How the developing world may participate in the global Internet Economy: Innovation driven by competition*

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Executive Summary

Full participation in the global Internet Economy requires electronic connectivity of considerable complexity. Today, due to a worldwide wave of liberalization and technological and business innovations in the mobile space, much of the world is electronically connected, albeit not at the levels that would fully support participation in the global Internet Economy. Yet, many millions of poor people are engaging in tasks normally associated with the Internet such as information retrieval, payments and remote computing using relatively simple mobiles. Understanding the business model that enabled impressive gains in voice connectivity as well as the beginnings of more-than-voice applications over mobiles is important not only because widespread broadband access among the poor is likely to be achieved by extending this model but because it would be the basis of coherent and efficacious policy and regulatory responses.

This report demonstrates that voice connectivity was achieved for a majority of the world's people, including substantial numbers of the poor, because governments removed or lowered barriers to participation in the supply of telecom services and created conditions somewhat conducive to competition, even if less than perfect. This was the necessary condition. Where multiple suppliers existed, intense competition, the critical step of implementing the budget telecom network model, occurred. The radically lower prices attracted more minutes of use, which in turn made further reductions possible. Operators were able to load their networks with high volumes of revenue-yielding minutes because they had succeeded in reducing the transaction costs of dealing with low-volume customers. Prepaid, which accommodates the needs of those with irregular earning patterns was also a critical element. Along with these business process innovations, the exponents of the budget telecom network model also succeeded in drastically reducing costs, especially opex. The new model makes ARPU [Average Revenue per User] irrelevant because what really matters is how many revenue-yielding minutes are carried on the network, not how much money is earned from a customer. In the same way that Ryan Air and Air Asia make profits while conventional airlines lose money, budget telecom networks make more money than conventional operators. However, the model increases the volatility of earnings and results in lower quality of service.

The extension of the budget telecom network model to broadband requires that small, prepaid, irregular payments be allowed, which is a significant deviation from the dominant always-on, all-you-can-eat models. It appears that the former is already emerging in the mobile-based broadband offerings such as HSPA.

This suggests that accessing the Internet over mobile networks, whether from fixed locations, nomadically or while actually mobile, will become a major, if not the dominant, mode. This fits into the present trends where many functions of the Internet, such as communication in multifarious forms, information retrieval and

remote computing, are increasingly occurring over mobile networks through relatively modest and inexpensive mobile handsets.

If business process innovations enabled by competition are solving the problem of electronically connecting billions of poor people, what is the role of government? When a business model is delivering the goods, rather than direct government action, the most appropriate government action would be that which supports the business model. Policy and regulatory actions must be derived more from analysis of the requirements of the business model and less from public administration theory. Early in the present reform cycle the need to adopt policy and regulatory solutions that fitted the specific institutional circumstances was identified. Yet, in actual practice, policy and regulatory solutions devised for developed-country circumstances tended to be applied in very different settings. The emergence of a new business model and deeper understanding of the functioning of government institutions in developing countries offers a possibility of devising policy and regulatory solutions with a better fit. This would, for example, involve a greater emphasis on lowering market-entry barriers and making available more spectrum ahead of the previous preoccupation with interconnection. As costs come down across the board, the relative importance of the key input of domestic and international backhaul capacity increases, requiring greater regulatory attention.

Coherence of different policy and regulatory actions is a good thing. It can be achieved by fully understanding the core budget telecom network business model and ensuring that all policy and regulatory actions are consistent with it, not solely in terms of making the model work, but also in terms of ensuring that public-policy objectives are achieved by leveraging the model rather than working at cross purposes to it.

List of acronyms

ADSL	Asymmetric Digital Subscriber Line
ARPU	Average Revenue Per User
BTS	Base Transceiver Station
CAGR	Compound Annual Growth Rate
DPRK	Democratic People's Republic of Korea
DS-3	Digital Signal Level 3
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
FDI	Foreign Direct Investment
GATS	General Agreement on Trade in Services
GDP	Gross Domestic Product
GGS	Govi Gnana Seva
GSM	Global System for Mobile Communications
GSMA	GSM Association
HSPA	High-Speed Packet Access
HSPDA	High-Speed Downlink Packet Access
ICTs	Information and Communication Technologies
IDNs	Internationalised Domain Names
IIT	Indian Institute of Technology
INR	Indian Rupees
INSEAD	Institut Européen d'Administration des Affaires
IPLC	International Private Leased Circuits
ITU	International Telecommunication Union
IVR	Interactive Voice Response
Kbps	Kilobytes Per Second
Mbps	Megabytes Per Second
OECD	Organisation for Economic Co-operation and Development
QOSe	Quality of Service Experience
RTT	Return Trip Time
SEC	Socio-Economic Classification
SIM	Subscriber Identity Module
SMP	Significant Market Power
SMS	Short Message Service
STM-1	Synchronous Transport Module Level-1
TCMO	Total Cost of Mobile Ownership
TCO	Total Cost of Ownership
TRAI	Telecommunication Regulatory Authority of India
TRE	Telecom Regulatory Environment
USSD	Unstructured Supplementary Services Data
VAT	Value Added Tax
VSAT	Very Small Aperture Terminals
WAP	Wireless Access Protocol
WiFi	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access
3G	Third generation

1.0 Foundation of the global Internet Economy: Electronic connectivity

Full participation in the global Internet economy requires electronic connectivity of increasing complexity. Today, due to a worldwide wave of liberalization and technological and business innovations, much of the world is electronically connected, albeit not at the levels that would support full participation in the global Internet economy. This report, which focuses on the developing world, examines the contributions made by competition and business innovation in achieving the current levels of connectivity and the possibilities of extrapolation to ensure widespread participation in the global Internet Economy. Within the developing world, the hardest problem is that of connecting the low-income groups. Solutions to the hardest problem will make other solutions easy. This report addresses the hardest problem, drawing extensively from research conducted in South and Southeast Asia. In the concluding section, the policy implications, including articulations with tax and other policies that must be aligned if access is to translate into wealth creation, are discussed.

1.1 OECD vision

The OECD Member Governments have set out a vision of the Internet Economy, covering the full range of economic, social and cultural activities supported by the Internet and related information and communications technologies (ICTs), which will strengthen the capacity of countries to improve the quality of life of all their citizens by:

- Providing new opportunities for employment, productivity, education, health and public services as well as addressing environmental and demographic concerns.
- Acting as a key driver for the creation of enterprises and communities and stimulating closer global co-operation.
- Enabling new forms of civic engagement and participation that promote diversity of opinions and enhance transparency, accountability, privacy and trust.
- Empowering consumers and users in online transactions and exchanges.
- Reinforcing a culture of security which applies to information systems and networks, and their users.
- Developing an increasingly important platform for research, international science co-operation, creativity and innovation in many different sectors.
- Creating opportunities for new economic and social activities, applications and services through ubiquitous and seamless access to communication and information networks.
- Promoting a global information society based on fast, secure and ubiquitous networks which connect billions of people, machines and objects.[1]

[1] OECD (2008, June). *The Seoul Declaration for the future of the Internet economy*, pp. 4-5.

The very facts that the OECD holds Ministerial meetings on the subject and resolves to promote ubiquitous access to ICTs and take other actions to advance the realization of the global Internet Economy indicates that they have not yet been fully realized even within the OECD. The Internet Economy is far from real for the billions living in developing countries, especially those who are poor. The OECD Ministerial takes this into account explicitly by declaring that it seeks to make the Internet Economy truly global, through policies that:

- Support expanded access to the Internet and related ICTs, especially for people in developing countries.
- Recognise the potential of the Internet and related technologies to provide enhanced services to people with disabilities and special needs.
- Recognise the importance of a competitive environment for the successful growth of the Internet Economy and the opportunities this can bring for development, particularly for people and regions with the most limited economic means.
- Promote use of Internet and related ICT networks by all communities as well as the creation of local content and multi-language translations to improve economic and social inclusion of people with different capabilities, education, and skills, and to preserve cultural and linguistic diversity.
- Facilitate the introduction of internationalised domain names (IDNs) while ensuring the integrity and stability of the Internet.
- Increase cross-border co-operation of governments and enforcement authorities in the areas of improving cyber-security, combating spam, as well as protecting privacy, consumers and minors.
- Harness the potential of the Internet to tackle global challenges such as improving energy efficiency and addressing climate change. [2]

The key point, for the purposes of this report, is the third bullet point which flags the importance of a competitive environment for the flourishing of the Internet Economy, especially for people and regions with the most limited economic means. As documented below, the massive progress achieved in the past few decades in bringing electronic connectivity to the hitherto unconnected in the developing world has indeed been made possible by the opening up of opportunities to participate in the offering of connectivity services, allowing varying degrees of competition. Success in deepening that connectivity to broadband forms will also require adherence to the principle of competition and increased emphasis on its effective implementation.

1.2 What is the Internet?

The most common mental image of the Internet involves a desktop (or laptop) computer connected by wire (or wirelessly) to an access path of adequate capacity to allow always-on capacity to handle down- and up-loads of data at certain speeds

[2] OECD (2008, June). *The Seoul Declaration for the future of the Internet economy*, pp. 8-9.

or to a broadband connection. However, awareness of the importance of the mobile as an alternative pathway is increasing, as evidenced by documents such as the World Economic Forum's 2008-09 *Global Information Technology Report*, "Mobility in a networked world," and Aspen India's 2008 Report entitled "m-Powering India: Mobile communications for inclusive growth,"[3] as well as the following excerpt from *The Economist*:

> . . . the number of mobile phones that can access the internet is growing at a phenomenal rate, especially in the developing world. In China, for example, over 73m people, or 29% of all internet users in the country, use mobile phones to get online. And the number of people doing so grew by 45% in the six months to June—far higher than the rate of access growth using laptops, according to the China Internet Network Information Centre.[4]

Broadband has been defined by Partnership for Measuring ICT for Development as an Internet service of at least 256 kbps in one or both directions.[5] The US Federal Communication Commission is also seeking to develop a definition of broadband.[6] Separate definitions are given for fixed-line and mobile broadband which would probably not have been the case 10 years ago. The incomplete nature of the definitions indicates that the phenomenon is inchoate.

There is value in thinking of the Internet, or the cluster of technologies enabling the Internet Economy, in terms of a bundle of functions rather than as the composite, common-sense image. The following functions are currently provided over the Internet:

- Communication in multiple forms, synchronous/asynchronous, one-to-one/one-to-many, etc.
- Information retrieval including search
- Publication
- Transactions (including payments), and
- Remote computing

The hierarchy above may be described as moving from simple to complex. It is no surprise that a sophisticated user sitting at the end of a multi-megabyte pipe can use all the above functions easily, especially if she has a credit/debit card. However, what is truly surprising is that many people who have never been near a computer in their lives are already performing some of these functions electronically.

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[3] Dutta, S. and Mia, I. (2009). *Global Information Technology Report 2008-09*, *Mobility in a networked world*, Geneva: World Economic Forum and INSEAD; Adler, R.P. & Uppal, M. (2008). *M-Powering India: Mobile communications for inclusive growth*, Washington DC: Aspen Institute.

[4] The Economist (2008, September 4). The meek shall inherit the web. *The Economist.* (http://www.economist.com/research/articlesBySubject/displaystory.cfm?subjectid=348963&story_id=11999307)

[5] Partnership for Measuring ICT for Development *Core list of ICT Indicators* (Revised 2009), at: http://www.itu.int/ITU-D/ict/partnership/material/CoreICTIndicators_e_rev2.pdf; accessed 18 August 2009. OECD (n.d.) *OECD Broadband Subscriber Criteria*, retrieved July 24, 2009 from http://www.oecd.org/document/46/0,3343,en_2649_34225_39575598_1_1_1_1,00.html.

[6] http://blog.broadband.gov/?p=87, retrieved August 20, 2009.

For example, take a poor person with a prepaid mobile connection. When she types in a short code to check her account balance, she is engaging in one of the more complex of current Internet functions, remote computing. When he downloads a ringtone and pays for it from the "load" on his prepaid phone he is engaging in a transaction that includes an electronic payment, again, something quite complex.

The mobile is used for all forms of communication, including text-based (SMS or short message service) and context-based ("missed calls") communication.[7] All these functions can be performed with the simplest of today's second-generation mobile handsets even in countries that have yet to release the frequencies needed for 3G [third generation] or sophisticated data-friendly services. In sum, billions of poor people in developing countries are also participating in the Internet Economy, albeit in somewhat constrained and unfamiliar forms.

As countries introduce 3G mobile networks, the migration of high-end phones to low-income users will accelerate. As of October 2008, the modal value of new phones among SEC [Socio-Economic Classification] groups D and E[8] in Bangladesh was USD 43 (mean USD 58); the modal value of second-hand phones was USD 29 (mean USD 35). Qualitative research conducted as part of LIRNEasia's teleuse@BOP3 study showed that many of the second-hand phones were quite sophisticated. Both types were being used to transfer music from one phone to another using Bluetooth, to listen to music, to watch video, to play games, to obtain news and employment information (sometimes as the sole source), and to keep records of transactions. The range and frequency of uses was much higher among the poor in Sri Lanka, the Philippines and Thailand, countries with relatively higher levels of disposable income, literacy and penetration.

