"Bridging the urban-rural digital divide and mobilizing technology for poverty eradication: challenges and gaps".

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1. **Introduction**

The issue of the "digital divide", the technological gap between the "haves" and the "have nots", has been identified as a potential contributor to the widening income gap both within and among countries for about 20 years now. Whereas, the internationally observed increases in inequality appears to be driven by factors such financialisation and the control of biotechnology, the unbalanced distribution of ICTs have also played a critical role. Despite the many positive aspects of these developments, in all three areas, advances in technology has made it easier for the emergence of monopolies or other forms of concentrated ownership rights, mainly within the hands of residents in large urban centres. Therefore, an essential part of the challenge of narrowing income gaps is the spreading of these technological advances to more rural areas and placing ownership into the hands of greater numbers of ordinary people. Several studies have shown that there are clear benefits from increasing connectivity, ranging from the micro level – increasing farm output, to the macro level, increasing GDP growth. The question is whether these benefits can be sufficiently diffused to have a major impact on rural poverty.

This brief paper summarizes some of the more challenging aspects of the "digital divide" in terms of its impact on bridging the urban-rural poverty gap. It outlines the problem on a global scale and identifies obstacles that limit the use of ICTs in reducing poverty in developing countries in Section 2. The specific problem of Internet access is examined in Section 3. In Section 4 a number of examples of attempts at using ICTs in closing the technology and income gaps. The paper concludes with some specific policy recommendations in Section 5.
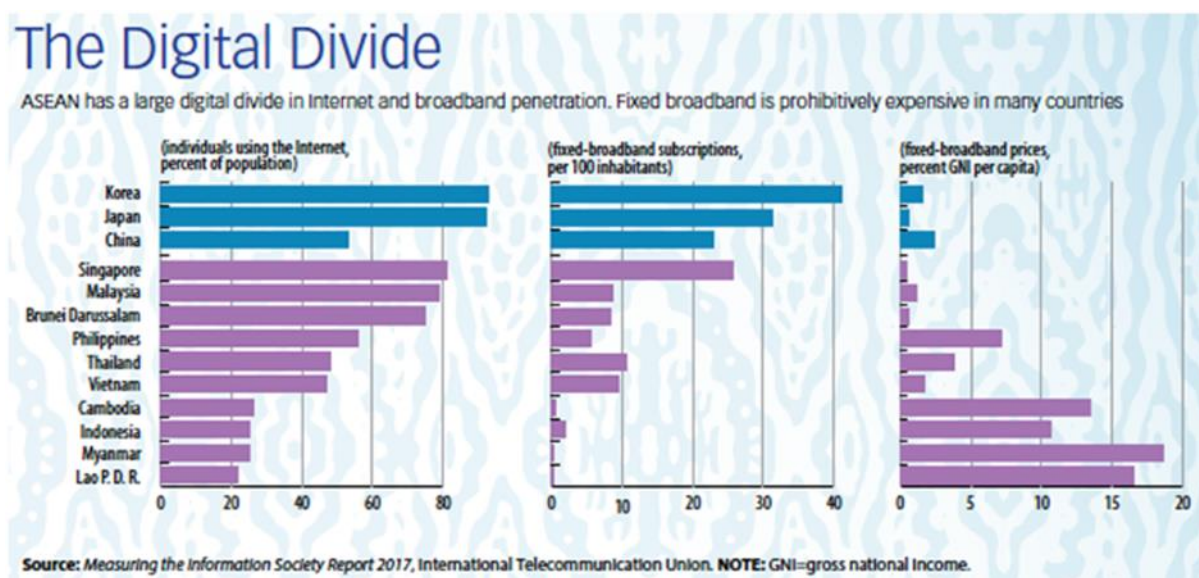
2. **The Challenge of Technology and Uneven Development**
   Rural – Urban Bias

Long before recent innovations in ICTs, there was a tendency towards uneven development between urban and rural areas in most developing countries. This was identified as the "urban bias" in the literature on economic development. In fact, early talk of the digital divide was met with resistance by some who argued that it was a "non-issue" or just another aspect of the existing urban bias and not really worth studying as a separate topic. However, as time progressed, and the evidence of increasing income inequality mounted, the doubters conceded that there was indeed a problem, that is, the digital divide was real and it was contributing to the observed income gaps

Even though there has been significant progress in the world wide use of the Internet, The ITU in its latest 2018 report, says that more than half of the world's population (3.9 billion) is now online. That is the good news. The bad news is that the other half is still offline. Most of this "other half", is in the developing countries, where on average only 45 percent of the population are using the internet. It is highly likely that most of the people offline are in rural areas.

