Enabling the Use of ICTs and Broadband: Understanding What Works to Stimulate ICT Adoption

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BROADBAND COMMISSION
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Foreword by Mr Houlin Zhao, ITU Secretary-General

As Co-Vice Chair of the Broadband Commission for Sustainable Development, I warmly welcome this report as a key contribution to the ongoing work programme of the Commission. Created in 2010 by ITU and UNESCO, the Commission believes that broadband can play a vital role in achieving the UN Sustainable Development Goals (SDGs), as well as underpinning inclusive and sustainable development. Through the engagement of its high-level Commissioners and different Working Groups, the Commission has contributed to the wealth of knowledge and campaigning actively to raise awareness of the social and economic benefits enabled by broadband networks, applications and services.

Today, the digital divide is proving stubbornly persistent, and attempts to connect the remaining offline populations must overcome major challenges. According to the latest ITU estimates, in 2016, over two thirds of the global population now live within mobile broadband network coverage. ITU data has also shown that ICT services are becoming more affordable. Despite these favourable conditions, more than half the world's population – some 3.9 billion people – will still be offline at the end of 2016. Historically, supply-side measures have tended to focus on the provision of services through the expansion of networks and technological coverage areas. Today, however, attention is shifting to programmes to boost effective demand for broadband services, which are coming to the fore as a key contributor to narrowing the digital divide.

This year's edition of the Commission's annual report, The State of Broadband 2016, highlighted that increased awareness and the ability to use broadband services effectively are critical to bringing the next 1.5 billion people online and to stimulating the growth, take-up and use of the Internet by new consumers. One of the recommendations put forward in the report is to increase investments in awareness campaigns, training programmes and the development and hosting of local content, including in local languages, which can help promote effective use of broadband services.

Each Working Group of the Broadband Commission undertakes in-depth analysis of the different social and economic aspects of broadband. The Working Group on Demand was led by Intel and comprised 12 Commissioners throughout 2015-2016. This report provides a lessons learned and impact analysis based on different demand creation programmes and policies which are spurring the use and adoption of broadband.

Houlin Zhao
ITU Secretary-General

Foreword by Mr John Galvin, GM and Vice-President, Intel Government and Education

Information and Communication Technologies (ICTs) play a critical role in the implementation and execution of the United Nation's Sustainable Development Goals (SDGs). The SDGs represent a global, multi-stakeholder, action-oriented commitment and an opportunity for collaboration on driving economic and social development to achieve a better future. Broadband is a key enabler with proven evidence of both its social and economic value with positive impacts for GDP, productivity, job creation, education, governance, and employment.

Despite these benefits, service providers often lack the business case to develop and expand broadband services in certain areas and existing broadband infrastructure often remains underutilised, due to factors such as lack of affordability, interest or knowledge. In this report, we take an in-depth look at demand creation programmes which develop relevant services, programmes and initiatives to unlock the benefits of broadband, address barriers to adoption, and increase first time users. The report examines case studies of different country-led programmes from around the globe, targeted to stimulate ICT adoption and increase the use and impact of technologies and broadband. It focuses on these critical demand creation efforts in parallel to broadband deployments which address adoption issues in real time. Each case study provides a unique lens and a set of best practices that can be scalable and replicable in other contexts.

At Intel, we see significant opportunities to do business while having a positive social impact. Collaboration and public-private partnerships are key to having significant impact in leveraging the opportunities related to broadband access and use. We hope that together we can encourage more equitable access and adoption of ICTs and relevant services.