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[7] Sivapragasam, N., Zainudeen, A., Ratnadiwakara, D. (2008). *Hit me with a missed call: The use of missed calls at the bottom of the pyramid (BOP).* Paper presented at CPRsouth3: Transformation Strategies for Telecom Operators, Beijing, December 5-9, 2008, retrieved July 27, 2009, from http://www.cprsouth.org/sites/default/files/Nirmali%20Sivapragasam.pdf

[8] Defined by the chief wage earner's education and occupation (as well as a few other parameters in certain countries), but closely correlated to an income level of around USD 2 a day in five of the six countries included in LIRNE*asia*'s ~10,000 sample, representative survey of teleuse @ the Bottom of the Pyramid: Bangladesh, India, Pakistan, Sri Lanka and Thailand. In the Philippines, only SEC E respondents were interviewed. For more detail, see, http://lirneasia.net/projects/2008-2010/bop-teleuse-3/.

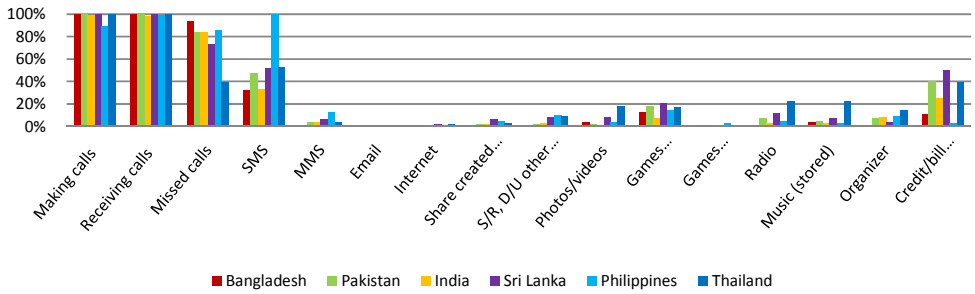

Figure 1: What mobiles are used for at the BOP (% of SEC D and E mobile owners)[9]
Source: LIRNE*asia* (2009). Teleuse@BOP3 Survey findings.

The Teleuse@BOP survey specifically probed awareness, trial and use by poor people of "more-than-voice" services over the mobile. These were low, unsurprisingly, because these services are just being developed and marketed and the business models of marketing information and transaction services to the poor are still being worked out. What is ground for optimism, however, is the clear evidence of higher awareness, trial and use of more-than-voice among the younger cohorts (Figure 2).

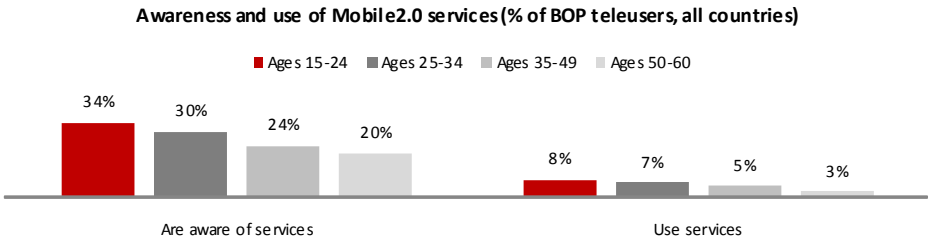

Figure 2: Awareness and use of Mobile2.0 (more than voice) services (% of SEC D and E teleusers, all countries)
Source: LIRNE*asia* (2009) Teleuse@BOP3. Survey findings

It is increasingly becoming clear that agricultural information is better provided on the almost-ubiquitous mobile, where information is available whenever and wherever the user wants it, rather than in distant kiosks with opening and closing hours or even in homes. Innovative companies such as CellBazaar in Bangladesh are introducing rudimentary e-commerce to BOP users who might otherwise never get access to such services, using SMS and WAP (Wireless Access Protocol).[10] Information on candidates in the 2009 Indian general election, such as whether or not they had criminal records, their educational attainments and assets and

[9] Categories: Making calls; receiving calls; missed calls; SMS; MMS; e-mail; Internet; share created content; send/receive or download/upload other content; photos/videos; games (individual); games (interactive); radio; music (stored); organizer; credit/bill checking

[10] Zainudeen, A., Samarajiva, R., and Sivapragasam, N. (2009). CellBazaar: A mobile-based e marketplace: Success factors and potential for expansion. Paper presented at Mobile 2.0: Beyond Voice?, Chicago, IL, May 20-21, 2009, retrieved July 28, 2009 from http://lirneasia.net/wp-content/uploads/2009/05/final-paper_zainudeen_et_al.pdf, supplemented by personal communication from Kamal Quadir, CEO of CellBazaar.

liabilities, were available through SMS.[11] BuzzCity and Gupshup are creating social networking in the mobile space.[12] Once the regulatory issues of m-payments are resolved,[13] it is likely that mobile phones, not credit cards, will become the main modes of e-payment in the developing world, as is already occurring in some parts of Africa.[14]

1.3 Preconditions for inclusion

That billions of poor people have not only become electronically connected in the past few decades,[15] but have also begun to use some of the functions of the meta-medium known as the Internet is cause for celebration, but not for complacency. The present capabilities of the 2G networks and handsets used by most poor people do not, for example, allow for the complex search and information-retrieval activities taken for granted in conventional desktop/laptop-based Internet use. Publishing, in the commonly understood sense of posting on websites and blogs, is quite cumbersome from a simple mobile handset, Twitter excepted.[16] The qualitative research conducted as part of the LIRNE*asia* Teleuse@BOP study showed that heavy users tended to use both modes, for example, downloading music at cybercafés, transferring via Bluetooth and then listening on the mobile handsets.[17]

There is little question then, that access to broadband in both forms, from mobile handsets and from computers, must be improved if the emerging Internet Economy is to be inclusive. Governments the world over must give priority to and expedite spectrum refarming and release frequencies by transparent means[18] to enable operators to offer 3G technologies and beyond to make mobile, nomadic and fixed

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[11] Giridharadas, A. (2009, May). A pocket-size leveler in an outsize land. *New York Times,* retrieved July 28, 2009 from http://www.nytimes.com/2009/05/10/weekinreview/10giridharadas.html?ref=world

[12] *Sirasoonthorn, P. (2009). Business Models for Delivering Mobile Value-Added Services. Working paper presented at LIRNE*asia *colloquium, Colombo, July 13, 2009.*

[13] Alampay, E. and Bala, G. (2009) *Mobile 2.0: m-money for the unbanked*. Working paper presented at LIRNE*asia* colloquium, Colombo, June 30, 2009.

[14] Greenwood, L. (2009, August 12). Africa's mobile banking revolution. http://news.bbc.co.uk/2/hi/business/8194241.stm; CGAP. (2009). Poor people using mobile financial services: Observations on customer usage and impact from M-PESA. http://www.cgap.org/gm/document-1.9.36723/MPESA_Brief.pdf

[15] http://www.itu.int/newsroom/press_releases/2008/29.html

[16] Chapman, J. and Kinsey, M. (eds.) (200). *Broadcast journalism: A critical introduction*. London: Routledge, p. 131.

[17] CKS Consulting Pvt. Ltd. (2009). Teleuse@BOP3: A Qualitative Study. Colombo: LIRNEasia, pp. 111-112, http://lirneasia.net/wp-content/uploads/2008/04/qualitativereport.pdf

[18] Samarajiva, R. (2006). Preconditions for effective deployment of wireless technologies for development in the Asia-Pacific, *Information Technology and International Development*, 3(2): 57-71. http://itidjournal.org/itid/article/view/224/94; Wellenius, B. and Neto, I. (2007). Managing the radio spectrum: Framework for reform in developing countries. http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/Wellenius-Neto.pdf, retrieved August 20, 2009. Malik, P. (2009). An evaluation of different models for the issuance of licenses for service provision and frequencies. Working paper presented at LIRNE*asia* colloquium, Colombo, July 9, 2009.

broadband a reality for the billions who will depend on wireless-access networks as gateways to the Internet Economy. Looking at spectrum solely as a source of government revenue at point of release is not the best either for broad deployment or for long-term government-revenue generation.

The value of wireless in the access network or the "last mile" does not negate the fundamental importance of wireguides in the backhaul component. Behind each WiFi hotspot is a series of wireguides that connect the user to the Internet cloud, in most cases, in the continental United States. In the same way that the strength of a chain is determined by its weakest link, the overall performance of one's Internet connection is determined by the slowest component in the connection to the Internet cloud.[19] LIRNE*asia*-IIT Madras research on broadband quality of service experience (QoSE) has shown that the real bottleneck for most users in developing countries is the international segment,[20] where undersea cable or satellite capacity still appears to be under-provisioned by operators (Figure 3).

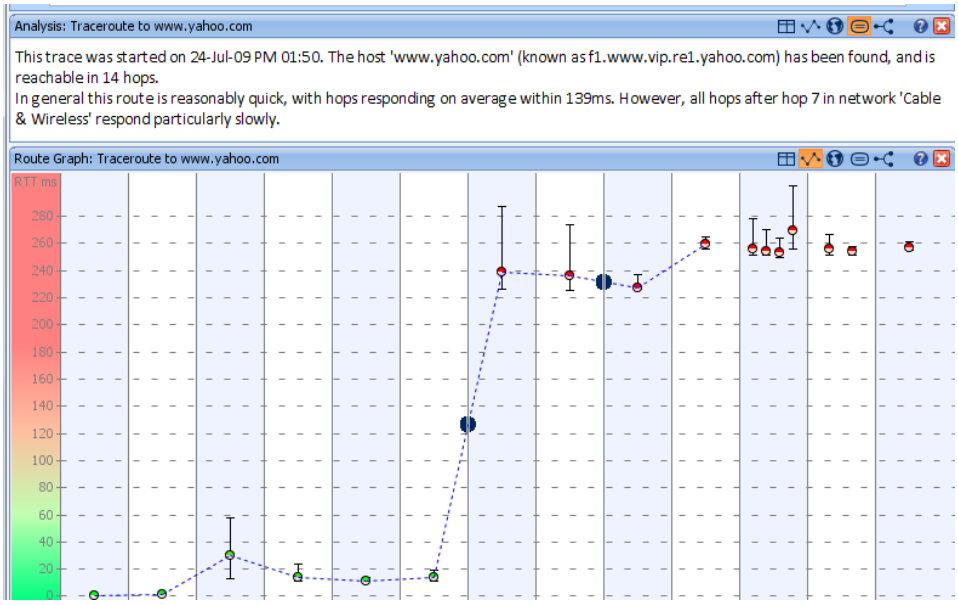

Figure 3: Return trip time (RTT) to www.yahoo.com, 24 July 2009 1350hrs
Note: This route graph is taken using VisualRoute 2009 Lite edition. Y-axis indicates the return trip time (RRT) to a server. Up to 6th hop IP addresses are within Sri Lanka (www.whois.net); the 'leap' is from a local server to the first entry point to USA.
Source: LIRNE*asia* (2009, July 24). Broadband Quality of Service Experience. Test findings.

Clearly, much has to be done in improving the supply of international and national backhaul capacity which constrains connecting both rich and poor in developing countries into the Internet Economy. Unless these producer goods are plentiful and

[19] Goswami, D. (2008). Wi-Fi: The network fix. In R. Samarajiva and A. Zainudeen (Eds.), *ICT infrastructure in Emerging Asia: Policy and Regulatory Roadblocks* (pp. 131-156). New Delhi & Ottawa: SAGE & IDRC.

[20] Gonsalves, T. and Bharadwaj, A. (2009). Comparison of AT-Tester with other popular testers for Quality of Service Experience (QoSE) of an Internet connection. Paper presented at LIRNE*asia* colloquium, Colombo, July 29, 2009.

reasonably-priced, inclusion cannot be realized. The best way to achieve this, as elaborated below, is through policy actions conducive to participation by a greater number of suppliers in the backhaul market.

2.0 How was this foundation laid?

Connecting a majority of the world's population to electronic networks, directly or through the connections of others, within a few decades is an extraordinary public-policy achievement. It is claimed that there are over 4 billion active SIMs in the world,[21] and a majority of the world's phones are now mobile. To get from the gloomy, but effective in hindsight, prognostications of the Maitland Commission in 1984 to the status quo in which the 87 percent of the poor in the Indo-Gangetic Plain, the world's largest concentration of poor people, have made a phone call in the last three months and 41 percent own a mobile or fixed phone has taken only 24 years.[22] Understanding the causal factors is important not only because the electronic foundation for the Internet Economy is not yet complete, but because there is value in learning the lessons of success in narrowband, voice connectivity in order to adapt them for the tasks of ensuring broadband connectivity for all. Or, minimally, there is value in understanding what did not work in narrowband voice, so that those failed solutions can be avoided.

The key to first-generation connectivity for the poor is shown by Figure 4, adapted from a Figure first developed by the Telecommunication Regulatory Authority of India (TRAI). Lower prices invariably lead to greater connectivity, which lead to even lower prices and even greater connectivity.

[21] GSMA (2009, February 11). The mobile world celebrates four billion connections. http://www.gsmworld.com/newsroom/press-releases/2009/2521.htm retrieved August 20, 2009.