For example, in China, statistics from the Ministry of Science and Technology in 2003 revealed that the total number of Internet users in rural China was 600,000. This was in sharp contrast to the country's entire number of Internet users which was more than 60 million. This coincided with an income gap which was estimated at 5 to 1 or even 6 to 1 in terms of per capita income. This gap has closed somewhat in more recent times However, in general, Asia continues to have a significant divide among and within countries. As seen in

Figure 1, taken from Finance and Development (2018), the Internet, especially broadband access, is inversely related to cost as a percent of gross national income (GNI).

The Digital Divide

ASEAN has a large digital divide in Internet and broadband penetration. Fixed broadband is prohibitively expensive in many countries

Source: *Measuring the Information Society Report 2017*, International Telecommunication Union. **NOTE:** GNI=gross national income.

In the case of Africa, the continent overall continues to lag behind in the availability, affordability, and use of ICTs. According to the ITU, Africa remains the region with the lowest ICT development Index (IDI). They note that: "the average value for this region in IDI 2017 is 2.64 points, little more than half the global average of 5.11". They further point out that only "Mauritius, ranked in the upper half of the global IDI distribution, while 28 of the 38 African countries included in IDI 2017 fall into the lowest (LCC) quartile"[i]. Again, this clearly relates to the basic lack of development infrastructure in the region. However, two countries, Namibia and Gabon, were among only three to show significant improvements in their IDI over 2016.

In Latin America and the Caribbean, as early as 2008, the ECLAC was reporting that experience has shown that digitization of information and communication flows has a positive impact on production processes and, consequently, on economic growth. Furthermore, From the social inclusion viewpoint, mobile telephones have experienced the fastest and most massive expansion of any technology in the history of Latin America and the Caribbean, and have improved the quality of life of the poorest segments of the population (ECLAC,2008, p.34).

The Caribbean, in particular, was seen as at "late comer", in terms of the liberalization of its telecommunications sector. In many islands, the British company Cable and Wireless, or its subsidiaries, had a monopoly on both domestic and international traffic. Breaking their monopoly control was very challenging for many of these small states, but it was a necessary step towards lower telecommunications costs. It was not till the entry of Digicel in the mid 2000s that there was a significant drop in call charges and the rapid expansion of Internet usage, as can be seen in the Table 1 below. This once again shows the importance of having a competitive environment for ICTs as it clearly results in cost reductions to the average user.

Table 1:   Caribbean and Latin America, Internet Penetration (2000-2016)

Country Name	2000	2005	2009	2010	2011	2012	2013	2014	2015	2016
World	6.7	15.7	25.4	28.7	31.1	34.2	36.7	39.8	43.0	45.8
Barbados	4.0	52.5	64.7	65.1	66.5	71.2	71.8	75.2	76.1	79.5
Trinidad and Tobago	7.7	29.0	44.3	48.5	55.2	59.5	63.8	65.1	69.2	73.3
Jamaica	3.1	12.8	24.3	27.7	37.4	33.8	37.1	40.4	42.2	44.4
Latin America & Caribbean	3.9	16.6	31.0	34.7	39.4	43.2	46.3	48.6	54.6	57.4
Caribbean small states	4.9	19.4	31.8	35.4	42.2	42.6	45.3	48.4	50.9	53.6

Sour**ce: World Development Indicators**

Starting from a very low level of internet penetration in 2000, the region has shown significant progress in catching up with the rest of the world.   By 2016, the small islands of Barbados and Trinidad and Tobago surpassed the ITU target of 70 percent penetration by 2023.   Chart 2 further shows the digital divide within the region.   Just as in Asia, there is a clear association with broadband costs and access.   Whereas, Barbados, St Kitts and Trinidad and Tobago, appear to making progress in closing the gap with the developed countries, Jamaica and Haiti are lagging behind.

