

Summit Level Group of Developing Countries GROUP OF FIFTEEN

THE ICT REVOLUTION AND G-15 COUNTRIES Suggestions for bridging the Digital Divide



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THE ICT REVOLUTION AND G-15 COUNTRIES

Suggestions for bridging the Digital Divide

Introduction

1. The value of information technology for developing countries was recognized by the G-15 during the very first years of the information and communications technology (ICT) revolution. As early as 1992, the Group launched the South Investment, Trade and Technology Data Exchange Centre (SITTDEC) – a project for exchanging trade and investment data among developing countries. This met with considerable initial success, evolving into a self-financed online facility called ‘Sibexlink’ that had more than 1000 reciprocal linkages to databases around the world. Over time, however, a variety of problems arose and in 2002 the project had to be wound up. In retrospect, it appears that the initiative was premature and ahead of its time. One of the main reasons for the inability of Sibexlink to sustain itself was the low level of ICT development in several G-15 countries then.

2. Meanwhile, in 2001, the Group decided to organize its XIth Summit under the theme “Harnessing the Potentials of the Digital Era for Development”. During the Summit, the Group passed the Jakarta Declaration on ICT for Development that established a G-15 Task Force on ICT. Subsequently, in 2002, member countries approved the Kuala Lumpur Framework Understanding for Cooperation in ICT. By then, many G-15 countries had begun to undertake reforms in the ICT sector and frame policies designed to tap the potential of the Internet, e-business and mobile telephony. Those countries that pursued ICT policy reforms vigorously early on have been able to reap the economic benefits of information technology. For many others, the pace of development of the sector has not picked up as fast. As we approach the end of the second decade of the ICT revolution, it may be appropriate to review the present status of ICT development in G-15 countries with a view to derive lessons that can facilitate better policy management, especially in those countries that may be missing out on the full benefits of the information age.

3. Many G-15 countries have come to occupy lead global positions in specific ICT sectors. Malaysia, with exports worth \$64,472m, was the 10th largest exporter of ICT goods in 2005, followed by Mexico at 12th position with exports worth \$43,878m¹. Similarly, India, with exports worth \$41,659m was among the top 10 exporters of ICT *services* in 2005². Eight other G-15 countries figured in the top 50 exporters of ICT services, including Brazil (\$7840m), Malaysia (\$5690m), Indonesia (\$4729m), Nigeria (\$3415m), Mexico (\$2541m), Egypt (\$2350m), Argentina (\$1842m) and Chile (\$1628m)³. These achievements are of enormous economic significance to the individual countries themselves. Export of electronic products in Malaysia and software exports in India are believed to have triggered off booms in the manufacturing and services sectors of these countries respectively. However, these success stories have been well documented elsewhere.⁴

¹ ICT goods include computer hardware, telephones, TVs and other electronic products.

² ICT services include software services, call centres and other back-office operations.

³ These figures have been taken from the Information Economy Report 2007-08, UNCTAD.

⁴ See, for example, Ashish Arora & Alfonso Gambardella, *From Underdogs to Tigers: The Rise and Growth of the Software Industry in Brazil, China, India, Ireland, and Israel*. Oxford University Press, 2006; Also see John A. Mathews and Dong-sung Cho, *Tiger Technology: The Creation of a Semiconductor Industry in East Asia*, Cambridge University Press, 2000.

4. This paper limits its analysis to two most influential technologies of the information age, viz, the Internet and the mobile telephone. Both have had profound effects on the manner in which individuals, businesses and government entities carry out their day-to-day operations in modern times. An important reason for focusing on them is because the spread of the Internet and mobile phones accelerates the process of technological diffusion within an economy and thereby contributes substantially to long-term economic growth. An understanding of the principal factors behind the spread of these technologies may contribute to informed policy management in G-15 countries.

The level of ICT development in G-15 countries

5. The last column of Table 1 gives world rankings for each of the G-15 countries in terms of the “ICT Opportunity Index”. This index, developed by the International Telecommunications Union (ITU) in November 2005 for 183 countries, uses a number of indicators to compare ICT development in different countries over time. It consists of a combination of 10 different indicators grouped into four sub-indices, that cover different aspects of ICT development viz, Networks, Skills, Uptake and Intensity.

Table 1
ICT Opportunity Index
(2005 values)

	<u>Networks</u> (main telephone lines per 100 persons; mobile phone subscribers per 100 persons; international Internet bandwidth (kbps per inhabitant)	<u>Skills</u> (Adult literacy rates; gross enrollment rates)	<u>Uptake</u> (Internet users per 100 inhabitants; proportion of households with TVs)	<u>Intensity</u> (Total broadband Internet subscribers per 100 persons; international outgoing telephone traffic (minutes) per capita)	World Ranking (1= Sweden; 183= D.R. Congo)
Jamaica	364	94	155	141	47
Chile	176	122	157	183	50
Malaysia	133	105	244	149	57
Argentina	151	102	197	125	60
Brazil	122	121	169	137	64
Mexico	114	109	151	129	70
Venezuela	102	115	120	120	76
Peru	74	113	125	114	81
Iran	77	98	117	73	98
Egypt	76	91	72	78	107
Algeria	80	95	45	95	113
Indonesia	58	103	49	73	121
Zimbabwe	29	78	74	77	127
Sri Lanka	54	98	29	77	128
India	39	79	36	75	133
Senegal	39	44	36	80	136
Nigeria	27	74	27	71	141
Kenya	26	73	24	71	145