[22] Kelly, T. (2005). Twenty years of measuring the missing link. In G. Milward-Oliver (Ed.), *Maitland+20 Fixing the Missing Link* (pp. 23-33). Bradford on Avon: The Anima Centre Limited; Independent Commission of the Independent Commission for World Wide Telecommunications Development (1985). *The Missing Link. Report of the Independent Commission for World Wide Telecommunications Development.* Geneva: ITU; de Silva, H., and Zainudeen, A. (2008). Teleuse at the Bottom of the Pyramid: Beyond Universal Access. *Telektronikk* (2), 25-38.

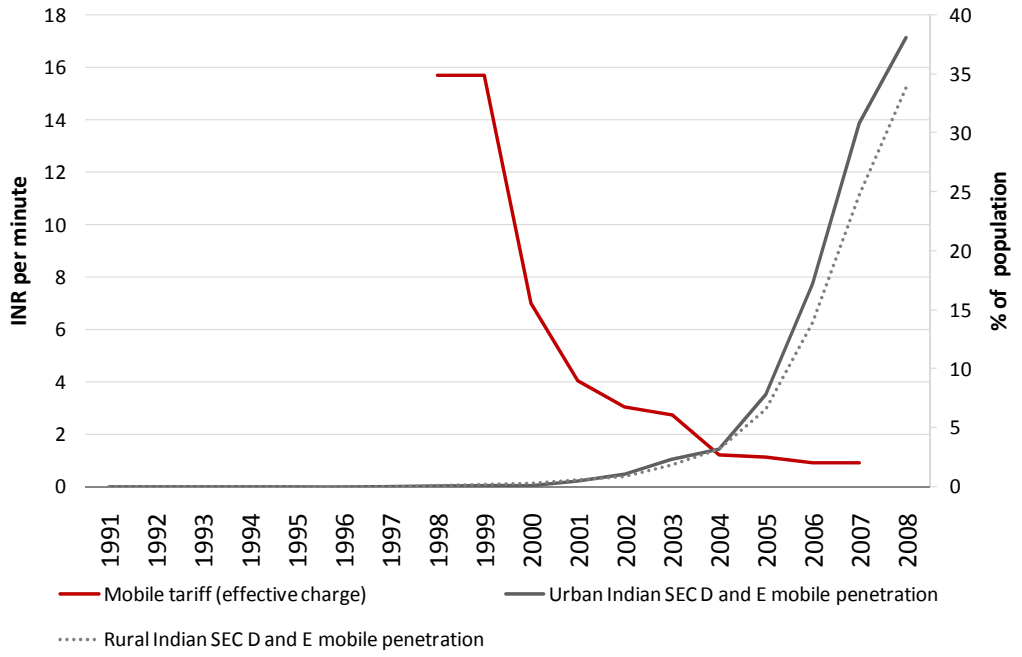

Figure 4: Mobile tariffs and the growth of Indian mobile in SEC D and E
Sources: Adapted from TRAI (2005). Recommendations on Growth of Telecom Services in Rural areas: The way forward, retrieved August 4, 2009 from http://ccaharyana.gov.in/recom3oct05.pdf; LIRNE*asia* (2009) Teleuse@BOP3. Survey findings

2.1 Market entry

Across countries, the trigger to growth was significant market entry. This took the form, for example, of transparent entry in Pakistan, opaque licensing in Bangladesh or even "backdoor" entry by so-called fixed operators into the mobile space in Nepal. What matters is that there should be a significant enough number of suppliers, with one of them at least being willing to engage in disruptive competition.[23] In different countries, different operators assumed this role. In India, it was Reliance who created the disruption and caused others to follow. In Thailand, it was the acquisition of a Thai-owned operator by a foreign operator that served as the trigger. In Sri Lanka, it was the late entry of the incumbent fixed operator into the mobile space through an acquisition that set off the latest rapid growth phase.

[23] Christensen, C. M. and Raynor M. E. (2003). *Innovator's Solution: Creating and Sustaining Successful Growth*. Boston: Harvard Business School Press. This contrasts with the "managed competition" approach espoused by the McKinsey contributors to the Global information technology report 2008-09: Dutta, S. and Mia, I. (2009). *Global Information Technology Report 2008-09*, *Mobility in a networked world*, Geneva: World Economic Forum and INSEAD, pp. 63-73.

2.2 Investment

Growth in connectivity cannot occur without investment.[24] The relaxation of government barriers to market entry resulted in increased investment, supplied in most countries, with the notable exception of India, by external sources. Even in India, telecom was the sector that attracted the second largest amount of foreign direct investment (FDI) in absolute terms and the government raised the permitted FDI threshold to 74 percent in 2005.[25]

Pakistan showed the most dramatic improvement in connectivity in South Asia, and possibly the world, in the past decade, as shown in Figure 5. Pakistan is not a small country, with a population of 162 million in 2007.[26] With a population/sq. km of 204, it is the least densely populated among the non-micro states in South Asia: Sri Lanka (305) India (342) and Bangladesh (1,101).[27] Generally low density poses additional difficulties in increasing connectivity.

Pakistan's per-capita GDP is considerably lower than that of Sri Lanka,[28] suggesting that its connectivity should be significantly below that of Sri Lanka, based on the Jipp Curve.[29] But it is not, except with regard to overall access paths (fixed plus mobile connections, as shown in Figure 5), where Sri Lanka was at 55.58 at end 2007, compared to Pakistan's 51.12. This is a substantial narrowing of the gap since 2002, when Sri Lanka had 9.58 access paths/100, compared to Pakistan's 3.65.

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[24] Mahan, A.K. and Melody, W.H. (2005). *Stimulating investment in network development: Roles for regulators*. Monte Video: World Dialogue on Regulation. Retrieved on July 27, 2009 from http://www.infodev.org/en/Document.12.pdf

[25] Malik, P. (2007). *LIRNEasia Six Country Multi-component Study 2006-2007: India report.* WDR Dialogue Theme 4th cycle Discussion Paper WDR0703. Retrieved July 27, 2009 from http://www.lirneasia.net/wp-content/uploads/2007/04/malik-2007-6cmcs-india.pdf

[26] World Bank (2009). *Key development data and statistics* [online database]. Retrieved July 27, 2009 from http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20535285~menuPK:1192694~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html

[27] Author calculations based on population and surface area data retrieved from World Bank (2009). *Key development data and statistics* [online database]. Retrieved July 27, 2009 from http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20535285~menuPK:1192694~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html

[28] World Bank (2009, July) *Gross domestic product 2008: Quick reference tables*. Retrieved July, 31 2009 from http://siteresources.worldbank.org/DATASTATISTICS/Resources/GDP.pdf

[29] Jipp, A. (1963, July). Wealth of nations and telephone density. *Telecommunications Journal,* pp. 199-201.

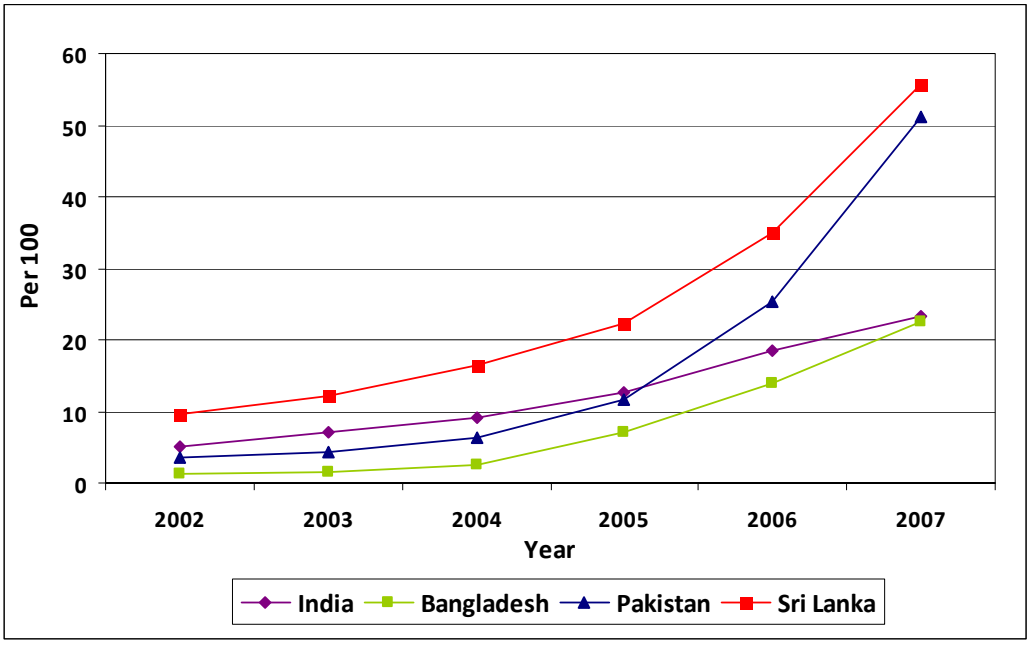

Figure 5: Access paths/100, 2002-07, Pakistan compared with South Asian peers
Source: ITU (2008). ICT statistics database. Retrieved from http://www.itu.int/ITU-D/icteye/Indicators/Indicators.aspx

How was this good performance achieved? FDI into the sector increased massively in 2002-07, as shown in Figure 6. From a negligible USD 6.04 million in 2002, it increased to USD 1,905.06 million in 2006 (accounting for over 50 percent of total FDI coming into the country) and USD 1824.25 million in 2007 (close to 40 percent of the total). The major reforms in Pakistan took effect in 2004, with the adoption of an exemplary licensing framework and the conduct of mobile-license auctions. Mobile growth rocketed up from that point, as did FDI.

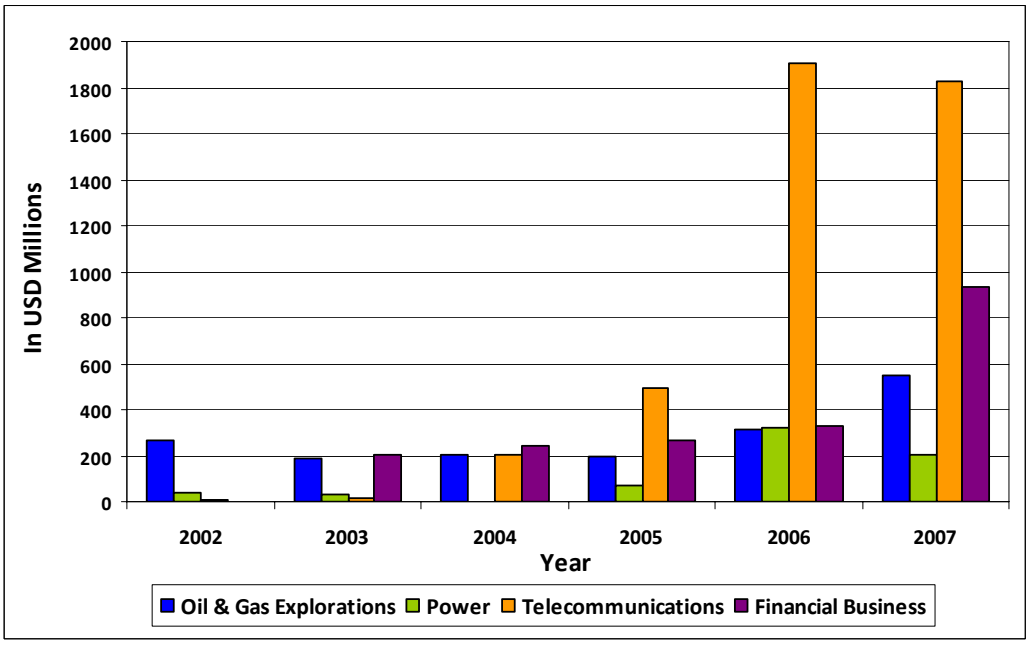

Figure 6: Foreign direct investment in the principal sectors in Pakistan, 2002-07
Source: State Bank of Pakistan (2008) Economic Data. Retrieved from http://www.sbp.org.pk/ecodata/NIFP_Arch/index.asp
Note: FDI for the power sector in 2004 was USD -14.24 million.

3.0 Lessons from the mobile success story for broadband

In India, home to a significant proportion of the world's poor, connectivity is not associated with low use of the network; in fact, India's average minutes of use are double those of OECD countries.[30] The low prices and high use of the network in India point to the core explanation for the success of connecting billions in the past decade. It is the discovery and application of an entirely new business model in South Asia, the "budget telecom network model," akin to the budget airline model implemented by the likes of Air Asia and RyanAir.[31]

3.1 Budget telecom network model

The budget telecom network model first emerged in the South Asian markets of Bangladesh, India, Pakistan and Sri Lanka, evidenced by the fact that their total costs of ownership (TCO) were the lowest at less than USD 5 in 2007, compared to an average of USD 13.15 across 77 emerging economies.[32] The operators in the South Asian region tend to be quite profitable in EBITDA terms, though there is considerable volatility.