Chart 2: Digital Divide in the Caribbean
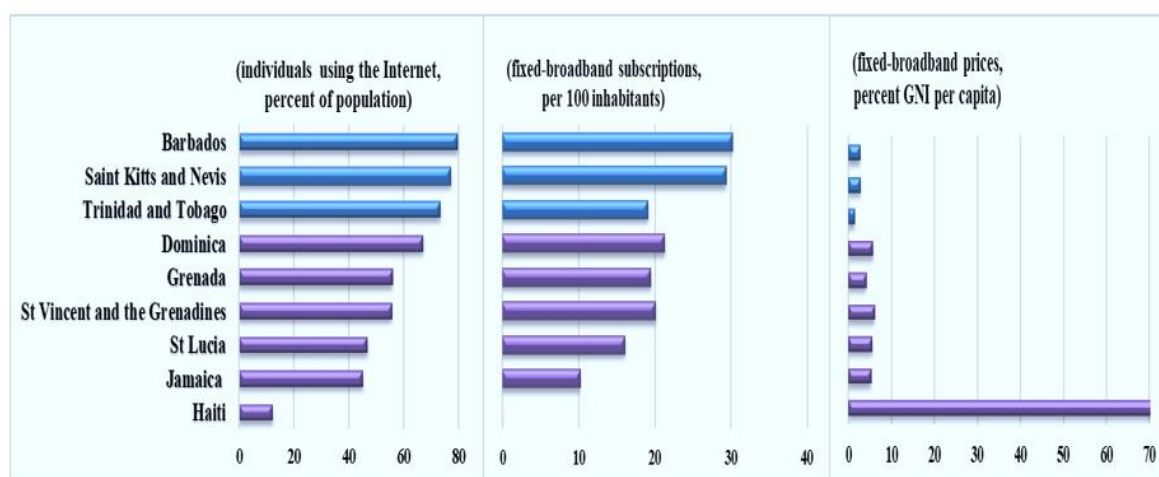
Source: ITU, Measuring the Information Society Report, 2017

3.   Internet Access and the Channels of Impact on Rural Poverty

It has been observed that even though 60 per cent of world households had Internet access at home in 2018, up from less than 20 per cent in 2005, fewer than half of households had a computer at home. This illustrates two major limitations on government's ability to bridge the digital divide and reduce rural poverty.   One, the mass penetration of mobile phone usage in many developing countries may be masking the general lack of computer skills, and two, there are some basic infrastructure issues still undermining the diffusion of ICTs.   Many average people access the Internet on their mobile phone and a typically with a "pre-paid" plan as post-paid plans are too expensive.   Fixed line and wired networks are usually unavailable or beyond their reach.

Some of the main, generally agreed upon, issues preventing the adoption and use of ICTS are:

- Lack of electricity, especially in rural areas; 15 percent of the world population is estimated to be without electricity
- Literacy: many (13 percent) are still incapable of basic reading and writing
- Gender: women are 50 percent less likely to be online
- Poverty: millions of people still live below the international poverty line
- Affordability: the high cost of broadband access in many countries
- Language: most online content is only in a handful of languages
- Local content: lack of locally appealing apps hinders usage
- Network coverage: 3G networks reached 70 percent of population but was only 29 percent in rural areas in 2016.

There may be many more locally specific factors, including issues of ethnicity, discrimination, ill-advised government policy and geographic difficulties in certain countries. For example, misguided regulatory policy on spectrum allocation can lead to higher costs. Also taxation can have an even more direct effect on costs. The Global System for Mobile Communications (GSMA) estimated that in 2014, taxes applied directly on mobile consumers represented 20% of the total cost of mobile ownership (TCMO) across 110 countries surveyed, up from 18% in 2008 and 17% in 2007. In many countries, including many developing nations, taxes can represent 30% to 40% of cost of owning a mobile device. Given that many of the apps currently being developed to assist farmers and villages in rural areas are concentrated on mobile platforms this can be a serious issue.