John Galvin
General Manager and VP, Intel Government and Education

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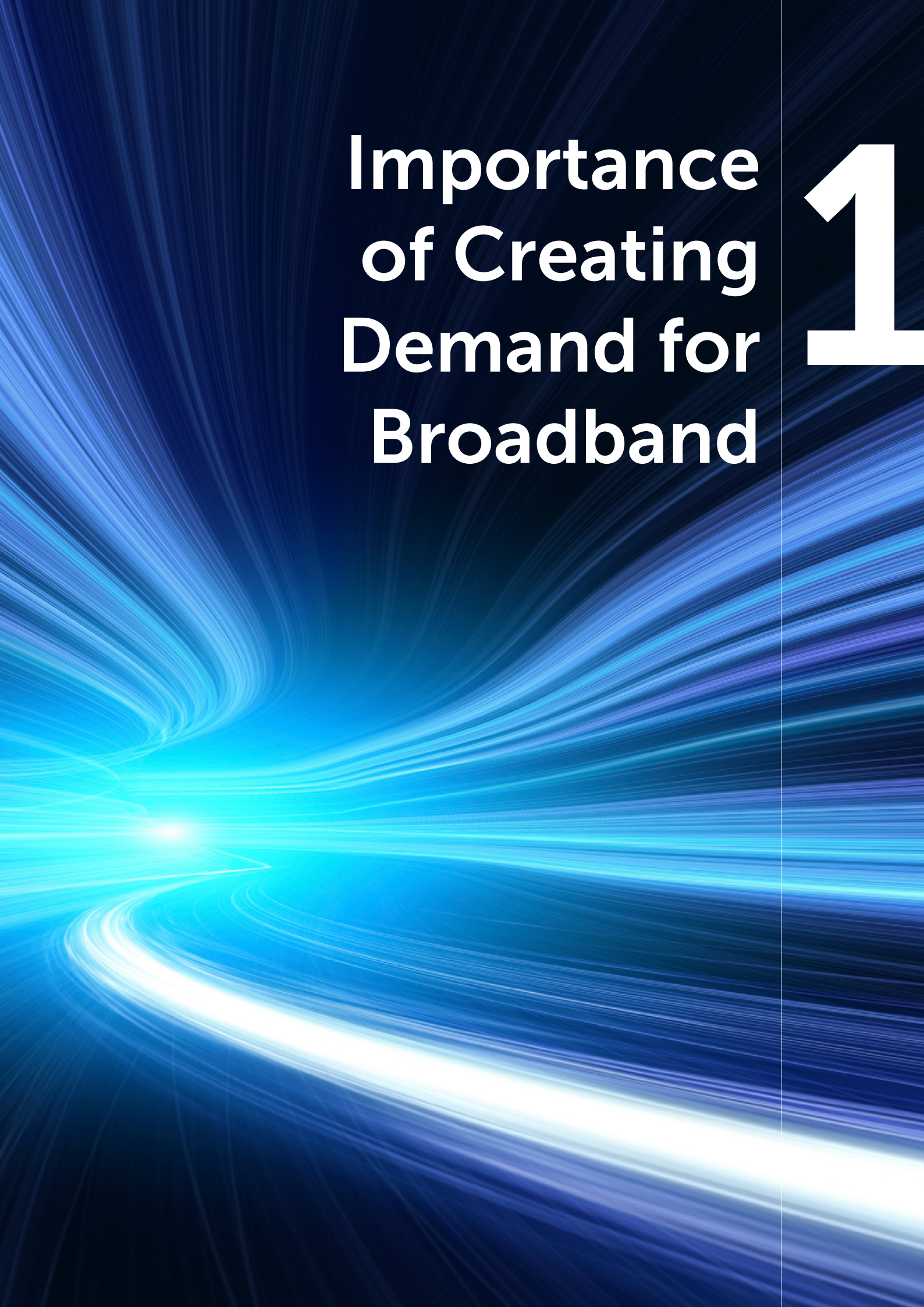
Executive Summary

Information and Communications Technologies (ICTs), combined with innovations in broadband connectivity and the rich ecosystem of applications and services, can transform the lives of individuals and entire countries. Yet in reality, many do not enjoy the benefits, and despite growing efforts to get the underserved population online, we need to do more. The infrastructure to provide connectivity is paramount, but only a first step, and the impediments to productive use – namely affordability, awareness and ability; are significant challenges. 'Demand stimulation' is the term given to addressing these impediments, recognising it's not enough just to address getting citizens online. We find when all the challenges around affordability, awareness and ability are adequately addressed, and the value of ICT and broadband connectivity are realised, people benefit greatly from these valuable tools.