Table 1: Operator Revenues, EBITDA and EBITDA Margins in selected South Asian markets (2005)

Country	Revenue (USD)	EBITDA (USD)	EBITDA Margins (%)
Sri Lanka	259,041,928	124,833,464	48
India	26,723,674,194 (2007)	9,938,340,523 (2007)	37 (2007)
Bangladesh[33]	655,900,000	344,500,000	54
Pakistan	978,802,178	n/a	n/a

Sources: Sri Lanka: Company annual reports, press releases by companies; India: Malik, P. (2008). Telecom Regulatory and Policy Environment in India: Results and Analysis of the 2008 TRE Survey; Bangladesh: Bangladesh Telecommunications Regulatory Commission (2007) *Annual Report 2007*. Retrieved July 27, 2009 from

[30] Teligen (2006). OECD telecoms price benchmarking baskets 2006: T-Basket implementation from February 2006 onwards. Retrieved July 28, 2009 from http://www.teligen.com/publications/oecd.pdf; Telecom Regulatory Authority of India (2008). The Indian Telecom Services Performance Indicators October– December 2007. Retrieved July 28, 2009 from http://www.trai.gov.in/WriteReadData/trai/upload/Reports/41/preport10april08.pdf

[31] Nokia (2008a). Affordability key in bringing digital inclusion. *Expanding Horizons, 1*, 12-13; Nokia (2008b). A roadmap to affordable mobility in emerging markets. *Expanding Horizons, 4*, 4-7.

[32] Nokia (2008a). Affordability key in bringing digital inclusion. *Expanding Horizons, 1*, 12-13. Nokia's TCO calculation is based on 1/36th of the price of the cheapest Nokia handset, 1/36th of connection charges if any, the cost of using the OECD low-user bundle of minutes and other services, plus all relevant taxes and levies.

[33] Data are only for the three main mobile service providers GrameenPhone, Aktel and Banglalink, whose total market share amounted to 93 percent in 2005.

http://www.btrc.gov.bd/btrc/annual_report_07_08_english.pdf;[34] Pakistan: Pakistan Telecommunication Authority. (2005). *Annual Report 2005*. Islamabad: Pakistan Telecommunication Authority. Retrieved July 28 2009 from http://www.pta.gov.pk/annual-reports/ann-rep-05.pdf

The difficult policy and regulatory environment and the low purchasing power of customers in the region appear to have compelled the operators to innovate, both in terms of reducing operating expenditures to a minimum and in terms of serving the "long tail"[35] of customers who use only a few minutes of calls a month. The latter innovation rests on the reduction of transaction costs associated with supporting prepaid customers. Among the SEC D and E segment represented in the Teleuse@BOP study, the overwhelming majority are prepaid (Figure 7). The reduction of transaction costs is exemplified by the simple fact that prepaid avoids the more or less invariable costs of generating and transmitting a monthly bill, which becomes a serious burden when the revenue per customer is very low.

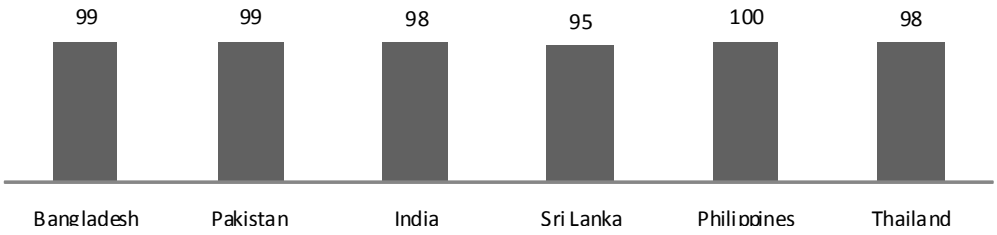

Figure 7: Prepaid mobile connections at the BOP (% of SEC D and E mobile phone owners)
Source: LIRNE*asia* (2009) Teleuse@BOP3. Survey findings

Prepaid also allows the customer to pay when she can or needs to use the service. This suits the requirements of the poor, many who have irregular income patterns. The introduction of low-value recharge cards and especially electronic reloads that allow for the greatest flexibility in payments was of special significance in making the model work.[36]

In essence, the budget telecom network business model is an innovation, driven by intense competition and in response to the hard regulatory environments and low purchasing power of the countries of South Asia. If not for competition, the innovation would not have happened. This was shown in Nepal, a country of 29 million people with many similarities to the South Asian countries where the model is operational, but had relatively high mobile prices in 2008. In 2009, the prices of all mobile operators dropped sharply despite no new licenses being granted. It was found that the cause was entry, not of the conventional kind, but of a form of

[34] Revenue and EBITDA Margin for Bangladesh (2005) as reported by Merrill Lynch are different (Merrill Lynch, *Global Wireless Matrix*, 2007).

[35] Anderson, C. (2006). *The Long Tail: Why the future of business is selling less of more*. New York: Hyperion Books. Whereas Anderson focuses on the long tail of products such as low-demand books, the budget telecom network model is based on the long tail of low-volume customers.

[36] Nokia (2008b). A roadmap to affordable mobility in emerging markets. *Expanding Horizons, 4*, 4-7; Samarajiva, R. and Malik, P. (2009, May 22). The economics of the chhota recharge. *The Financial Express.* Retrieved from http://www.financialexpress.com/news/the-economics-of-chhota-recharge/463849/3

backdoor entry where certain wireless-access operators licensed as "fixed" operators had entered the mobile space.[37]

3.2 Lessons for Internet access

What lessons does the budget telecom network model hold for "expand[ing] access to the Internet and related ICTs, especially for people in developing countries"?

To expect that conventional models of always-on, all-you-can-eat broadband will connect the billions of poor people now connected only to voice, if at all, is as realistic as expecting the conventional business model of voice telephony to have succeeded in connecting the poor in the Indo-Gangetic Plain. As with voice telephony, it is imperative that opex be lowered. This will include, most importantly, the key input cost of international backhaul. The radical reductions in domestic leased-line prices observed in the emerging economies suggest that there is plenty of room for improvements in the levels of competition in leased lines, and in some regions, especially in Africa and parts of the Indian Ocean, greater supply. India, one country that has paid sustained attention to domestic and international leased-line prices has reduced both dramatically (Table 2 and Table 3).

Table 2: Trends in Domestic Leased line tariffs in India (for highest distance slab, i.e., > 500 km) for the Incumbent, USD per annum, 1998-2005

Year	Capacity			
	64Kbps	**2Mbps(E1)**	**DS-3**	**STM-1**
1998	33,043	157,885	3,315,582	9,946,745
1999*	2,207	50,586	1,062,313	3,186,940
2000	2,053	47,059	988,235	2,964,706
2001	2,003	32,137	674,875	2,024,624
2002	1,994	31,990	671,791	2,015,372
2003	2,106	33,779	608,028	1,824,084
2004	2,183	20,009	420,191	1,260,573
2005	2,103	19,281	404,908	1,214,724
November 2005 *	986	19,041	137,970	370,072

Source: Kathuria, R. (2009). Comparing the impact of decline in leased line prices in India and Indonesia: Lessons for Latin America. Unpublished paper.
**Regulatory price revision implemented*

[37] This finding contradicts the recommendations for limited entry propounded by the McKinsey contributors in Dutta, S. and Mia, I. (2009). *Global Information Technology Report 2008-09*, *Mobility in a networked world*, Geneva: World Economic Forum and INSEAD, pp. 63-73. Given the high costs of wireline access, many countries have issued frequencies to new fixed entrants, in some cases, specifying restrictions on the mobility of the handset. The lowest-cost fixed wireless access technology is the CDMA standard. However, it is also common that users and in some cases operators violate the legal restrictions, creating "backdoor" entry to the mobile space.

Table 3: IPLC (Half Circuit) Tariff, India to US, 2000-2008 (USD per annum)

Year	Capacity		
	E1	DS3	STM1
1998	413,631.02	-	-
1999	404,690.73	-	-
2000	342,245.99	6,203,208.56	17,967,914.44
2001	333,889.82	6,203,208.56	17,529,215.36
2002	54,009.14	979,019.53	2,835,479.85
2003	67,558.68	1,033,779.34	2,994,077.65
2004	53,888.13	1,011,823.56	2,808,094.59
2005	44,390.89	790,753.72	2,191,717.79
Nov-05	28,483.79	227,870.29	655,127.08
2006	26,209.68	209,677.42	602,598.57
2007	25,158.19	201,366.74	578,840.80

Source: Kathuria, R. (2009). Comparing the Impact of Decline in Leased Line Prices in India and Indonesia: Lessons for Latin America. Unpublished paper.

In addition to the reduction of input costs, extension of the budget telecom network model will be essential. Flat-rate pricing models are not appropriate for poor people with irregular incomes. They will buy broadband access the same way they buy voice telephony and shampoo today, in small prepaid increments as and when money becomes available and the needs arise.[38]

Broadband is currently on offer in prepaid form in South Asia.[39] Interestingly, prepaid offers tend to come from mobile providers using HSPA/HSDPA, rather than from fixed broadband (ADSL or WiMAX) operators. The vexed questions related to "net neutrality"[40] take a different complexion in the mobile setting. Almost by definition, one cannot provide the identical Internet experience to those connecting through mobile networks, fixed, nomadic or mobile.[41] Unlike in wireline and fixed wireless networks, the relation between the user and access-network resources in mobile networks is not fixed. Variation in the numbers of users using a BTS [Base Transceiver Station] and the associated network resources results in variable quality of service experience (QOSe). More so than in fixed networks which may be dimensioned to accommodate fixed numbers of users for components of the access network (through contention ratios), users of broadband services offered by mobile operators tend to be subject to rationing rules that are automatically applied depending on demand, including 3G geographical-coverage areas that contract when

[38] Kishore, J.V.S. (2003, December), Paan-power. *Avant garde*, 1(9). Retrieved January, 30, 2006 from http://www.iitk.ac.in/ime/MBA_IITK/avantgarde/Archive/paan.htm

[39] E.g., http://www.mobitel.lk/support/3g_delight.html

[40] http://lirneasia.net/2006/05/net-neutrality-implications-for-emerging-asia/

[41] Fixed means that one connects to the network from one location all the time, using a "dongle" or a netbook with a built-in antenna. Nomadic means that at the moment of connecting the user is stationary, though she connects from multiple locations, again, usually from a dongle-equipped laptop or a netbook. Mobile means that the user is on the move while connecting. Here, it is likely that the user connects through a handset, though netbooks or even laptops may be used in moving vehicles.

demand from a specific BTS is heavy. In addition, the concept of "always on" has limited applicability to users of broadband services offered by mobile operators.

The budget telecom network model rests on aggregating small amounts of use in ways that will absorb a high proportion of the available capacity, rather than on the obsolete and misleading concept of average revenue per user (ARPU).[42] With individual users connecting from their handsets, netbooks, laptops or desktops, the key is keeping transaction costs (e.g., customer acquisition costs, billing costs) to a minimum. Another way of achieving the same result is to have many low-volume users connecting to the Internet from common-use facilities such as telecenters and cybercafés. The earlier thinking that rested on fixed connections such as ADSL or VSAT links for telecenters is increasingly being replaced by a focus on connectivity supplied by mobile operators, HSPA or even 2.5G connections.[43] This shifts the debate from a mobile-versus-telecenters frame to a mobile-and-telecenters frame.[44]

3.3 Applications

Teleuse@BOP qualitative research shows that low-income users are indeed using cybercafés and mobiles in complementary ways, downloading music in cybercafés, transferring the content to mobiles using Bluetooth and then listening to the music from the handset.[45]

The Teleuse@BOP3 survey specifically probed awareness, trial and use of "more-than-voice" services over the mobile. The levels of awareness, trial and use, especially among the lower SEC groups in Pakistan, India and Bangladesh (the Indo-Gangetic Plain, constituting the hardest case) were generally low. Awareness, trial and use were low even for services such as premium-SMS-based voting for American Idol-type reality shows in the Southeast Asian countries and in Sri Lanka. (Figure 8 and Figure 9) This was unsurprising, because these services are just being developed and the business models for serving the poor are yet being worked out.

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[42] The accurate term could be average revenue per customer (ARPC), because that is what is actually counted. But now, in mobile markets where many customers are using multiple active SIMs, the term should be average revenue per active SIM (ARPAS).

[43] GSMA (2009, January). *How to realize the benefits of mobile broadband today. A public white paper*, section 5. Retrieved July 28, 2009 from http://hspa.gsmworld.com/upload/news/files/13022009113831.pdf; Grameen Telecom (n.d.). *CIC and GIK*. Retrieved July 28, 2009 from http://www.grameentelecom.net.bd/gik_cic.html (case of 2.5G use).

[44] Samarajiva, R. (2009, April-June). PCs are not the best vehicles for providing IT-delivered services to rural areas, *Telecentre Magazine*: 30, 32. http://lirneasia.net/wp-content/uploads/2009/08/Telecenter.pdf

[45] CKS Consulting Pvt. Ltd. (2009). *Teleuse@BOP3: A Qualitative Study*. Colombo: LIRNE*asia* (pp. 111-112). Retrieved July 28, 2009 from http://lirneasia.net/wp-content/uploads/2008/04/qualitativereport.pdf

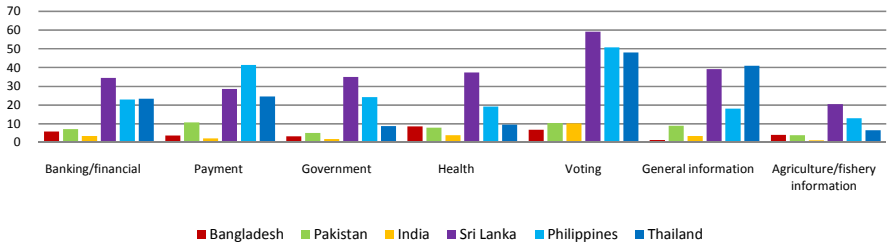

Figure 8: Awareness of Mobile2.0 services at the BOP (% of SEC D and E teleusers)
Source: LIRNE*asia* (2009) Teleuse@BOP3. Survey findings

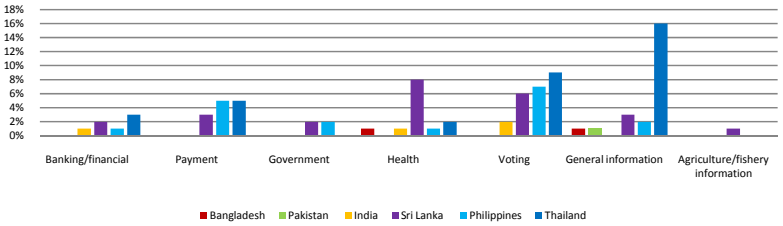

Figure 9: Use of Mobile2.0 services at the BOP (% of SEC D and E teleusers)
Source: LIRNE*asia* (2009) Teleuse@BOP3. Survey findings

However, the uniformly higher levels of awareness, trial and use among the younger users suggest that there is considerable potential (Figure 10). The survey also found variable degrees of readiness to try different services among the current teleusers (Figure 11).