Source: World Information Society Report, ITU, 2007

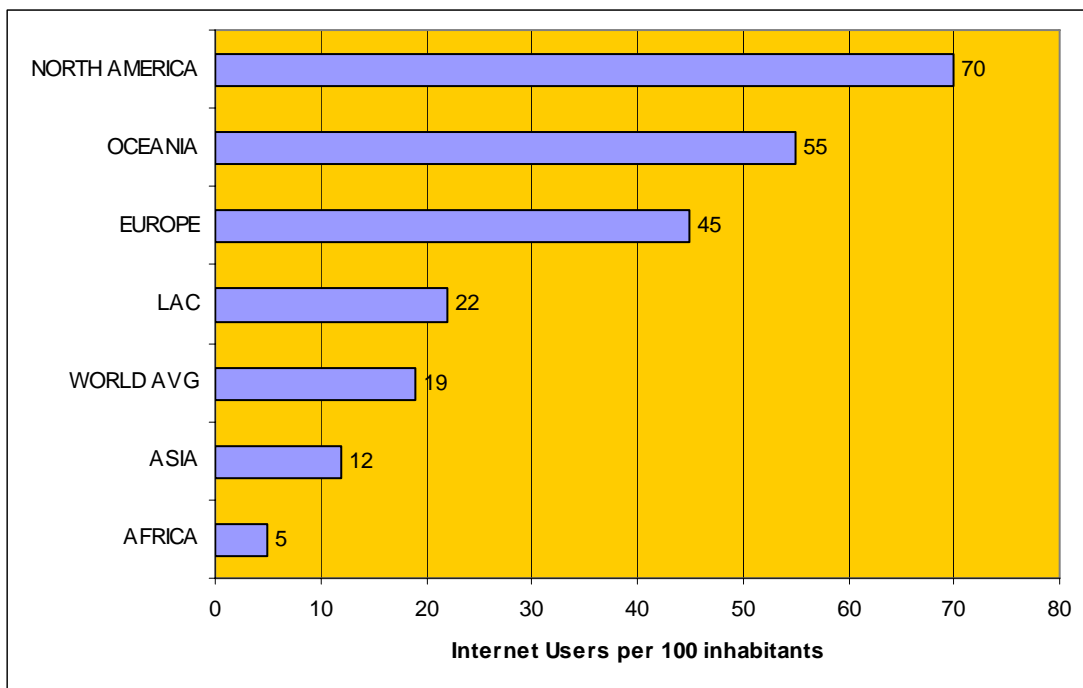
6. The above table reveals that only two G-15 countries figure in the top 50 in the global ICT rankings – Jamaica at number 47 and Chile at number 50. Another seven countries,

namely Malaysia, Argentina, Brazil, Mexico, Venezuela, Peru and Iran rank between 51-99. The remaining G-15 countries are all ranked between 100-150 in terms of their level of ICT development. A closer look at the table also reveals that the eight G-15 countries that are at the bottom of the list have poor scores under either the “Networks” sub-index or the “Uptake” sub-index, or under both. Algeria, for example, which has relatively good scores in the other three sub-indices, has a poor score under “Uptake”. Zimbabwe, on the other hand, has a poor score under “Networks” but fairly good scores under the others. Kenya has poor scores under both “Networks” as well as “Uptake”. As the table indicates, Internet usage takes up half the weight of the Uptake sub-index, while mobile phone usage constitutes one-third of the Networks sub-index. Thus, a country’s ICT world ranking is dependent to a great extent on its level of Internet and mobile phone usage. In the following sections we take a closer look at these two indicators of ICT development.

Internet penetration in G-15 countries

7. It is undisputed that access to the World Wide Web is necessary for the understanding and optimum use of most of the new technologies underpinning life in the modern world. In such a situation, the importance of expanding the Internet user base becomes integral not only to a country’s ICT policy framework but also to its overall development strategy. Some experts have suggested that the expansion of a country’s Internet penetration level constitutes a form of *technological diffusion* – the adoption of a new technology by workers who use it both to produce existing goods and services more efficiently, and also to produce new kinds of goods and services - a necessary condition for sustained economic growth.

Figure 1
Internet penetration (2007)



Source: TSF chart using data from ITU and www.internet.worldstats.com

8. Figure 1 indicates that the leading region in terms of Internet penetration⁵ is North America where 70 per cent of the population was using the Internet in 2007. In Oceania and Europe around 50 percent of the population was using the Internet. The chart also shows that on an average, one in five persons in the world was using the Internet in 2007.

9. How do individual G-15 countries compare in this regard? Table 2 shows Internet penetration levels in G-15 countries for the years 1996 and 2007.

Table 2
Internet penetration in G-15 countries

	Internet users per 100 inhabitants	
	1996	2007
Algeria	-	7.4
Argentina	.14	39.7
Brazil	.45	22.4
Chile	.69	43.2
Egypt	.07	7.5
India	.05	5.44
Indonesia	.06	8.5
Iran	-	27.5
Jamaica	.58	46.48
Kenya	-	7.5
Malaysia	.85	60
Mexico	.2	21.8
Nigeria	-	5.9
Peru	.25	25.5
Senegal	-	5.2
Sri Lanka	.06	2
Venezuela	.25	20.4
Zimbabwe	-	9.9

Source: Yearbook of Statistics, ITU July 2007 and www.internetworldstats.com

10. The table shows that in Malaysia, 60% of the population was using the Internet by 2007. The overall situation of Latin American and Caribbean members was also impressive, with all countries of the region having higher Internet penetration than the world average. Nine G-15 countries, or exactly half the total membership, had an Internet coverage level of less than 10%. In other words, Table 2 shows the existence of a ‘digital divide’ within the Group of 15.