Governments have a vested role in the solution, given the positive impacts of broadband and ICT on their citizens, budgets, competitiveness and economic growth. However, the greatest positive benefits are achieved when governments and the private and civil sectors collaborate, leverage their respective expertise and resources and ultimately work together towards common goals. In this report we provide a number of examples of such public-private partnerships, from countries around the world. These examples address a range of issues or impediments, and describe the associated solutions needed to stimulate demand and productive use. For example, Costa Rica's connected homes programme provides Internet access and devices (PCs) for vulnerable socio-economic groups. Colombia's programme leveraged the use of subsidies to increase Internet access for low income households, more than doubling the number of underserved people online. Senegal's programme subsidised computers for university students in order to reduce overcrowding in the public universities and to greatly enhance virtual learning. Republic of Korea's Information Network Village project, which provided PCs, training, and content to underserved citizens, focused on reducing the digital divide, and providing a basis for economic self-reliance. In India, the mobile governance platform, m-Seva*, is stimulating demand for local content through a portfolio of life-enhancing services via mobile networks, and the government in Kenya has established a digital learning programme which has helped to increase the number of students attending primary education. While not exhaustive, we believe these examples provide a useful window into different ways governments and the private and civil sectors can collaborate for mutual benefit, to get underserved populations productively online.

1 Importance of Creating Demand for Broadband



1.1 Impact of Broadband

The benefits of broadband are well studied, with clear evidence of both social and economic value[1,2]. The economic benefits are well documented with positive impacts on GDP, productivity, job creation, employment, firm efficiencies and consumer surplus[3]. On GDP growth, it was found that the speed of growth actually increased as the broadband penetration increased, and a penetration threshold must be reached before the benefits kick in. This is significant because it demonstrates countries will continue to fall behind unless they accelerate their broadband deployment and adoption. Consumer surplus, another element positively impacted by broadband, is defined as the difference between what a consumer is willing and able to pay for a good or service versus what they actually pay. In one example, the Boston Group calculated the Internet consumer surplus for 13 of the G20 countries to be $1.9 trillion in 2012[4]. They go on to say that the benefits of the Internet are relatively greater for lower income people than for wealthier people. In another example, McKinsey and Co[5]. in 2011 calculated the consumer surplus from the Internet to be $100 billion. Access to the Internet can lead to increased connections to communities outside of one's immediate network, increased confidence, awareness, and potentially more empowerment[6]. Although the numbers vary, one thing is clear: the value for people of all income backgrounds to get online is significant. Without a concerted effort and urgency on this agenda, there is the potential for existing income, social and political disparities to be exacerbated.

1.2 Who is Online?

In general, most connectivity is concentrated in the industrialised countries, urban areas and with higher income citizens. Today, the ITU estimates that while 46% of households (HH) have Internet access, the disparity between regions is quite stark. For example, in the 2015 report, *Measuring the Information Society*[7], 81% of HH in developed markets are connected, while only 34% in developing markets. Additionally, only 11% of HH in Africa are connected. Furthermore, other disparities appear when we break the demographics out further by age, income, gender and whether in rural or urban areas.

1.3 Why People are not Online

Supply and demand are two of the major reasons why people are not online. On the access side, many people cannot get online simply because there is no infrastructure. As previously mentioned, operators may not build out their (fixed and/or mobile) network where it is not financially viable. According to a recent report by the GSMA[8], 73% of the global population was covered by 3G networks in 2014, however only 26% had 4G coverage. The GSMA further states that the growth of 4G networks is rapidly changing, with the expectation that 63% of the global population will be covered by 4G by 2020. However, a recent report by the United Nations Economic and Social Commission for Asia and the Pacific, titled *State of ICT in Asia and the Pacific 2016,* explained that the digital divide is continuing to grow, given the lack of investment in fixed broadband networks in many developing countries[9]. While there is some advancement, we can clearly see that more needs to be done to accelerate access for all global citizens.