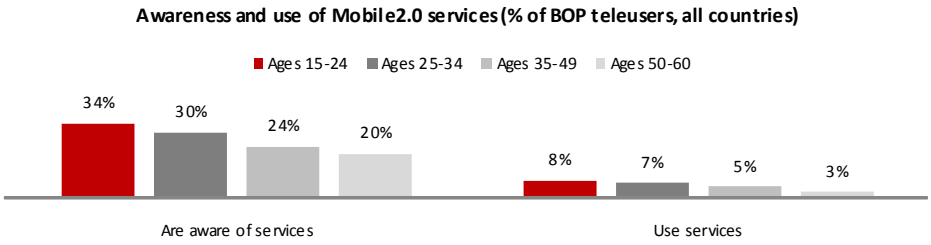

Figure 10: Awareness and use of Mobile2.0 (more than voice) services (% of SEC D and E teleusers, all countries)
Source: LIRNE*asia* (2009) Teleuse@BOP3. Survey findings

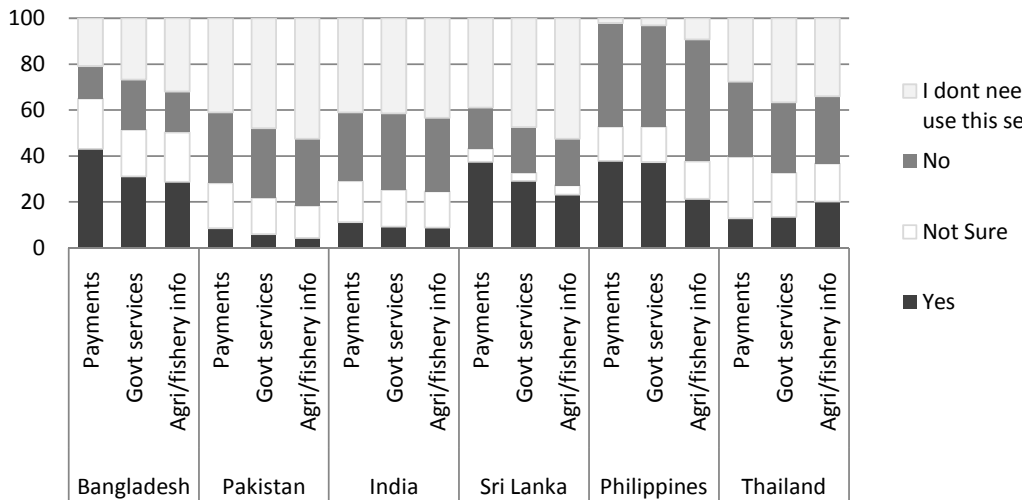

Figure 11: Willingness to try accessing payment, government or agriculture/fishery information services through a mobile (% of SEC D and E teleusers who are currently unaware of such services)
Source: LIRNE*asia* (2009) Teleuse@BOP3. Survey findings

It is increasingly becoming clear that agricultural information is better provided on the almost-ubiquitous mobile that provides information when and where users want it, rather than in distant kiosks with opening and closing hours or even in homes. Findings from the Warana Wired (old and failing; centered on common-use computers) and Warana Unwired (new and successful; centered on mobiles) projects in Maharashtra,[46] now being applied on a larger scale in Vietnam by Microsoft Research,[47] vividly illustrate this.

[46] Veeraraghavan, R., Yasodhar, N., and Toyama, K. (2009). Warana Unwired: Replacing PCs with mobile phones in a rural sugarcane cooperative, *Information Technologies and International Development*, 5(1): 81-95

[47] Personal communication from Kentaro Toyama of Microsoft Research, June 3, 2009.

Figure 12: Maharashtran farmer accessing agricultural information through Warana Unwired services on a mobile phone
Source: Toyama, K. (2008). Warana Unwired: With an examination of rural PC kiosks [Presentation slides]. Retrieved August 2, 2009 from http://www.tcs-trddc.com/Tecs%2708/KT_Warana%20Unwired.ppt

Companies such as CellBazaar in Bangladesh are introducing e-commerce to BOP users who would otherwise never get access to such services. CellBazaar is designing its services for the highly constrained capabilities of the cheapest, simplest GSM phones on the market and is therefore focusing only on the search phase of the transaction (Figure 13).

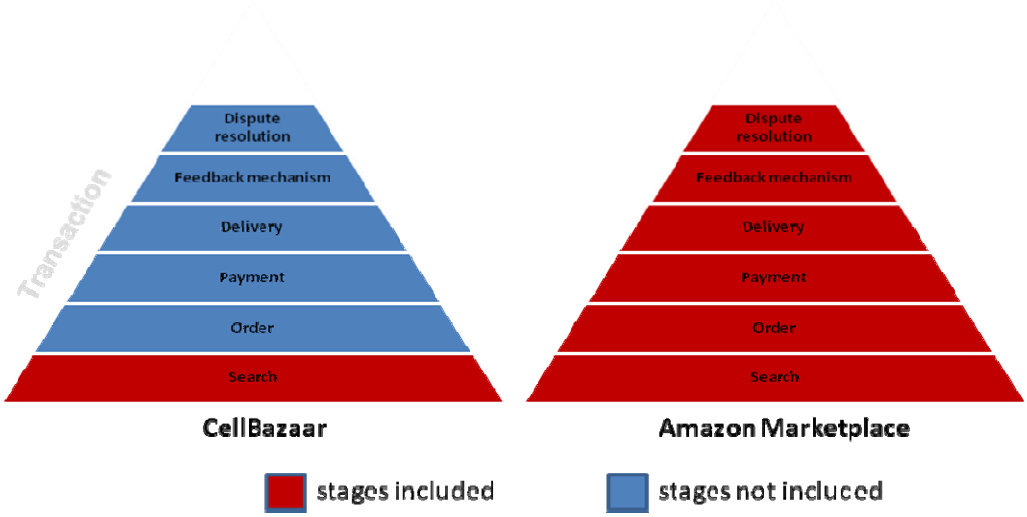

Figure 13: Stages of a commercial transaction included in CellBazaar compared with Amazon Marketplace

Everything else takes place outside the CellBazaar system, but using the conversational and messaging capabilities of mobile phones. Analysis shows that the

enterprise is still in the promotional phase, seeking to attract users at low prices (around a minimum of USD 0.35 for a transaction in the case of SMS) and sacrificing high returns. The rather clumsy user experience through the familiar SMS format is being improved through WAP, in the case of CellBazaar and may be improved by others using the USSD [Unstructured Supplementary Services Data] functionality that is also part of GSM.

As with the sugarcane farmer who can obtain market information even while on a tractor, the mobile interface in CellBazaar has inherent additional benefits with regard to transactions that cannot be completed fully on the web (e.g., purchase of a used car or a cow). Unlike comparison shopping on a desktop that requires the taking of notes or printouts before venturing out for actual transactions, the mobile interface allows comparison shopping as-needed, when-needed.

The Govi Gnana Seva (GGS) system for delivering agricultural market prices in Sri Lanka has gone through many incarnations since 2002.[48] First, it focused on collecting spot-prices from Sri Lanka's largest fruit and vegetable wholesale market and displaying the prices of large electronic screens intending to reduce price dispersion within the market itself. Then, it sought to deliver spot prices to those who were distant from the market through SMS and an interactive voice response (IVR) system. When pilot-project funding ended, prices were collected and disseminated over radio and television. Starting in 2009, the system is being redesigned to deliver spot and rudimentary forward prices to mobile phones.[49] Delivery of forward and spot prices to mobile devices allows for a whole range of behaviors that would not be possible if they were delivered only to desktops in telecenters or elsewhere. Here the mobile can be used directly in negotiation, with additional information being pulled up by either party as needed, when needed.

The use of mobiles in reducing friction from fish markets in Kerala, India and in grain markets in Niger have been well studied. In both cases, it was found that producer prices increased, consumer prices decreased and waste was eliminated (in the case of the perishable commodity, fish) because producers ranged over a larger number of hitherto isolated markets that were newly connected through mobiles. In contrast with Warana and GGS, the Kerala and Niger cases do not involve any kind of organized data collection, but simply the use of mobiles for information gathering and decision making by individual market actors.[50]

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[48] de Silva, H. (2009, July 16). ICT policy for agriculture in Sri Lanka: Some thoughts, in *Proceedings of the Joint National Conference on Information Technology in Agriculture* (pp. 34-43). Moratuwa and Matara (Sri Lanka): University of Moratuwa and University of Ruhuna

[49] http://www.lirneasia.net/wp-content/uploads/2009/07/harsha.de.silva.pdf

[50] Jensen, R. (2007). The digital provide: Information (technology), market performance, and welfare in the South Indian fisheries sector. *Quarterly Journal of Economics*. Vol. CXXII(3): 879-924; Aker, J.C. (2008). Does digital divide or provide? The impact of cell phones on grain markets in Niger. Unpublished job paper. Retrieved August 2, 2009 from http://are.berkeley.edu/~aker/cell.pdf

Mobiles are attracting considerable attention as payment devices, especially for the poor.[51] Clearly, payment is one of the more complex functions performed on the Internet and in combination with other functions can yield higher-level participation in the Internet Economy. In particular, there is interest in the use of mobiles in facilitating remittances by temporary migrant workers.

LIRNE*asia* research shows that compared to their Pakistani, Indian, Sri Lankan and Filipino peers, Bangladeshi overseas migrants called home most frequently: 87 percent of Bangladeshi migrants called home *at least* once a week, while 34 percent called home daily. The survey found that on average, Bangladeshis also paid the most for communication with family and friends back home, spending USD 48 per month to keep in touch, as against USD 15 by Indians.

The Bangladeshi migrants mostly work West and East/Southeast Asia. On average, they earned approximately USD 485 a month, of which USD 203 was sent home. The most popular mode of communicating home was the telephone, though unlike the other nationalities, 28 percent also made calls through the Internet.

Bangladeshi domestic migrants appeared to be making the most use of mobiles to send money home. Hand-carrying cash was the most popular way of remitting money, but a significant number sent money home through mobiles, despite the absence of a formal mobile payment system in the country. They are using "flexi-load" (whereby one customer can transfer value to another's prepaid account) to transfer money home. Often migrants maintain good relations with village flexi-load sellers who "cash out" the value of load transfers from the migrant to his family (less the commission, which may be as high as 20 percent or as low as zero). Ironically, in the Philippines, the only country in the study where mobile-remittance services are currently legal, fewer migrants used such systems (Figure 14).[52] The explanation is related to the availability of alternatives. It appears that the alternatives are less attractive in Bangladesh than in the Philippines.

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[51] Alampay, E. and Bala, G. (2009) *Mobile 2.0: m-money for the unbanked*. Working paper presented at LIRNE*asia* colloquium, Colombo, June 30, 2009; BBC (2009, June 15). Africa pioneers mobile bank push. Retrieved August 2, 2009 from http://news.bbc.co.uk/2/hi/technology/8100388.stm; Boyd, C and Jacob, K. (2007). Mobile financial services for the underbanked: Opportunities for mbanking and mpayments. Chicago: Center for Financial Services Innovation. Retrieved August 2, 2009 from http://www.cfsinnovation.com/document/mbanking.pdf; Vodafone (2007). The transformational potential of m-transactions. Vodafone Policy Paper. Retrieved August 2, 2009 from http://www.ictregulationtoolkit.org/en/Document.3437.pdf; Wishart, N. (2006). Micro-payment systems and their application to mobile networks: Examples of mobile-enabled financial services in the Philippines. Washington DC: infoDev Retrieved August 2, 2009 from http://www.infodev.org/en/Publication.43.html

[52] LIRNE*asia* (2009). Teleuse by the Bangladeshi migrant worker. [Presentation slides]. Retrieved August 2, 2009 from http://lirneasia.net/2009/06/teleusebop-migrant-study-findings-to-be-released-in-dhaka/; *The Daily Star* (2009, June 26). Bangladeshi migrants call home more frequently: survey (p. B3); *The Financial Express* (2009, June 29). Calling home means a lot to Bangladeshi expat workers (p. 8); *The New Nation* (2009, July 1) Migrants use mobiles to remit money to families (p. 6)

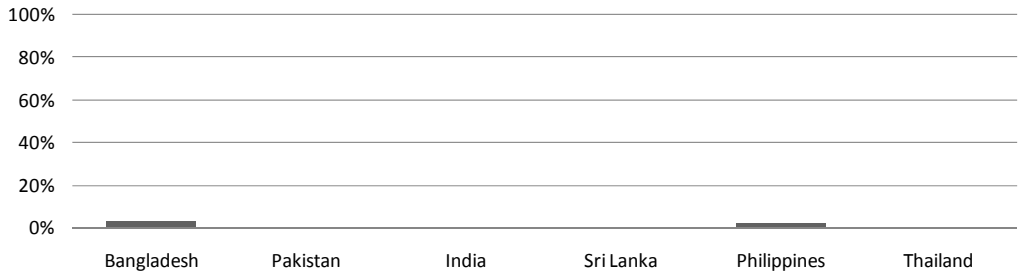

Figure 14: Use of mobile remittance services (% of SEC D and E migrant workers)
Source: LIRNE*asia* (2009). Teleuse@BOP3 migrant worker study. Survey findings.