Key determinants of Internet Penetration

11. Is there anything in the economic data available on G-15 countries that could suggest appropriate policy initiatives for bridging such a divide? The following section examines the role of three variables, which appear to have an impact on the rate of Internet penetration in

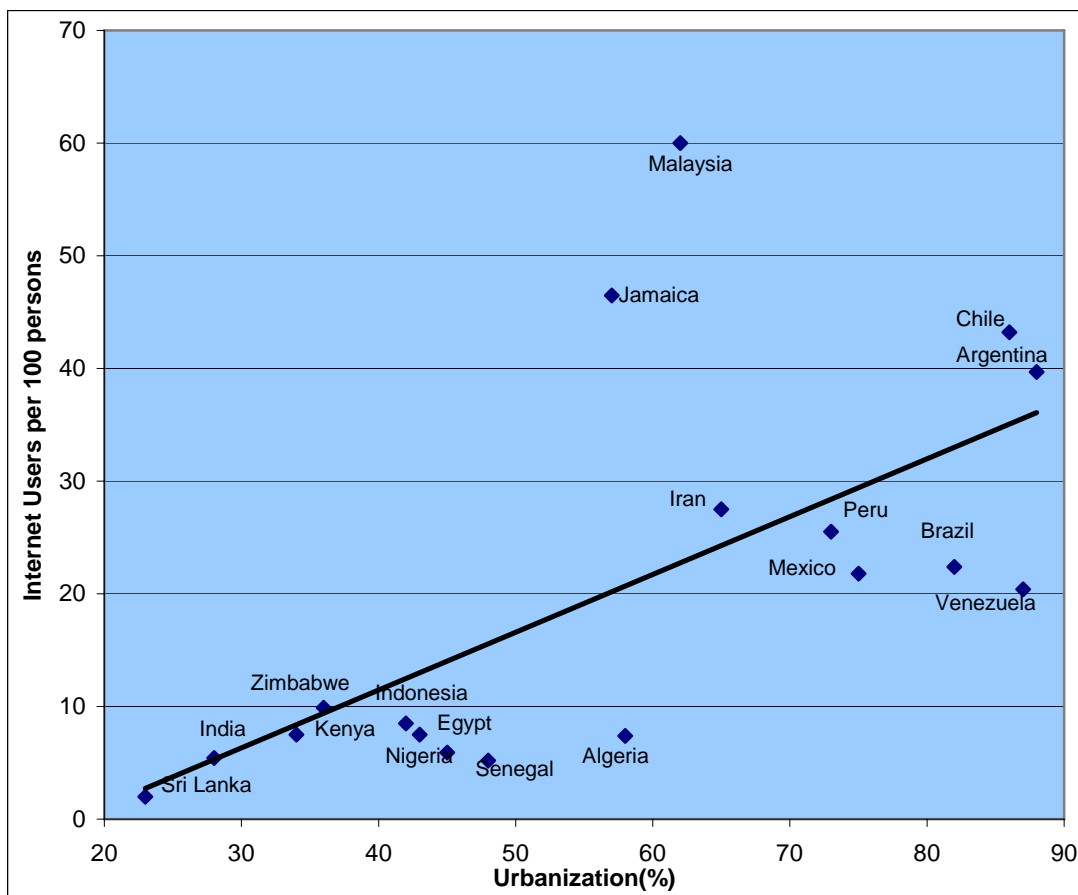
⁵ As population size distorts country-comparisons, the standard measurement used is not the absolute number of Internet users in a country, but the number of Internet users *per 100 inhabitants* or Internet penetration/coverage.

any country: *the extent of urbanization, Internet costs and financial investment in the telecom sector.*

Urbanization and Internet penetration levels

12. The highest rates of Internet penetration in the world (>85%) are found in Norway, the Netherlands and Iceland, countries that have very high rates of urbanization. Is there a similar pattern discernible among G-15 countries? Figure 2 has been drawn by plotting the number of Internet Users per 100 persons against the percentage of urban population in G-15 countries. The trend line slopes upwards, indicating a positive relationship between the two, i.e. the higher the extent of urbanization in a country, the higher the degree of Internet penetration. Not surprisingly, all G-15 member countries from South America - regarded as the most urbanized region on the planet - also have substantially high degrees of Internet penetration.

Figure 2
Urbanization and Internet penetration levels in G-15 countries



Source: TSF chart using data in Yearbook of Statistics, Time Series 1996-2005, ITU, 2007 and country statistics of the United Nations Human Settlement Program; urbanization figures for Malaysia and Venezuela from Malaysian Census 2000 and UN, World Urbanization Prospects, 1999.