When it comes to adoption or actual use, an even greater gap exists, with only 39% of the population reported to have 3G or 4G connections. This discrepancy with availability is due to a lack of demand, which can be described in three broad categories: affordability, awareness and ability. Affordability is simply the ability for a citizen to afford the subscription, and devices to access the network. The ITU

Broadband Commission has proposed the affordability target of 5% of GNI, and according to the recent Broadband Commission *The State of Broadband* report released September 2016, there is still work to do in developing markets, given fixed broadband average costs are 31% of GNI, and 64% of average income in Africa, while only 1.7% of average income in developed markets[10]. Similarly, the average cost of mobile broadband in developing countries was reported to be 11%-25%, versus 1-2% in developed markets. The lack of awareness and ability which are impediments, and statistics have found that people do not subscribe either because they are not aware of how broadband and ICT can enhance their lives, or because they are not familiar with how to use the devices, software and Internet generally to achieve their goals[11]. Additionally, social and cultural norms also dictate whether certain populations, such as women, use the Internet[12]. All of these impediments must be addressed, and an enabling policy framework is the first step to ensure inclusive growth.

1.4 Ensuring Inclusive Growth

The demographic differences among users who are not online (such as age, income, education level and interest group) can be used to target demand stimulus programmes to reach as many unconnected citizens as is feasible – particularly the low income and underserved who have minimal access to the benefits of broadband. As the ITU *The State of Broadband* report indicates, Internet user penetration is not evenly distributed and there are great disparities between developed and developing countries. The report states:

"By the end of 2016, some 3.5 billion people or 47.1% of the world's population will be online, up from 3.21 billion people in 2015 (equivalent to 43.8% penetration). The target of 60% Internet user penetration is unlikely to be achieved until 2021 at the earliest. In the developing world, Internet penetration will reach 40.1% by end 2016 (up from 24% five years earlier). However, the good news is that the LDC (least developed country) target of 15% should be achieved this year, with a projected penetration of 15.2% in LDCs by the end of 2016.[13]"

A McKinsey and Co. study (2014) indicates that 75% of the total global offline population resides in 20 countries. India, China, Indonesia, Pakistan, Bangladesh and Nigeria account for 55% of the offline population[14].

The offline population is disproportionately rural, low income, elderly, illiterate and female[15]. The ITU estimates that the overall global Internet user gender gap grew from 11% in 2013 to 12% in 2016. Across all regions of the world, Internet user penetration rates are higher for men than for women[16]. The McKinsey and Co. report estimates that 64% of offline individuals live in rural areas. Almost 50% of the offline population has an income below "the average of their respective country's poverty line and median income." With these disparities in Internet user penetration, targeted efforts are critical to promote inclusion, access and affordability for these populations.

Endnotes

1 http://broadbandtoolkit.org/1.3

2 http://www.broadbandcommission.org/resources/Pages/default.aspx

3 https://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_Impact-of-Broadband-on-the-Economy.pdf

4 https://www.bcg.com/documents/file100409.pdf

5 http://www.mckinsey.com/industries/media-and-entertainment/our-insights/the-webs--and-8364100-billion-surplus

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7 http://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2015/MISR2015-w5.pdf

8 http://www.gsma.com/mobileeconomy/global/2015/

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10 http://www.broadbandcommission.org/Documents/reports/bb-annualreport2016.pdf at 40.

11 https://www.ntia.doc.gov/blog/2016/digitally-unconnected-us-who-s-not-online-and-why

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14 http://www.mckinsey.com/industries/high-tech/our-insights/offline-and-falling-behind-barriers-to-internet-adoption

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16 http://www.broadbandcommission.org/Documents/reports/bb-annualreport2016.pdf

Targeted Demand Programmes

2

2.1 Broadband Development Model

Drawing on the model in the World Bank *Broadband Strategies* handbook[17], broadband can be thought of as an ecosystem of mutually dependent – and reinforcing – components: supply and demand. This section describes the different roles that supply and demand sides have in this model. According to the World Bank: "The term broadband may refer to multiple aspects of the network and services, including: 1) the infrastructure or pipes used to deliver services to users; 2) high-speed access to the Internet; and/or 3) the services and applications available via broadband networks, such as Internet protocol television (IPTV) and voice services that may be bundled in a 'triple play' package with broadband Internet access."