As more applications become available on mobile platforms, it may be expected that the use of mobiles for more-than-voice will increase, giving large numbers of poor people experience with functionalities today commonly associated with static desktops connected to broadband pipes. As these uses increase, it may also be expected that the demand-pull for 3G–and-beyond network standards more conducive to satisfactory mobile web experiences will become stronger and for supply to become ubiquitous. As the mobile pathway to the Internet becomes increasingly well-trodden, we can also expect the complementary uses of the conventional pathway to increase from users who wish to print or scan documents or pictures and those who wish to use bigger screens and keypads for particular tasks.

4.0 Internet/telecom access and wealth creation through service industries

The service sector has always been a residual category that included all that did not fit within agriculture (including fishing and mining) and manufacturing.[53] Therefore, the large and generally increasing size of service sectors in developing economies cannot, per se, be taken as evidence that they are developing in ways that will move large number of people out of poverty. Nevertheless, the service sector does play an important role in absorbing excess labor from the agricultural and manufacturing sectors as they become more productive.

The knowledge sector is a subsector within the service sector. Its end-product is knowledge. Examples are education, research, and software. This subsector relies greatly on ICTs, but in fact the role of ICTs in contributing to wealth creation is not limited to it, but extends across the entirety of services, manufacturing and agriculture. ICTs play a foundational role in the emergence of a knowledge-based economy, where innovation based on systematic applications of knowledge occurs in all sectors. Without ICTs, it would be difficult or impossible to codify knowledge and transmit it in a range of forms and scale at low cost. The basic argument regarding access to the Internet and telecom networks contributing to wealth creation is

[53] Maddison, A. (2004, March). Quantifying and interpreting world development: Macromeasurement before and after Colin Clark, *Australian Economic History Review*, 44(1): 1-34. Longer version retrieved 20 August 2009 from http://www.ggdc.net/maddison/articles/colin_clark.pdf

anchored on the access to knowledge that is made possible and the reductions of the frictions of time and space that can be realized.[54] Access to ICTs does not per se result in wealth creation. It is a foundational element along with governance and financial infrastructure. Without education/skills, investment and innovation, the desired results cannot be achieved. Access to ICTs is a necessary condition, but not a sufficient one.[55]

4.1 Do ICTs cause development?

The fact that access to ICTs is complementary makes the establishment of causal links to development outcomes difficult, though there have been several attempts, each with its own shortcomings.[56] At the macro level, Solow famously said that "You can see the computer age everywhere but in the productivity statistics."[57] There are those who argue that there was a need to factor in a time lag and there are studies that show the contribution.[58] In the specific context of economic development, the World Bank made a magisterial effort in 1999 to establish the case.[59]

At the micro level, case studies and studies abound. Perhaps the most rigorously argued micro study is that of producer prices, consumer prices and waste in a number of adjacent but previously independent fish markets along the coast of the

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[54] World Bank. (1999). *World Development Report 1998/99. Knowledge for Development*. New York: Oxford University Press.

[55] Samarajiva, R. and A. Zainudeen (Eds.) (2008), Introduction. What is . . . and what could have been . . . , in *ICT infrastructure in Emerging Asia: Policy and Regulatory Roadblocks.* (pp. 19-20). New Delhi & Ottawa: Sage & IDRC. See also Spence, M. (2009). A Response to "A Dialogue on ICTs, Human Development, Growth and Poverty Reduction." http://publius.cc/reactions_mike_spence/091109

[56] Cronin, F. J., E. K. Colleran, E. B. Parker and M. A. Gold (1991). Telecommunications infrastructure and economic growth: An analysis of causality. *Telecommunications Policy* 15(6): 529-535; Cronin, F. J., E. K. Colleran, E. B. Parker and M. A. Gold (1993). Telecommunications infrastructure investment and economic development. *Telecommunications Policy*, 17(6): 415-430. Hardy, A. P (1980). The role of the telephone in economic development. *Telecommunications Policy* 4(4): 278-286; Parker, E.B, H.E. Hudson, D.A. Dilman, S. Strover and F. Williams (1995) *Electronic byways: State policies for rural development through telecommunications*, 2nd ed. Washington DC: Aspen Institute; Waverman, L., M. Meschi and M. Fuss (2005). The impact of telecoms on economic growth in developing countries. In *Africa: The impact of mobile phones in the developing world. Moving the debate forward,* The Vodafone Policy Paper Series 3(March 2005): 10-23, retrieved November 2, 2005 from http://www.vodafone.com/assets/files/en/SIM_Project_download_2.pdf. See also review of related work in Waverman, L. and Dasgupta, K. (2009). How to maximize the economic impact of mobile communication: The four waves, in Dutta, S. and Mia, I. (eds.) *Global Information Technology Report 2008-09*, *Mobility in a networked world*, pp. 53-63. Geneva: World Economic Forum and INSEAD.

[57] Solow, R.M. (1987). We'd better watch out. *New York Times Book Review* (July 12): 36.

[58] David, P.A. (1990). The dynamo and the computer: A historical perspective on the modern productivity paradox, *American Economic Review Papers and Proceedings*: 355-61; and Brynjolfsson, E., and S. Yang (1999, December). The intangible costs and benefits of computer investments: Evidence from the financial markets. MIT Sloan School of Management.

[59] World Bank. (1999). *World Development Report 1998/99. Knowledge for Development*. New York: Oxford University Press.

Indian state of Kerala before and after the arrival of mobile phones.[60] This natural experiment clearly established that both consumers and producers benefited and the markets cleared (eliminating waste) because the fishermen called multiple fish markets while still at sea and went to the one offering the best price. It was reported that in contrast to all the boats returning to the home harbor prior to the arrival of mobiles, 35 percent sold their catch at a harbor other than the one they set off from afterward. Jensen assumed the diversion to be costless. Aker, in a subsequent study of grain trade in Niger, factored in transport costs and distance and arrived as similar conclusions.[61]

In the same way that it took the best economists and statisticians working with high-quality data more than a decade to establish the contribution of ICTs to productivity in the US economy, it will take substantial effort to make the case in the developing world. [62]

4.2 ICTs and trade in services

The significance of access to telecom and the Internet for wealth generation may also be discussed in relation to making services tradable. There are four accepted modes of services trade, as set out in the General Agreement on Trade in Services (GATS):

1. Mode 1, where the seller remains in Country A and the buyer remains in Country B and trade takes place. This is most like trade in goods.
2. Mode 2, where the buyer travels to Country A where the seller is. The trade occurs in Country A.
3. Mode 3, where the seller in Country A establishes a non-natural person (a company) in Country B to supply services to customers in Country B. The trade occurs in Country B. This may or may not involve the movement of natural persons from Country A to Country B.
4. Mode 4, where natural persons from Country A travel to Country B to supply services to buyers in Country B. This may occur in conjunction with Mode 3 trade or independently.

In many developing countries, the principal mode of services trade is Mode 4, wherein skilled and unskilled workers travel to labor-deficit countries for varying periods to sell their services and remit the earnings back home. Beyond the social problems caused by family separations (particularly among the low-skilled, only the worker is permitted entry), the home economies do not get the spin-off benefits of large workplaces and wage earners within their territories. In addition, Mode 4

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[60] Jensen, R. (2007). The digital provide: Information (technology), market performance, and welfare in the South Indian fisheries sector. *Quarterly Journal of Economics*. Vol. CXXII, Issue 3: 879-924

[61] Aker, J.C. (2008). Does digital divide or provide? The impact of cell phones on grain markets in Niger. Unpublished job paper. Retrieved August 2, 2009 from http://are.berkeley.edu/~aker/cell.pdf

[62] Spence, M. (2009). A Response to "A Dialogue on ICTs, Human Development, Growth and Poverty Reduction." http://publius.cc/reactions_mike_spence/091109

trade is generally not governed by rules and thus tend to be unfavorable to the powerless, the migrant workers.[63] Mode 3, even though resisted by nationalists and protectionists to some extent, brings the large workplaces closer to the buyers of services, though they do not provide as many employment opportunities as does Mode 4.

Mode 1 has the greatest potential to alleviate the negative aspects of Mode 4. It allows firms and workers in Country A to sell services to buyers in Country B without physically moving there. Mode 1 is enabled by ICTs, in particular cheap and reliable leased lines. Here, the workers do not have to separate themselves from families for long periods and the money they and the firms which employ them generate circulate in the local economy, creating further wealth. Workplaces and worker movements do create pressure on infrastructure, but the long-term result is generally the building of adequate infrastructure that benefits more than the service-export companies.[64]

More than developing service industries serving the domestic market, ICT-enabled service industries that export their services create wealth and pull more people out of poverty. Of course, the modern business practices that allow for differentiation of functions and the outsourcing of non-core activities will then seep into the domestic economy as well, creating the conditions for inshoring, as opposed to offshoring or the export of services. This results in domestic firms becoming more efficient and/or customer responsive and jobs being created outside the major urban agglomerations.

Both offshoring and inshoring have been flourishing in Southern and Western India since the 1990s. It is generally accepted that these regions make a disproportionate contribution to the Indian economic growth story. Unpacking the specific contributions of services trade made possible by ICTs and various other factors such as the demographic dividend[65] is beyond the scope of this report. It would suffice to say that the growth of the organized and export-oriented service industries made possible by ICTs has made a significant positive contribution to India's recent spurt in economic growth and the resultant escape from poverty by large numbers of Indians and that these lessons may be extrapolated to other countries.

5.0 Policy and regulation conducive to the Internet Economy

The traditional conception of policy and regulation derives the policy framework and regulatory instruments from public administration theory, with contributions from

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63 Jackson, J.H. (1997). *The world trading system*: *Law and policy of international economic relations*, 2nd edition. Cambridge, MA: MIT Press

64 Vijayabaskar, M. and Krishnaswamy, K. (2004). Understanding growth dynamism and its constraints in high-technology clusters in developing countries: A study of Bangalore, Southern India. Working group paper. http://www.eadi.org/fileadmin/WG_Documents/Reg_WG/vijayabaskar.pdf, retrieved August 20, 2009.

65 Nilekani, N. (2008). *Imagining India: The idea of a renewed nation*. New York: Penguin.

explicit or implicit theories of the state. In the case of developing countries, the state was seen as lacking certain elements or attributes. For example, it lacked adequate respect for the sanctity of contract. Case after case, investors would be given promises and assurances based on which they would make investments. Once the investments were in the ground and their negotiating power atrophied, the assurances would be cast to the wind and outright or administrative expropriation would take place. Investment insurance was seen as a remedy, as was the creation of sector-specific regulatory agencies and regimes to govern specific industries, especially those in capital-intensive infrastructure that were especially vulnerable to administrative expropriation.[66]

The tendency was to import regulatory regimes and practices from developed market economies, especially those created by the ownership, market-entry and regulatory reforms of the 1980s in the UK and the USA by pro-private-sector governments. However, scholars pointed out the need to align regulatory solutions with the institutional conditions of the host countries.[67]

Given one of the special attributes of the state in developing countries, its lack of capacity for effective reforms, external expertise was brought in to advise on transactions (where the results were not too bad) and on the design of new policy and regulatory frameworks and instruments (where the result were less satisfactory, tending to result in the wholesale transplantation of developed-economy frameworks and instruments). Over time and at considerable cost the frameworks and instruments are being adapted to local conditions, though in many cases the adaptations take pathological forms consonant with some of the less pleasant aspects of state formation in the developing world.[68]

The surprise, despite these mistakes, is that the telecom infrastructure has expanded greatly and more than three billion people who were denied service by government-owned integrated monopolies are now connected to electronic networks, even in countries with no functioning regulatory agencies and the most rudimentary policy frameworks. Of course, there are the cases of the low-mobile countries, led by North Korea and Burma/Myanmar, where nothing seems to have worked. Among this group, several such as Eritrea, Ethiopia, Papua New Guinea and Turkmenistan are now showing rapid growth from low bases (Table 4). The conclusion that has to be drawn is that some degree of market entry is essential to initiate the market dynamics. The uniformly lower growth rates on the fixed side also support the thesis that market entry to at least a few suppliers is a necessary condition for rapid growth.

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[66] Samarajiva, R. (2002). Why regulate? In International Telecommunication Union, *Effective regulation: Trends in telecommunication reform*, 4th edition. Geneva: International Telecommunication Union.