4. **Potential for Poverty Reduction: Some Specific Examples**

Based on all available research, there is no question as to the potential for digital innovations to have a direct and significant impact on poverty reduction and improving the living standards in rural areas in the developing world. Thus far, most of the innovative apps have been designed for mobile platforms. This is in keeping with the fact that cell phone penetration has far outstripped other forms of digital devices. The following are a few specific examples of how recent technological developments are changing the world and giving us insights into why developing country governments need to be very proactive in overcoming the digital divide.

Mobile for Development is an initiative of the GSMA, which is supposed to foster cooperation among mobile operator members, tech innovators, the development community and governments, to prove the power of mobile in emerging markets. They aim to identify opportunities and deliver innovations with socio-economic impact in financial services, health, agriculture, digital identity, energy, water, sanitation, disaster resilience and gender equality[1]. They claim that their work has impacted 30 million lives across 49 countries.

GSMA mHealth program Under the mNutrition Initiative funded by UK aid, works with mobile operators and other mobile and health sector stakeholders to support the launch and scale of mobile health services. As of June 2018, these services have cumulatively delivered lifesaving maternal and new born child health and nutrition content to over 2 million women

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[1] https://www.gsma.com/mobilefordevelopment/

and their families across eight sub-Saharan African markets: Nigeria, Ghana, Malawi, Tanzania, Zambia, Mozambique, Uganda and Kenya[2].

Esoko Is a mobile app that was initially developed to provide a technological solution to collect and share market prices via SMS with farmers across most African countries. It has since evolved in having agricultural content and on-the-ground deployment services for any business needs with regards to agriculture. It is seen as the gateway to services such as marketing and goods sourcing, mobile money deployments, national farmer clubs and statistical services[3].

Drones to fight Deforestation This recent development can address one of the major sauces of displacement and poverty on rural areas: deforestation. Some are estimating that drones can plant as many as 100,000 trees in a day. For, example, a group of villagers along the country's Irrawaddy River will soon use drones to plant a million new mangrove trees in an effort to restore the area's natural ecosystem[4]. One of the innovators of tree-planting drones, Fletcher "This isn't just a convergence of technology, it's actually a convergence of social will and political power that are all focused on this global problem."

The list of Apps and innovations can be quite extensive, however, unless the underlying issues of access and affordability are resolved then they will remain out of the reach of most the poorest rural people.

5. Summary and policy Recommendations

There are several dimensions to digital divide that needs to be addressed by policy makers: (1) how to get greater access to devices for average citizens, (2) how to improve the skills and training necessary to make use of the devices (3) how to foster a culture of innovation, especially in the development of local content, and (4) how to overcome gender and other biases that are still present in many developing countries.

First, improving access requires:
- Government policies that encourage competition in domestic telecom markets
- The removal of all taxes on Mobile and other ICT devices
- Public-private partnerships to incentivise the spread of devices
- Ensuring minimal access standards
- Developing broadband plans
- Careful spectrum policies
- Increasing the number of local IXPs
- Specific regions can move towards a single IT space

Second, improving skills and training:

- Addressing digital literacy
- Promoting better understanding of the benefits of the internet
- A holistic approach to skills development strategy

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[2] (https://www.gsma.com/mobilefordevelopment/mhealth/creating-mobile-health-solutions-behaviour-change)

[3] (https://www.africa.com/most-popular-mobile-apps-in-africa)

[4] https://www.curbed.com/2017/8/11/16130522/tree-planting-drones-myanmar-biocarbon

- Systems to track new required skills
- Embedding IT skills in school curricula

Third, innovation and local content:

- Locally appropriate, holistic and smart community-based policies
- Social and Community based networks.

Forth, overcoming gender and other social biases:

- Wage parity between men and women
- Addressing "time poverty" issues (the 'Internet Saathi' campaign)
- Making programs "skill specific"
- Encouraging more women in STEM fields
- More gender specific data collection and research

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[i] Measuring the Information society Report, 2017