Broadband is an enabling ICT platform that has the potential to impact entire economies. An important point that the World Bank and OECD notes is that the applications and services that broadband enable and related gains in productivity are the true benefits rather than just infrastructure on its own. One trend on the supply side is that developments and innovations in the different types of technologies, the spread of high speed wireless networks, and market models used to deploy broadband infrastructure enable operators to supply broadband services to more people, and with a range of service capabilities. On the demand side, the development of applications, services and broadband enabled devices stimulate demand for broadband access.

2.2 Definition of Demand Programmes

The increased spread of broadband connectivity has led to the development of more robust applications and services – which leads to an increase in demand for broadband and devices. Demand programmes are about: a) understanding the varied reasons/categories for weak demand of broadband services and b) defining stimulus programmes to improve demand in each major category, in domains such as banking, health, education, entertainment and employment. This means identifying the critical elements for a successful demand programme, such as awareness, training, devices, content, subsidy, sustainability, etc. In practice, increased demand for these services results when traditionally offline or non-electronic services are brought online to the Internet. The demand for higher-quality video and other rich content and applications are increasingly driving broadband use. Social media applications, which connect users to a network or a community and facilitate social interaction, are also helping to drive demand. Other mechanisms to increase demand include the exchange of user-generated content and compelling local content, as well as programmes with a focus on education with virtual classrooms or other e-learning tools.

2.3 Different Tools to Promote Demand

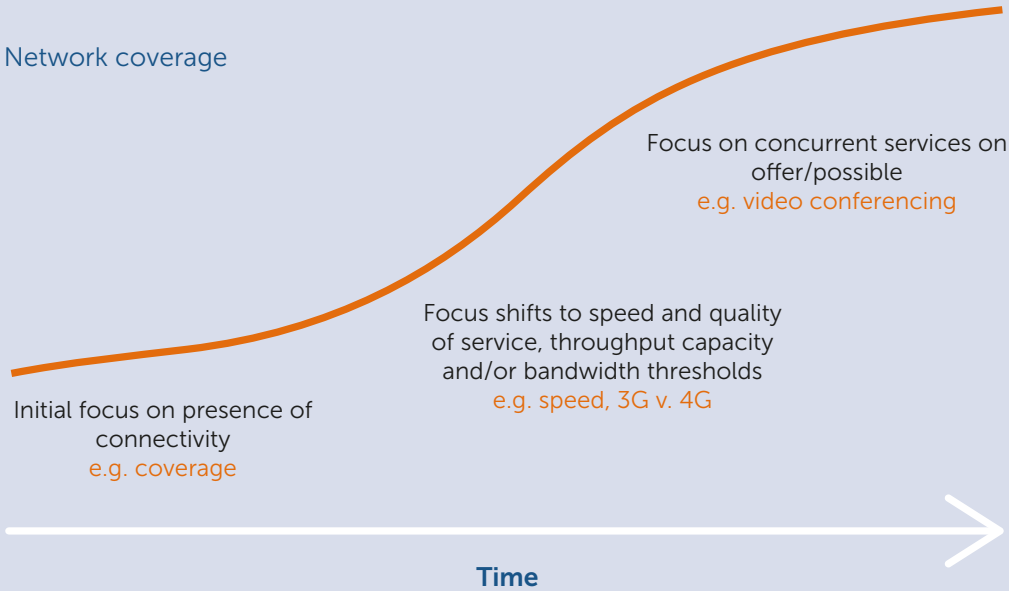
There are a number of tools or instruments that can be used to encourage broadband adoption. Governments, NGOs, and both local and multinational companies play a critical role in encouraging unconnected populations, many of them marginalised and low income families, to get online. These tools are focused on addressing the previously mentioned impediments, i.e. lack of affordability, awareness and ability, as well as lack of relevant content. First and foremost, governments must establish policies that encourage competition, and ensure technological neutrality. However additional actions can be required, in particular to administer to the unconnected and marginalised populations. Many examples include financial instruments to address affordability issues, not only for the subscriptions, devices and content, but also for training programmes to address the gaps in knowledge and