13. That a relationship exists between the level of Internet penetration and the extent of urbanization should not come as a surprise. People living in urban areas are likely to be more literate, more technologically aware and therefore more likely to demand Internet services compared to their rural brethren; they are also likely to be richer and therefore better able to afford a personal computer. For the suppliers of Internet services too, urban areas allow economies of scale, making it cheaper to lay down networks (e.g. optical fibre cables for

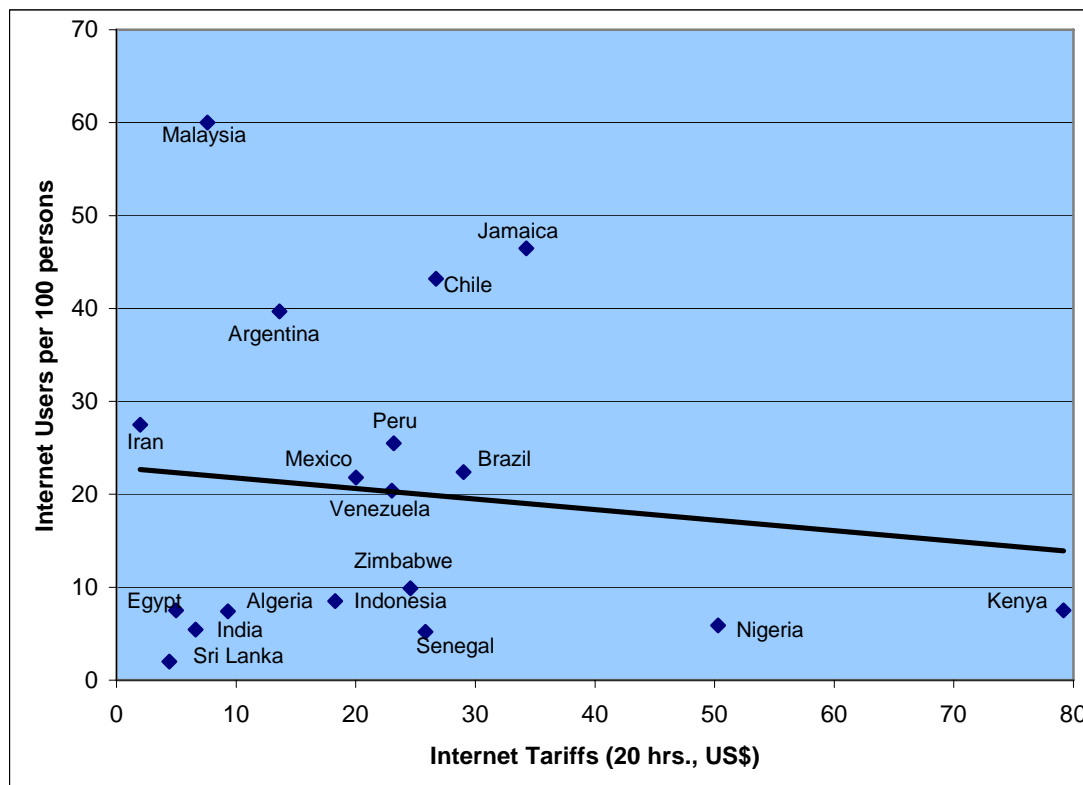
supply of broadband services). However, urbanization is a long-drawn process that cannot be used as a policy tool. Developing countries that wish to catch up in Internet penetration will have to look at other options that are more likely to bring about the desired results within a short period of time. One such potential policy instrument is the cost of accessing the Internet.

Access charges and Internet penetration levels

14. When governments were framing ICT policy in the early years of the Internet, high Internet access costs were perceived as a major barrier to Internet use. The problem then was that in most countries the provision of Internet services was the monopoly of the (usually state-owned) main telephone service provider or PSTN⁶. Subsequently, several countries initiated reforms that reduced monopolies in the telecom sector and introduced privatization and competition that led to a fall in Internet access costs for the consumer, triggering significant improvements in teledensities and Internet penetration levels.

15. How have G-15 countries fared in this regard? Do Internet access charges continue to influence Internet penetration within the Group? Figure 3 has been drawn by plotting the number of Internet users per 100 persons in each G-15 country, against Internet access tariffs for the year 2006. The trend line slopes downwards, indicating a negative relationship between the two, i.e. the higher the costs of accessing the Internet, the lower the level of Internet penetration. In other words, Internet access charges continue to matter in G-15 countries - an indication, perhaps, that telecom reforms remain incomplete in some countries.

Figure 3
Internet tariffs and penetration levels in G-15 countries



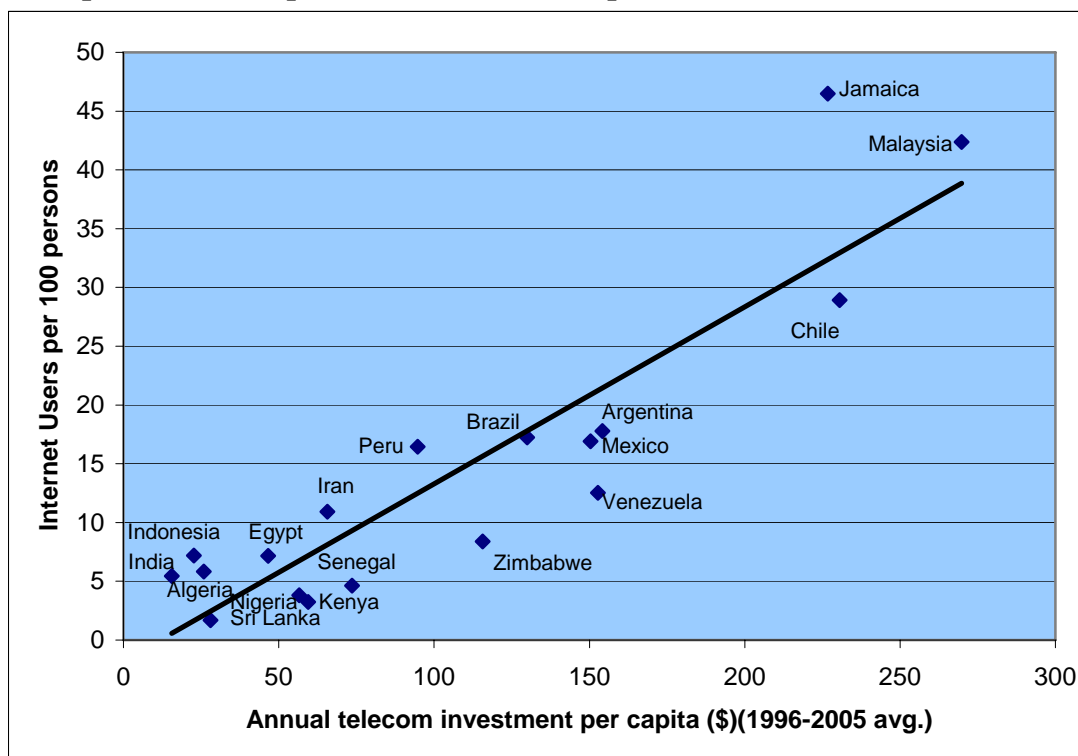
Source: TSF chart using data in Yearbook of Statistics, ITU, 2007.

