT Opportunity Index
 - Network readiness index etc
- Different methodologies
- Examine individual indicators with the same care
- Question the weights (or how the final figure is arrived at)
 - Makes sense? Why not a different way?

Other basic data you need

Mostly supplied by the NSO

- 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 (often from central bank or authoritative source)
- Gross National Income

**What demand-side data doesn't tell
us**

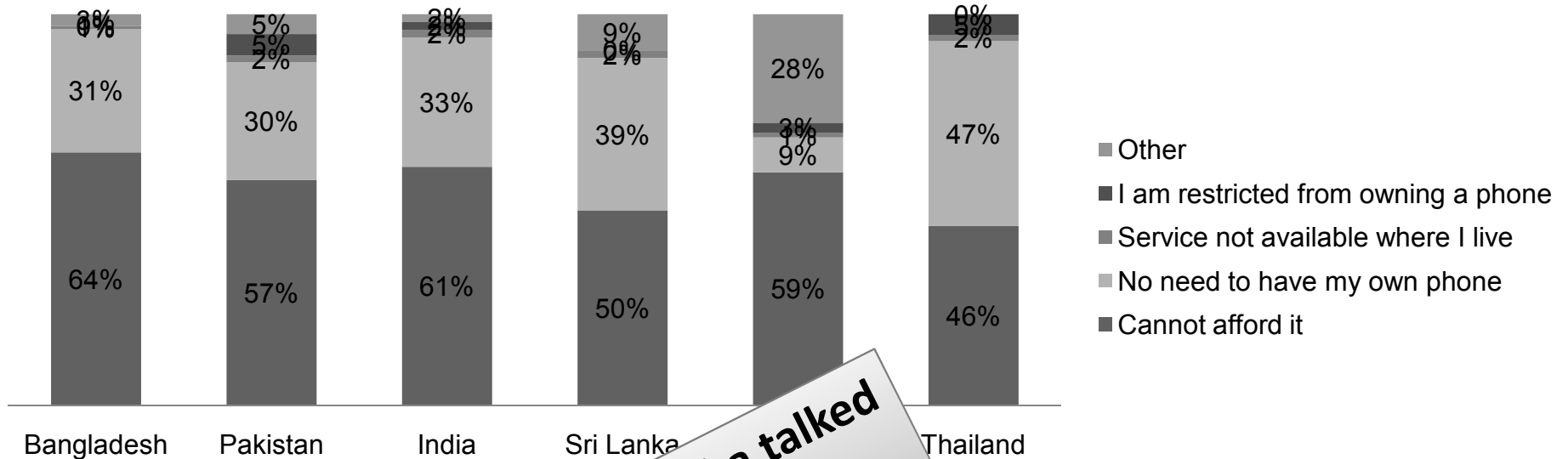
We already know some answers

- We don't know how many people USE phones
 - (we only know how many SIMs are sold)
- We don't know how many people USE computers or the internet
 - we only know how many internet connections are sold
 - With AMAZING customs control, the # of computers
- **Most important – We don't know why (or why not) they are using ICTs, how they use it, where, or for what?**

All the stuff Harsha talked about

Why don't people own a phone? Answers from demand-side survey of the BOP

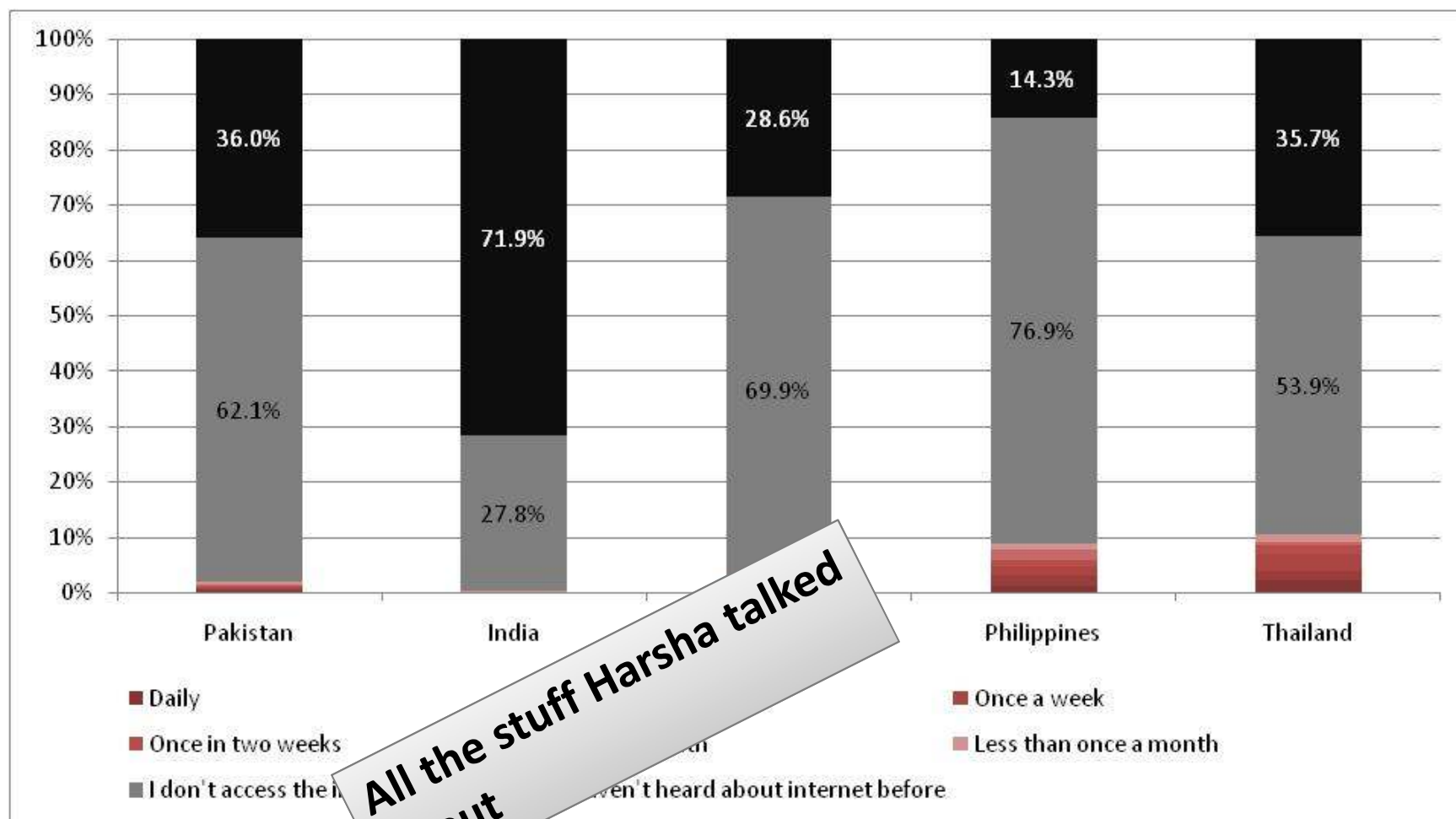
Primary reason for not owning a phone (% of BOP non-owner teleusers)



- Just 2% say that service not available where they live → not an issue

All the stuff Harsha talked about

Are the poor using the Internet? Answers from the demand side survey of the BOP



Concluding thoughts

Supply side data tells you a lot. But don't take it at face value

- Question **EVERYTHING**
 - Definition of the indicator
 - Data collection method
 - Who is reporting the data
- Definitions not standardized
 - care when comparing countries and operators
- Where possible, triangulate with demand side data
- Finally: Question **EVERYTHING**