awareness. Examples include general government subsidies, jobs placement and skills development programmes, Universal Service Funds (USF), Universal Service Obligations (USO), tax reductions, low interest loans and various public private partnerships. USOs and USFs have particular utility for encouraging demand, and while they were originally designed for promoting communications infrastructure deployment, are being used increasingly to stimulate demand as well.

USOs have been used for years, and are receiving renewed interest, for example in attaching adoption targets to spectrum licenses auctioned for the 700 MHz digital dividend bands. In general, a USO is an obligation placed on the carrier to achieve some deployment or adoption milestone in designated underserved areas either before or in parallel with other build-outs. The conditions of the USO should be defined prior to the auction, so that the costs associated with meeting the obligation can be included in bidding strategies and final prices paid. This helps equalise any distortive elements associated with serving higher cost areas and underserved populations, since the operators plan upfront what they can and are willing to fund, and those adjustments are reflected in the competitive bidding process.

USFs have also existed for several years, and were originally intended to assist with infrastructure deployments. Recently, many USFs have been updated to support additional demand-creation elements, e.g. subscriptions, devices, training and content. Despite their value, a 2013 ITU report studied USFs in 69 countries[18], and found that many had little to no activity. Some reasons include shortcomings in the regulatory framework, national social and political conditions and economically unviable fund design. However those that do have activity have made great strides to support broadband uptake. As the case studies described later will illustrate, there are various creative examples for others to follow.

Different Aspects to the Urban-Rural Digital Divide



2.4 Measuring Effectiveness of Demand Programmes

Considerable attention has been devoted to supply-side issues, but case studies suggest that demand stimulation is a vital driver of increased Internet access in many countries.

Indeed, we have seen a shift in attention away from the supply-side discussions that dominated the early years of the digital divide discussion on the importance of supplying remote communities with ICT "for connectivity's sake". Today, we are seeing more nuanced discussions about what can actually be done with the connectivity, including more cutting-edge use cases (e.g. tracking the spread of migrants or people with Ebola through their use of Facebook or mobile phones, respectively). In this light, it is not just Internet use which matters – it is what people are using the Internet for.

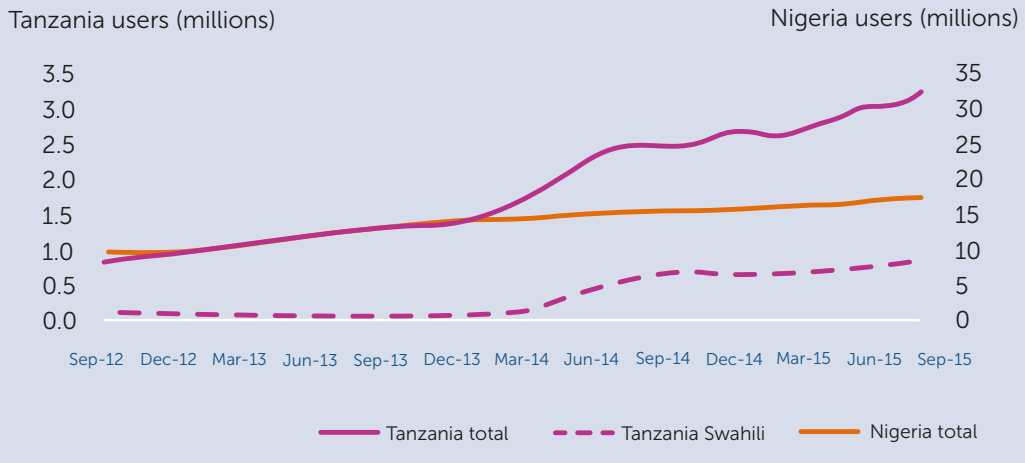
2.5 How Can We Know When a Programme Has Proved Effective?