[67] Levy, B. and Spiller, P.T. (1994). The institutional foundations of regulatory commitment: A comparative analysis of telecommunications regulation. *Journal of Law, Economics, and Organization*, 10(2).

[68] Khan, M. (2005). The capitalist transformation. In, K.S. Jomo and E.S. Reinert (eds.), *The origins of development economics: How schools of economic thought have addressed development* (pp. 69-80). London and Chennai: Zed Press and Tulika Press.

Table 4: Low-mobile-penetration countries, excluding micro states

	Active SIMs, 2003 ('000)	Active SIMs, 2008 ('000)	CAGR, 2003-08 (%)	Active SIMs/100
DPR Korea	-	-	-	-
Myanmar	66.5	375.8	41.4	0.76
Eritrea	-	108.6	-	2.2
Cuba	35.4	331.7	56.5	2.96
Ethiopia	51.3	3,168.3	128.1	3.93
Papua New Guinea	17.5	300	103.5	4.67
Burundi	64	480.6	49.7	5.95
Turkmenistan	9.2	347.6	148	6.98

Source: ITU (2008). ICT statistics database. Retrieved from http://www.itu.int/ITU-D/icteye/Indicators/Indicators.aspx

Note: CAGR: compound annual growth rate. No data reported for DPR Korea. Its 3G License was issued in 2008

Table 5: Fixed performance of low-mobile countries, excluding micro states

	Fixed lines, 2003 ('000)	Fixed lines, 2008 ('000)	CAGR, 2003-08 (%)	Fixed/100, 2008
DPR Korea	980	1180	4.8	4.97
Myanmar	363	708.9	18.2	1.44
Eritrea	38.1	40.4	1.2	0.82
Cuba	724.3	1103.6	8.8	9.85
Ethiopia	404.8	908.9	17.6	1.13
Papua New Guinea	62.9	60	-1.2	0.93
Burundi	23.9	30.4	4.9	0.38
Turkmenistan	376.1	457.9	5	9.2

Source: ITU (2008). ICT statistics database. Retrieved from http://www.itu.int/ITU-D/icteye/Indicators/Indicators.aspx

The conclusion that may be drawn is that market entry permitting entry by at least a few suppliers (even as few as two in micro states) is the necessary condition for rapid growth of access to telecom services and thereby for participation in the global Internet Economy. Competition strong enough to cause the operators to adopt the budget telecom network model is the sufficient condition, at least for low-income countries. This qualification has to be inserted because countries such as China and South Africa have achieved high levels of mobile penetration (though not low prices and high minutes of use, as in South Asia) without necessarily adopting the budget telecom network model.[69]

[69] The McKinsey contributors to Dutta, S. and Mia, I. (eds.) *Global Information Technology Report 2008-09, Mobility in a networked world*. Geneva: World Economic Forum and INSEAD make the mistake of seeing China and the Philippines, countries that started the reform process very early as models for the entire developing world. The Budget Telecom Network model emerged in South Asia only in the past few years and is now diffusing to other regions.

The question then is what policy frameworks and regulatory instruments are conducive for participation in the global Internet Economy by developing countries? The short answer is those that are hostile, to a greater or lesser degree, to market-entry barriers and are supportive of the budget telecom network model.

5.1 Market entry and spectrum management

In light of the absolute necessity of spectrum for building access networks for voice and data in developing countries, it is meaningless to talk about market entry in the abstract. Except in the case of specialized services such as international gateways, for the most part most telecom service suppliers require frequencies, mostly for access networks, but also in some cases for backhaul.

Market entry and spectrum assignments based on published policy frameworks and transparent procedures, consistent with the provisions in the Reference Paper that forms part of Protocol 4 of the General Agreement on Trade in Services (GATS), are obviously very good. However, opaque market entry and spectrum assignments are still better than none. Bangladesh, a country that arguably failed to meet standards of good practice on market entry in the past, has nevertheless succeeded in connecting over 40 percent of its SEC D and E population at the world's second-lowest mobile prices.[70]

Even if operators can muddle through with poor spectrum management and opaque assignment in the early stages, there will be problems as the networks expand and more new services are offered if spectrum management, especially refarming, is not done professionally and transparently.[71] Delays in releasing 3G frequencies in many countries, including in important markets such as India, have already caused harm to their participation in the Internet Economy.

5.2 Interconnection

In the early days of regulation, most experts answered "interconnection, interconnection and interconnection" when asked for the top-three priorities of regulation. When one sets regulatory priorities in terms of the Budget Telecom Network model, market entry and spectrum management emerge as the highest priorities.

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[70] LIRNE*asia* (2009, February). Mobile benchmarks: South Asia. Retrieved August 2, 2009 from http://lirneasia.net/wp-content/uploads/2007/08/09-02-sa-baskets-explained-v1-0.pdf; Nokia. (2009). Affordability key in bringing digital inclusion. *Expanding Horizons* (Quarter 1 2009) (pp. 10-12). Retrieved from http://expandinghorizons.nokia.com/issues/?issue=ExpandingHorizonsQ12009

[71] "Box 2: Refarming for success in Sri Lanka" in Dutta, S. and Mia, I. (eds.) *Global Information Technology Report 2008-09, Mobility in a networked world*. Geneva: World Economic Forum and INSEAD (p. 72); Samarajiva, R. (2006). Preconditions for effective deployment of wireless technologies for development in the Asia-Pacific, *Information Technology and International Development*, 3(2): 57-71. http://itidjournal.org/itid/article/view/224/94

Research on customer behavior has shown that workarounds for imperfect interconnection have been devised. The incumbent fixed operator's refusal to offer interconnection to mobile operators in Bangladesh and the failure of the regulator to compel interconnection did not prevent the people of Bangladesh from getting connected to mobile networks at a CAGR of over 100 percent in 2002-07[72] and from enjoying some of the lowest prices in the world. Furthermore, there is an increasing tendency for customers to carry multiple SIMs, switching them on the same handset if not using them on dual-SIM handsets to keep most of their calls "on-net," thereby enjoying the various discounts offered for friends-and-family calling within networks.[73] This suggests that conventional interconnection is being worked around, at least by those willing to suffer the additional inconveniences of multiple SIM use.

This is not to say that cost-based, non-discriminatory interconnection is irrelevant. It is, especially in terms of reducing the differentials between on-net and off-net calls and the intended or unintended effects on illegal termination of international calls. Indeed, the oft-neglected issues of wholesale access to backhaul and essential facilities require even greater regulatory attention in light of the requirements of the budget telecom network model. As other input costs get driven down, backhaul costs become even more significant.

5.3 Regulation of anti-competitive practices

This topic is given the greatest importance in the GATS Protocol Four Reference Paper. Yet, many policy frameworks contain lacunae in terms of enforcing prohibitions on anti-competitive practices and many regulatory instruments that deal with it are blunt and crude. In markets defined by the budget telecom network model, success rests on ever thinner margins of cost differentials. Therefore, the effects of anti-competitive practices such as cross-subsidies and tied sales become even more potent.

As firms increasingly offer bouquets of services, in some cases including entertainment offerings, there is a need to ensure that cross subsidization does not get out of control. The best control, of course, is to ensure that firms do not enjoy market power in any line of business. As retail prices keep getting driven down, the possibilities of anti-competitive vertical price squeezes grow larger. The success of the budget model rests on price flexibility as well as protection from tactics such as vertical price squeezes.

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[72] ITU (2009). ICT statistics database. Retrieved from http://www.itu.int/ITU-D/icteye/Indicators/Indicators.aspx.

[73] CKS Consulting Pvt. Ltd. (2009). Teleuse@BOP3: A qualitative study. Colombo: LIRNE*asia*. Retrieved July 28, 2009 from http://lirneasia.net/wp-content/uploads/2008/04/qualitativereport.pdf

5.4 Tariff regulation

Old-style tariff regulation is inappropriate for the effective deployment of the budget telecom network model. In any case, price or revenue regulation is difficult to apply when each firm offers bundles of services measured in tens if not hundreds. In practice, what is done is de facto forbearance, where all tariffs are more or less routinely approved, or at most asymmetrical regulation, wherein only the SMP [Significant Market Power] operator's tariffs are regulated. The weakness in this course of action is that SMP determinations and the resultant regulatory actions are extraordinarily complex and most developing country regulatory agencies are incapable of implementing them.[74] The end result can be regulatory paralysis, to the unintended benefit of incumbent operators.

Banded forbearance, where a country will choose to be benchmarked against prices of peer countries, is a possible solution.[75] Here, flexibility is allowed to all operators including the incumbent, within a defined band set through benchmarking. If prices go below the lower threshold they will trigger a review based on stated competition-related criteria. The thresholds will be periodically readjusted based on external factors such as taxes or price movements in peer countries.

5.5 Quality-of-service regulation

In the same way that one cannot expect silver tea service on RyanAir, one cannot expect premium service from budget telecom networks. All operators are likely to offer sub-optimal quality because of the need to squeeze as much traffic as possible into the network. Strict and aggressive QOS regulation is inimical to the model. However, it is also naïve to expect competition to prevent the operators from letting QOS fall to unacceptable levels.[76] Therefore, gentle supervision of QOS, focusing primarily on publishing QOS performance against benchmarks and ensuring that barriers to unhappy customers switching suppliers are kept low, would be the most appropriate.

5.6 Universal service

The idea of making universal service obligations transparent by replacing vague commitments to extend services to the un- and underserved through cross subsidies with universal service funds was a good idea in its time and complied with the

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[74] Gillwald, A. (2009, July 31). RIA rapid response for Bangladesh Telecommunications Regulatory Commission on significant market power. Retrieved August 2, 2009 from http://lirneasia.net/wp-content/uploads/2009/07/LIRNEasia_BangladeshSMP_Response_July2009.pdf

[75] Samarajiva, R. and Iqbal, T. (2009). Banded forbearance: A new approach to price regulation in partially liberalized telecom markets, *International Journal of Regulation and Governance*, 9(1): 19-40.

[76] Hirschman, A.O. (1970). *Exit, voice, and loyalty: Responses to decline in firms, organizations, and states*. Cambridge, MA: Harvard University Press.

provisions of the Protocol 4 Reference Paper. However, experience suggests that most universal service funds have become counter-productive. Billions of dollars of universal service levies lie unspent in government accounts or are being used for general expenditures.[77] Where money has been disbursed, it has generally gone to fixed network operators, mostly incumbents. All the while, people in un- and underserved areas are being connected, not by subsidized fixed line operators but by mobile operators, whose poor customers, including the intended beneficiaries of universal service policies, are paying to support the inefficiencies of incumbents.[78] A strong case can now be made that universal service funds and levy percentages no longer satisfy the criterion of being "no more burdensome than necessary to achieve the defined universal service" and therefore are in violation of the commitments made under Protocol 4 of the GATS by many countries.

5.7 Telecom regulatory environment

Evaluations of the telecom regulatory environments of several Asian countries across the dimensions discussed above were conducted by LIRNE*asia* in 2006 and 2008.[79] The key results for 2008 given in Table 6 show that informed stakeholders see much room for improvement in the TRE of all the countries studied, except in the micro state of the Maldives where it is believed that the limited number of informed stakeholders may have precluded candid answers.

Table 6: Final scores for 2008 TRE studies in eight countries: Mobile sector

	Bangladesh	India	Indonesia	Maldives	Philippines	Sri Lanka	Thailand	Pakistan
Market entry	3.1	3.1	3.0	3.8	3.2	2.8	2.7	3.9
Access to resources	2.8	2.2	2.7	3.6	2.8	2.7	2.6	3.6
Interconnection	3.3	2.8	2.7	3.5	2.8	2.6	2.6	3.7
Tariff regulation	3.5	3.9	2.6	3.4	2.8	2.7	2.9	3.2
Anti-competitive practices	3.1	2.7	2.5	3.1	2.5	2.7	2.6	2.8
Universal service obligations	2.4	3.1	2.1	3.5	2.6	3.0	2.6	3.2
Quality of service	3.2	2.8	2.3	3.8	3.1	2.9	3.1	3.2

[77] Samarajiva, R. (2008, October 12). Bangladesh doesn't need a universal service tax, *Daily Star*, retrieved on 20 August 2009 from http://www.thedailystar.net/story.php?nid=58271

[78] Malik, P. (2008). Universal service obligations: To incumbents. In R. Samarajiva and A. Zainudeen (Eds.), *ICT infrastructure in Emerging Asia: Policy and Regulatory Roadblocks* (pp. 216-39). New Delhi & Ottawa: SAGE & IDRC

[79] http://lirneasia.net/projects/2008-2010/indicators-continued/telecom-regulatory-environment/, retrieved August 20, 2009.

5.8 Taxation

Taxation was not included in the GATS Protocol 4 Reference Paper and was almost routinely ignored in discussions of telecom policy and regulation until recently. This is no longer possible because the taxation tail has begun to wag the regulatory dog. Certain policy or regulatory actions are understandable only when one posits taxation as the principal purpose and the provision of telecom services as the secondary purpose.