⁶ Public Switched Telephone Network.

Investment in the telecom sector and Internet penetration levels

16. The ICT sector is extremely capital-intensive, requiring the laying out of a considerable amount of hardware before ICT services can be provided to end-users: telecom networks, terrestrial or VSAT, have to be created or upgraded, optical fibre cables have to be laid (in some instances, below ocean beds for cheaper and optimum speed of access), computer terminals and associated accessories have to be installed. Furthermore, in many developing countries, it may be necessary to first promote a culture of computerization by carrying out a programme of e-literacy. This typically occurs over a number of years, beginning with the introduction of computer education in schools and requires the cooperation of a large number of departments. All these call for huge financial investments in the ICT sector. Governments in developing countries would ideally like to have some evidence that shows that a link between the level of financial investment and the level of Internet penetration exists, before they commit scarce resources to this end. Is any such evidence available in the data?

Figure 4
Per capita telecom expenditure and Internet penetration levels in G-15 countries



Source: TSF chart using data in Yearbook of Statistics, Time Series 1996-2005, ITU, 2007.

17. Figure 4 plots annual telecom investment *per capita* made by G-15 countries for the period 1996-2005 against Internet penetration in each country⁷. The trend line is a sharply upward sloping graph, indicative of a strong positive relationship between the two, so that, for example, Malaysia, Chile and Jamaica, which have the highest levels of per capita investment, also have the highest levels of Internet penetration. This result suggests that among the various policy options available, hiking capital expenditure in the telecom sector is the one that is most likely to increase Internet penetration in the country. It is important to emphasize that it is not just a rise in the absolute amount of financial investment that is likely

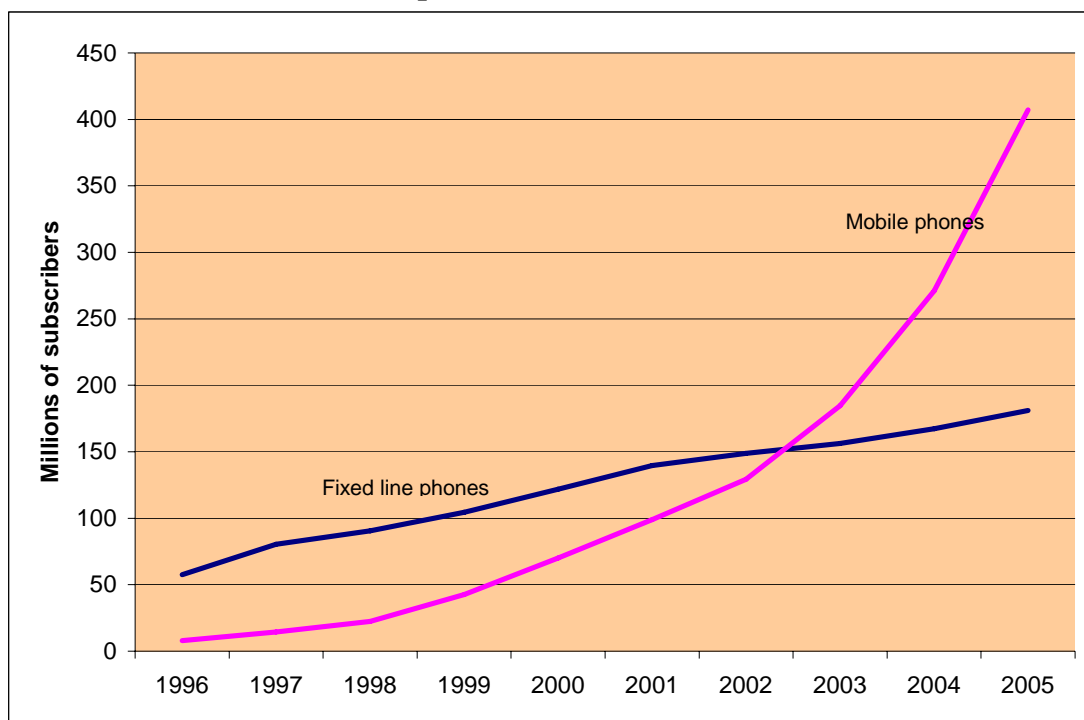
⁷ For equivalence, Internet penetration levels for the year 2005 have been used.

to make a difference. Rather, an increase in capital expenditure *per head* in the telecom sector should be the crux of the strategy.

Mobile phone penetration in G-15 countries

18. We now turn to the second symbol of the Information age - the mobile telephone. Its portable nature has made it the focus of continuous innovation by telecom equipment manufacturing firms. The addition of several new features every year has transformed it into a versatile communication instrument. Not surprisingly, even though it arrived on the scene later, the mobile phone has eclipsed the fixed-line phone in terms of the sheer number of users.