Historically, attention has focused on Internet adoption or access rates rather than other programme outcomes. Many programmes identify their own Key Performance Indicators (KPIs) in this regard, but changes can also be compared to trend or prior performance – either for the country itself, or a similar country.

The graph below shows the impact of the introduction of a Swahili user interface into Facebook in Tanzania (where 98% of the population speaks Swahili and only 8% speak English) in early 2014. Whilst adoption (measured as monthly active users or MAU on Facebook) had previously followed broadly the same trend as Nigeria (where local language interfaces have not yet been launched), Facebook adoption increased significantly when Swahili was introduced both compared to prior trend and compared to Nigeria.

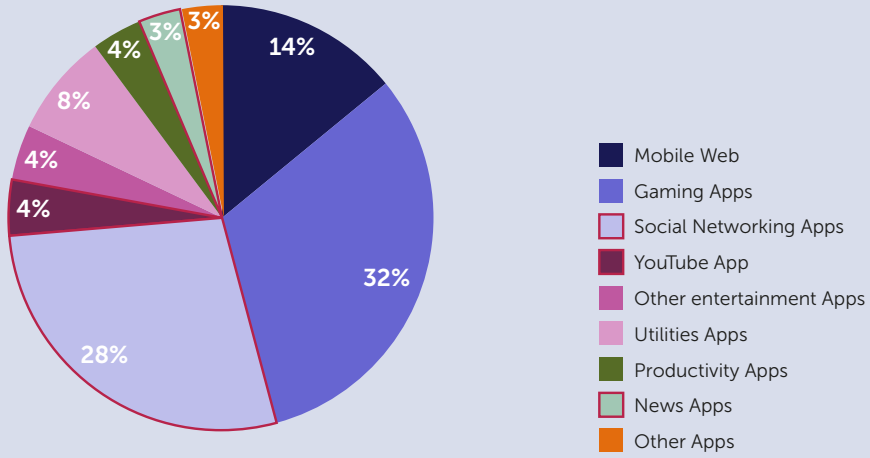
Impact of Launch of Swahili Language User Interface on People Using Facebook

Source: Facebook, 2015



Another way of assessing the impact of demand programmes lies in changes to the depth, sophistication or frequency of Internet use. In the United States, mobile web and gaming apps account for nearly half of all time spent online, with a further 28% spent on social networking apps. Demand programmes may also claim to be effective, if they can prove that they have changed the sophistication and depth of Internet use.

Breakdown of Online Activities in the US



Source: Pew Internet Centre.

Another means of evaluating the real-time impact of demand programmes could also be through the increase in news searches, content or information searches. Google and Twitter are now able to evaluate the impact of events and issues in the real-time exchange of information or searches over the web.

Ultimately, however, demand programmes cannot claim to be effective based solely on metrics to do with Internet usage, frequency or sophistication of Internet usage. The ultimate end-goal of many demand programmes is to achieve results in the offline world e.g. improved crop irrigation and crop yields by farmers, better educational outcomes, or increased employment opportunities based on information found online.

Endnotes

17 http://broadbandtoolkit.org/en/home

18 https://www.itu.int/en/ITU-D/Conferences/GSR/Documents/ITU%20USF%20Final%20Report.pdf

3 Demand Programmes

The following examples illustrate some of the many ways that governments, NGOs and the private sector around the world help to encourage and even accelerate broadband adoption.