Studies conducted by the industry lobbyist body, the GSM Association (GSMA) show that for every 100 units of currency spent on mobile service, as much as 44 percent is being extracted as tax (including license fees, spectrum fees, universal service obligations, equipment important levies, sales tax, etc.), with the operator acting as tax collector (Figure 15). This is obviously inimical to the efficacy of the budget telecom network model. Some taxes such as handset and SIM taxes are regressive and constitute entry barriers mostly to the poor. Kenya is an exception in reducing such taxes recently.[80]

[80] The Economist (2009, June 18). East Africa gets broadband: It may make life easier and cheaper. *The Economist*. http://www.economist.com/research/articlesBySubject/displayStory.cfm?story_id=13876700&subjectID=348963&fsrc=nwl

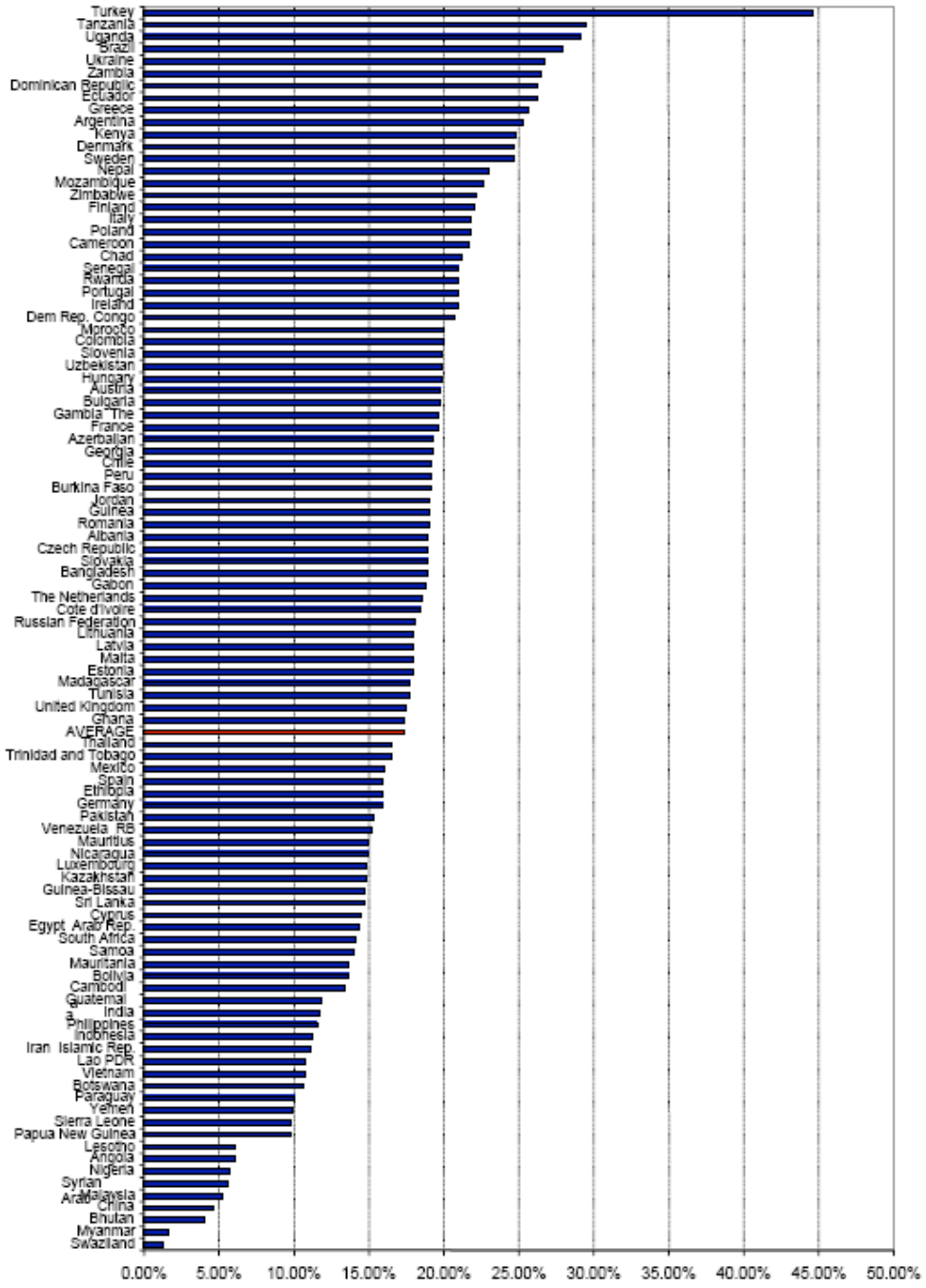

Figure 15: Tax as a total share of cost of mobile ownership

Source: Deloitte (2007). Global mobile tax review: 2006-2007. London: GSMA. Retrieved August 7, 2009 from http://www.gsmworld.com/documents/tax_review_06_07.pdf

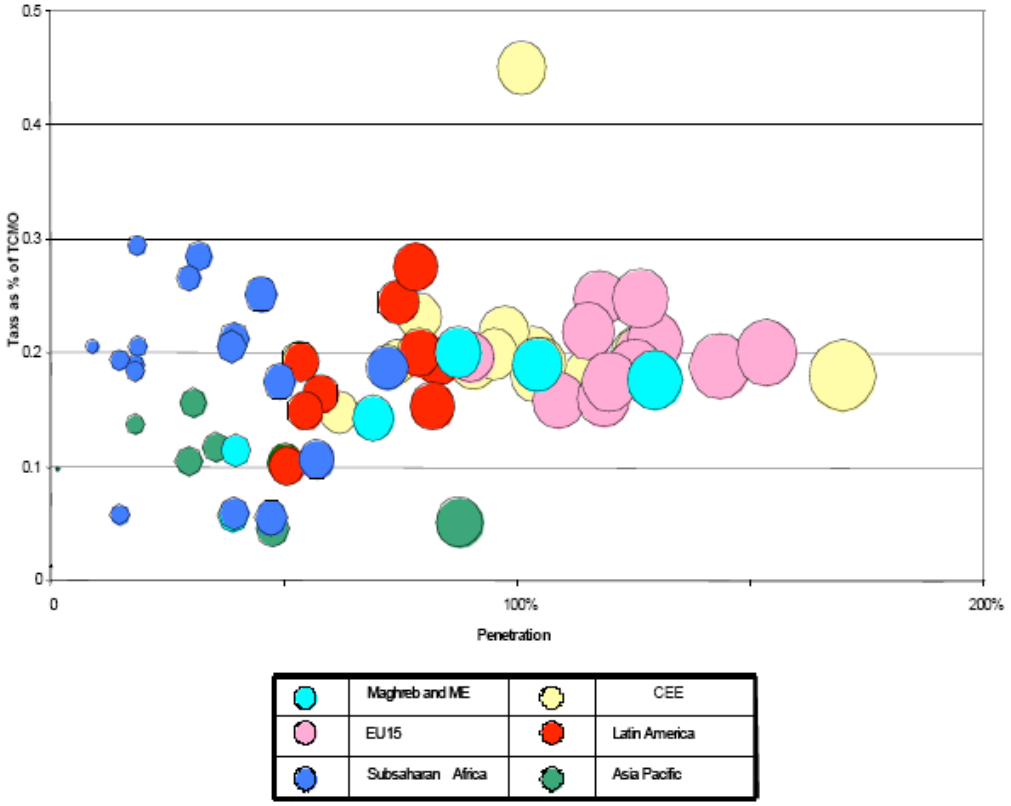

Figure 16: Tax as a percentage of TCMO and penetration
Source: Deloitte (2007). Global mobile tax review: 2006-2007. London: GSMA. Retrieved August 7, 2009 from http://www.gsmworld.com/documents/tax_review_06_07.pdf

Studies of user behavior and attitudes among SEC groups D and E in South and Southeast Asia showed that customers are unaware of the taxes embedded in phone charges (Figure 17). The GSMA has done some modeling that shows that removing taxes other than those imposed on all goods and service such as VAT will increase government revenues. Though the goal of removing all telecom-specific taxes is somewhat unrealistic, this is an area where further research can serve public policy goals of increasing connectivity as well as ensuring adequate revenues for the government from a dynamic sector of the economy.

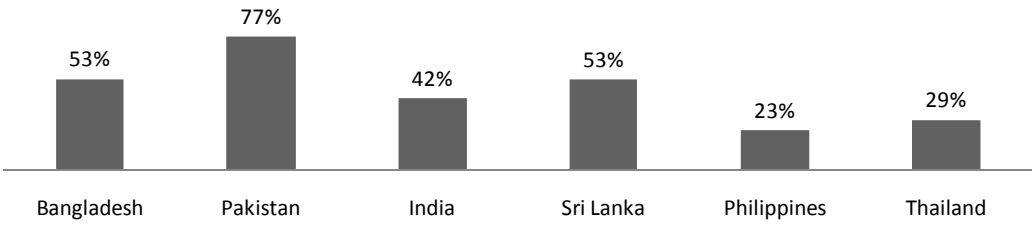

Figure 17: Awareness of tax component on phone charges (% of SEC D and E phone owners)
Source: LIRNE*asia* (2009) Teleuse@BOP3. Survey findings

6.0 Conclusion

Full participation in the global Internet Economy requires electronic connectivity of considerable complexity. Today, due to a worldwide wave of liberalization and technological and business innovations in the mobile space, much of the world is electronically connected, albeit not at the levels that would fully support participation in the global Internet Economy. Many millions of poor people are engaging in tasks normally associated with the Internet such as information retrieval, payments and remote computing using relatively simple mobile handsets. A new budget telecom network business model has enabled impressive gains in voice connectivity as well as the beginnings of more-than-voice applications over mobiles. Widespread broadband access among the poor is likely to be achieved by extending this model. It would also be the basis of coherent and efficacious policy and regulatory responses that would serve connectivity goals.

This report demonstrates that voice connectivity was achieved for a majority of the world's people, including substantial numbers of the poor, because governments removed or lowered barriers to participation in the supply of telecom services and created conditions conducive to competition, even if less than perfect. This was the necessary condition.

Where enough suppliers existed, intense competition, the critical step of implementing the budget telecom network model, occurred. The resultant, radically-lower prices attracted more minutes of use, which in turn made further reductions possible. Operators were able to load their networks with high volumes of revenue-yielding minutes because they had succeeded in reducing the transaction costs of dealing with low-volume customers. Prepaid, which accommodates the needs of those with irregular earning patterns was also a critical element because it allowed exploitation of long-tail markets by reducing transaction costs. Along with these business process innovations, the exponents of the budget telecom network model also succeeded in drastically reducing costs, especially opex. The new model makes ARPU irrelevant because what really matters is how many revenue-yielding minutes are carried on the network, not how much money is earned from a customer. In the same way that RyanAir and Air Asia make profits while conventional airlines lose money, budget telecom networks make more money than conventional operators despite offering radically lower prices. However, the model increases the volatility of earnings and results in lower quality of service.

The extension of the budget telecom network model to broadband requires that small, prepaid, irregular payments be allowed, which is a significant deviation from the dominant always-on, all-you-can-eat models. It appears that the former is already emerging in the mobile-based broadband offerings such as HSPA. And of course, there must be more content that is desirable to low-income consumers.

This suggests that accessing the Internet over mobile networks, whether from fixed locations, nomadically or while actually mobile, will become a major, if not the dominant, mode. This fits into the present trends where many functions of the

Internet, such as communication in multifarious forms, information retrieval and remote computing, are increasingly occurring over mobile networks through relatively modest and inexpensive mobile handsets. There is evidence that more than voice applications that foreshadow participation in the Internet Economy are beginning to gain ground among the poor, especially among the youth cohorts. It may be expected that these uses will increase as the business model gets sharpened and more services offered.

If business process innovations enabled by competition are solving the problem of electronically connecting billions of poor people, what is the role of government? When a business model, rather than direct government action, is delivering the goods the most appropriate government action is that which supports the business model. Policy and regulatory actions must be derived more from analysis of the requirements of the business model and less from public administration theory. Early in the present reform cycle the need to adopt policy and regulatory solutions that fitted the specific institutional circumstances was identified. Yet, in actual practice, policy and regulatory solutions devised for developed-country circumstances tended to be applied unchanged in very different settings.

The emergence of a new business model and deeper understanding of the functioning of government institutions in developing countries offers a possibility of devising policy and regulatory solutions that fit better. This would, for example, involve a greater emphasis on lowering market-entry barriers and making available more spectrum ahead of the previous preoccupation with interconnection. As costs come down across the board, the relative importance of the key input of domestic and international backhaul capacity increases, requiring greater regulatory attention. Again as retail prices come down, the importance of regulating anti-competitive practices will increase, especially with regard to vertical price squeeze.

The business model results in heavy loading of networks, necessarily resulting in occasional problems with quality of service. Gentle supervision of QOS which places emphasis on publishing comparative performance data and lowering barrier to the switching of suppliers would be the appropriate response in terms of the business model. Universal service funds have outlived their utility and are inimical to the business model. They should therefore be phased out. Taxation is increasingly becoming a central motivating element of government action with regard to telecommunications. It requires further study to identify the best ways in which governments can collect reasonable revenues without disrupting the business model.

Coherence of different policy and regulatory actions is a good thing. It can be achieved by fully understanding the core budget telecom network business model and ensuring that all policy and regulatory actions are consistent with it, not solely in terms of making the model work, but also in terms of ensuring that public-policy objectives are achieved by leveraging the model rather than working at cross purposes to it.