Figure 5
Mobile & Fixed phone subscribers in G-15 countries



19. Figure 5 shows that the total number of mobile telephone subscribers in G-15 countries had surpassed fixed phone subscribers by the end of 2002. Individual country data shows that mobile phone subscribers now outnumber fixed telephone subscribers in all G-15 countries with the sole exception of the Islamic Republic of Iran. In four countries, viz. Chile, Malaysia, Jamaica and Kenya, the number of fixed line subscribers has actually started declining during the past few years.

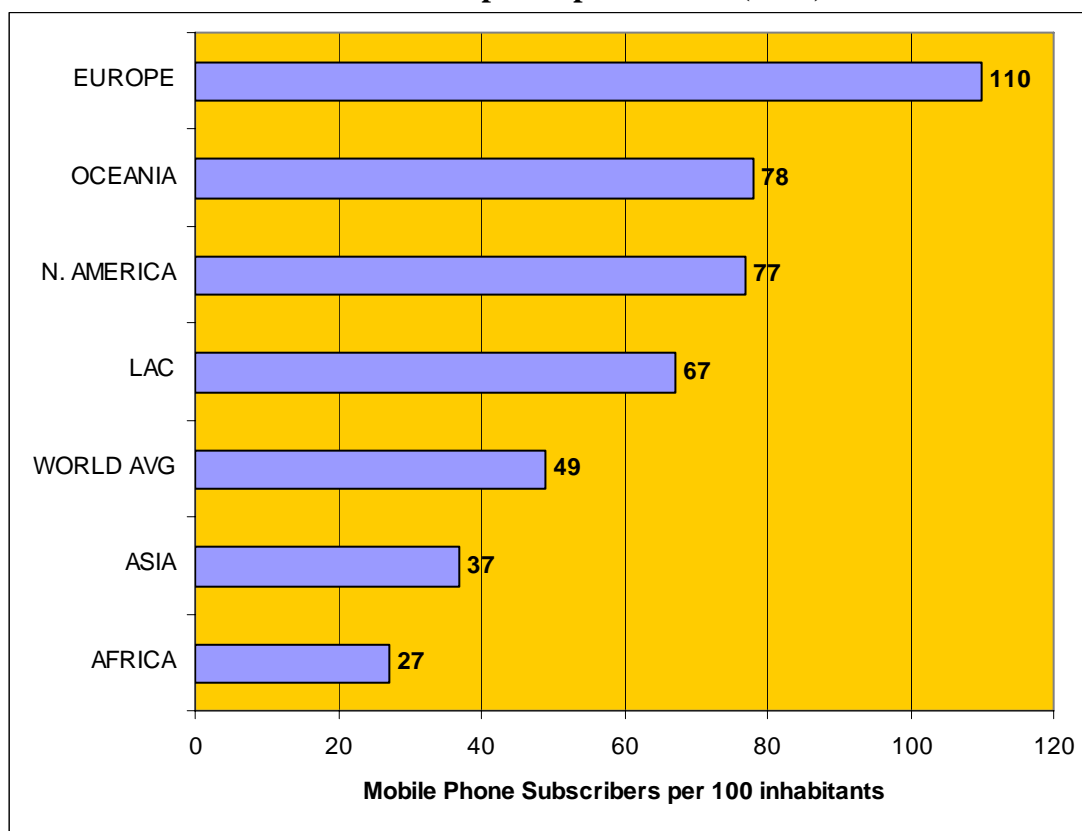
20. Increasingly, cellular mobile telephony is being regarded not just as a communication tool but also as an important trigger of economic development. Numerous examples exist of how mobile phones are driving entrepreneurship and growth, particularly in developing countries and rural communities. In Bangladesh, a country with significant overseas workers, banks have financed mobile telephones for village women who are able to increase their incomes by charging for calls made by village residents to their relatives working abroad⁸. In

⁸ This is the well-known Village Phone scheme of Bangladesh's Grameen Bank.

several sub-Saharan African countries, the mobile phone is increasingly being used for transferring money or making payments that bypass the conventional banking system. Customers gain from the lower user charges they pay on monetary transactions. Some experts suggest that mobile telephony provides a gateway to technological literacy. For many individuals or communities, once the initial hurdle has been overcome, the way is paved for the acceptance and use of higher levels of technologies (e.g. computers) ⁹. In this manner, mobile telephony becomes a catalyst for technological diffusion, and by raising the overall level of skills, contributes significantly to economic growth.

21. Figure 6 indicates that by 2007, the leading region in terms of mobile telephone penetration is Europe where a person owned more than one mobile telephone on an average. In Oceania and North America, around 75 percent of the population were mobile phone subscribers. The chart also shows that on an average, one in two persons was a mobile phone subscriber in the world by 2007.

Figure 6
Mobile phone penetration (2007)



Source:

TSF chart using data in www.itu.int/ITU-D/ict/statistics

22. How do G-15 countries compare with each other and with the rest of the world in terms of mobile phone coverage? Table 3 shows mobile phone penetration levels in G-15 countries for the years 1996 and 2007.

⁹ UNCTAD, Information Economy Report, 2007-2008, Overview page 23.

Table 3
Mobile phone penetration in G-15 countries

	Mobile phone subscribers per 100 inhabitants	
	1996	2007
Algeria	0	63.34
Argentina	1.90	102.2
Brazil	1.52	63.08
Chile	2.22	83.89
Egypt	0	39.80
India	0	19.98
Indonesia	0.28	35.33
Iran	0.10	41.81
Jamaica	2.17	93.74
Kenya	0	30.48
Malaysia	7.18	87.86
Mexico	1.07	64.07
Nigeria	0	27.28
Peru	0.84	55.25
Senegal	0	33.21
Sri Lanka	0.40	41.37
Venezuela	2.56	86.13
Zimbabwe	0	9.18

Source: Yearbook of Statistics, Time Series 1996-2005, ITU, July 2007 and Information Economy Report, 2007-2008, ITU-UNCTAD, 2008.

23. By 2007, mobile phone penetration in Argentina had reached European levels, with coverage crossing 100 %. The overall situation of Latin American and Caribbean members was impressive, with all countries of the region having mobile phone penetration levels higher than 50%. However, all African and Asian member countries, with the exception of Algeria and Malaysia, had mobile phone penetration levels below the world average. Table 3 therefore underscores the digital divide that exists among member countries of the G-15.

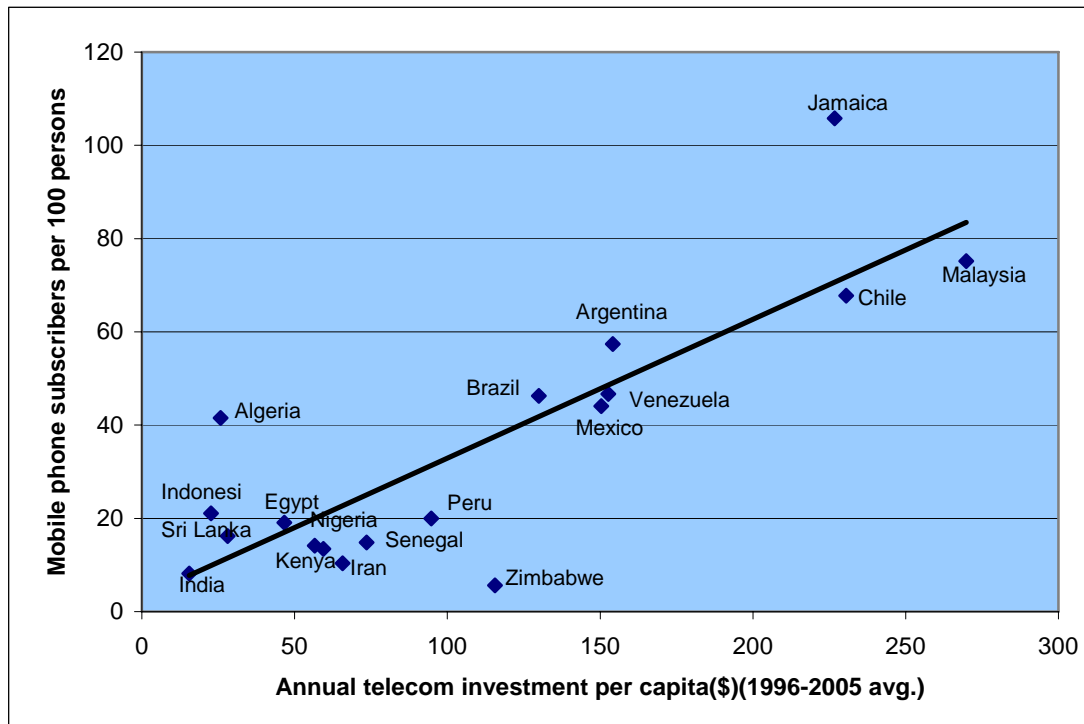
Key determinants of Mobile phone penetration

24. Given the broader economic benefits of mobile telephony, what can G-15 governments do to promote its wider use? In an attempt to answer this question, we looked at the mobile phone penetration levels in G-15 countries and tried to link them to a number of other variables that had the potential of influencing mobile phone usage. Specifically, we analyzed the links between mobile phone penetration and (a) the price of using a mobile phone; (b) extent of urbanization; (c) the level of competition in the mobile telephones market; (d) the extent of privatization and (e) financial investment in the telecom sector. This exercise revealed that with the exception of (e) and to a limited extent (b), none of the other factors appear to have much influence on the spread of mobile telephony.

25. Urbanization, to some extent, does influence the extent of mobile phone coverage in G-15 countries. However, statistical analysis shows that the relationship between the two is weak, and is likely to remain so in view of the fast rising demand for mobile phones in rural areas.

26. However, the single most important factor found to be affecting the level of mobile phone penetration in G-15 countries was financial investment in the telecom sector. Figure 7 plots mobile phone subscribers per 100 inhabitants in 2005 in each of the G-15 countries against annual per capita investment in the telecom sector for the period 1996-2005.

Figure 7
Per capita telecom expenditure and mobile phone penetration in G-15 countries



Source: TSF chart using data in Yearbook of Statistics, Time Series 1996-2005, ITU, 2007.

27. Like in the case of the Internet, the trend line slopes upwards, indicating a positive relationship between the two variables. Countries like Jamaica, Malaysia, Chile and Argentina, with high investments in the telecom sector also have high levels of mobile phone penetration. The prognosis for policy makers is clear: increase investment in the telecom sector on a per capita basis in order to improve mobile phone penetration levels in a country.

28. An interesting finding of the exercise was the low correlation between the price basket of a mobile phone subscription and mobile phone penetration. Two possible explanations could account for this unusual result. On the one hand, it could be that high levels of competition in the mobile phones market has forced operators to concede increasingly larger shares of their profit margins to customers, leading to a continuous fall in subscription charges to a level where price is no longer a deciding factor. It could also be evidence of the willingness of customers to obtain a mobile phone subscription, *regardless of costs*, a reflection of the critical role mobile phones have come to play in the lives of ordinary people in the information age.

Conclusions and Recommendations

29. This Working Paper has been motivated by the challenge of informing G-15 member countries about their present level of ICT development and also to discover policies that may help the less developed countries to catch up with the rest in this critical sector of the modern era. The data shows that relatively low levels of Internet and mobile phone penetration have prevented many G-15 countries from achieving higher levels of ICT development.

30. A key recommendation that emerges from the findings in the paper is that an increase in the *intensity* of financial investment in the ICT sector i.e. a rise in investment *per capita*, can lead to a rise in both Internet and mobile phone penetration levels.

31. Policies that aim at reducing access charges also require a fresh impetus in some countries. As highlighted in this paper, these remain important for promoting the spread of the Internet, though not as much for mobile telephony. What can G-15 countries do to reduce Internet access charges further? An early World Bank study found that in African countries, for example, 42 % of Internet access charges were related to the cost of purchasing computer equipment¹⁰. As most developing countries are importers of ICT equipment, policies designed to minimize import duties on ICT equipment become important. At present just four G-15 countries – Egypt, India, Indonesia and Malaysia - are signatories to the World Trade Organization’s Information Technology Agreement under which countries bind themselves to reduce import duties on ICT products to zero within a fixed time period.

32. Another 43% of Internet costs were attributed to the fees paid by the customer to the Internet service provider (ISP). Here the importance of completing the process of regulatory reforms in the telecom sector cannot be overemphasized. In a few G- 15 countries, partial monopolies continue to exist in certain critical ICT sectors that keep ISP charges artificially high¹¹. Inadequate electricity supply and the high cost of investment capital are some of the other reasons that have been attributed to the high cost of accessing the Internet in some other countries¹².

33. The Kuala Lumpur Framework Understanding for G-15 Cooperation in ICT called for “collaborative efforts in bridging the digital divide by encouraging human resource development, capacity-building, training and education programmes targeted at the youth, women, small and medium-sized enterprises, and rural businesses at the national and G-15 levels”. Unfortunately not much was achieved in terms of joint activities due to lack of subsequent follow up. The data shows that a digital divide continues to exist within the G-15. This paper suggests that national and collaborative efforts that focus on increasing Internet and mobile phone usage can contribute to the bridging of this divide, and also to long-term economic growth. To this end, Malaysia, Chile, Argentina and Jamaica, who lead in both Internet and mobile phone penetration, are ideally placed to be nodal countries for future joint efforts within the Group.

¹⁰ ‘Economic Toolkit for African Policymakers’ Africa Internet Forum, UNECA and infodev project <http://www.infodev.org>

¹¹ VSAT and international gateways are two such sectors that have not been fully liberalized.

¹² African Telecommunications/ICT Indicators, 2008, ITU.

Annex Table 1

	Internet Users per 100 inhabitants (2005)	Urban Population (%) (2001)	Internet Access Charges* (\$) (2005)	Per capita Investment in telecom sector (\$)**
Algeria	5.83	58	9.31	25.82
Argentina	17.78	88	13.62	154.14
Brazil	17.24	82	29.02	129.98
Chile	28.93	86	26.7	230.51
Egypt	7.15	43	4.98	46.6
India	5.44	28	6.6	15.56
Indonesia	7.18	42	18.27	22.65
Iran	10.93	65	1.98	65.66
Jamaica	46.48	57	34.25	226.74
Kenya	3.24	34	79.18	59.44
Malaysia	42.37	62	7.61	269.77
Mexico	16.9	75	20.03	150.32
Nigeria	3.8	45	50.29	56.62
Peru	16.45	73	23.17	94.7
Senegal	4.63	48	25.82	73.57
Sri Lanka	1.69	23	4.41	28.04
Venezuela	12.54	87	23.02	152.69
Zimbabwe	8.4	36	24.58	115.59

*20 hours per month usage

**1996-2005 annual average

Annex Table 2

	Mobile Subscribers per 100 inhabitants (2005)	Urban Population (%) (2001)	Mobile phone price basket (\$) (2005)	Per capita Investment in telecom sector (\$)	Competition in mobile phone market*	Extent of privatiza tion of PSTN** (2005)
Algeria	41.52	58	7.5	25.82	3	1
Argentina	57.41	88	7.8	154.14	5	5
Brazil	46.25	82	26.5	129.98	5	5
Chile	67.79	86	11.4	230.51	5	5
Egypt	19.1	43	5.8	46.6	3	1
India	8.17	28	2.4	15.56	5	3
Indonesia	21.06	42	4.3	22.65	5	3
Iran	10.39	65	2.6	65.66	3	1
Jamaica	105.78	57	7.5	226.74	5	3
Kenya	13.46	34	16.5	59.44	3	1
Malaysia	75.17	62	5	269.77	5	3
Mexico	44.04	75	14	150.32	5	5
Nigeria	14.13	45	10.6	56.62	3	1
Peru	19.96	73	22.9	94.7	5	5
Senegal	14.84	48	9.6	73.57	5	3
Sri Lanka	16.21	23	1.2	28.04	5	3
Venezuela	46.71	87	1.2	152.69	5	3
Zimbabwe	5.61	36	3.4	115.59	5	3

* 1= Monopoly; 3= Partial competition; 5= Full competition

** 1= Government owned; 3= Partly privatized; 5= Fully privatized