3.1 Costa Rica's Connected Homes Programme Benefits Vulnerable Socioeconomic Groups

Country at a Glance: Costa Rica

Land area	51060 square km	Population below poverty level	24.8% (2011)
Population	4.8 million (July 2015 est)	Households with a PC/computer	51.1% (2015)
Urban population	76.8% (2015)	Households with internet access	46.7% (2013)
GDP per capita (PPP)	US$15500 (2015)	Internet users	46.0% (2015)
Labour force	2.268 million (2015)	Internet access in schools (relative 1-7 4.67 (2014) scale, 7=best)	4.67 (2014)
Number of households	1.346 million (2013)	Mobile broadband subscribers	72.7% (2015)
Adult literacy rate	97.8% (2015)	Cell phone subscriptions per 100 inhabitants	149 (2014)

Sources: CIA World Factbook, ITU and WEF data.

Introduction

Costa Rica's Hogares Conectados (Connected Homes) programme is a public-private partnership for providing increased access to information technologies via subsidies for computer equipment and Internet access. The programme targets approximately 140,000 families[19] in vulnerable socioeconomic groups (representing approximately 15% of total Costa Rican households). The goals of the programme are to reduce poverty and inequality, as well as to promote job creation and economic growth. The partnership is between state institutions including the Vice Presidency and the Rector and Regulator for Telecommunication, and Internet Service Providers[20] (ISPs), with support from NGOs and other institutions. In May of 2016, the programme concept won an award from the World Summit on Information Society (WSIS) in the category of access to information and knowledge[21].

Programme Eligibility

The programme uses multiple criteria for determining eligibility. The first criteria – households at or below poverty income levels – includes all households in the bottom three deciles of income. In addition, households in the 4th and 5th decile of income who have special social needs (such as elderly and disabled persons, indigenous persons, female heads of household, self-employed persons, and students meeting certain

criteria) also qualify for subsidies. The eligible households have been identified by the government through their participation in other social programmes, via the Joint Institute for Social Aid (IMAS).

Subsidies

The programme implements three levels of subsidy, depending on income and other special social needs. The most vulnerable households receive an 80% subsidy (this results in approximately a $6 subscription price per month for the household). The second group receives a 60% subsidy (resulting in approximately a $12 monthly price), and the third group receives a 40% subsidy (resulting in approximately a $18 monthly price).

The ratio of household income to the cost of Internet service and a basic computer configuration was used in arriving at the subsidy amounts for the three levels. A threshold was chosen to determine the maximum income level that would be eligible for subsidies, with the result that income deciles six and above are not eligible. The budget for the programme is approximately $128 million over five years.

The subsidy – which lasts for three years – covers computer equipment (e.g. a laptop computer) and monthly Internet service of 2 Mbps, using Universal Service Fund (FONATEL) assets. The programme aims to help achieve 60% national household Internet and computer penetration for Costa Rica by focusing on the lower income brackets where penetration is proportionally lower. According to the *Encuesta Nacional de Hogares (National Household Survey)* published in July 2015, only 19% of the poorest households in the country have a computer. This compares to approximately 51% household computer ownership across the entire socioeconomic spectrum of the country.

Programme Participation

The programme is a public-private partnership where the government defines the policy, identifies eligible households, and provides the subsidy via USF assets accumulated in the National Telecommunications Fund (FONATEL[22]). The role of the private sector (including ISPs) is to implement the rest of the programme including providing the Internet service, the computer resources and software licenses, the programme promotion, as well as providing e-government applications and digital literacy training.

Programme Sustainability

Even under the most optimistic projections for the programme, impoverished and socially vulnerable members of the population without Internet access will still exist for the foreseeable future. Thus the programme has to be sustainable beyond the three-year time period of the initial subsidies. While some percentage of those families receiving the subsidy will improve their economic status and no longer qualify for the subsidy after three years, there will be new families qualifying for the subsidy at that point, while others could qualify for a renewed subsidy. Additionally, new USF funds will continue to be collected, which aids in the programme's sustainability and helps address the availability of future subsidies to qualifying families that did not receive the subsidy in the initial phases.

The programme officially kicked off in June 2016, and the programme estimates as many as 55,000 families (approximately 5% of the population) could be lifted out of poverty and satisfying their basic needs within the next few years, aided by this programme. Ongoing monitoring and evaluation are critical to assessing the impacts of this programme.

3.2 Colombia's Subsidy Programme to Increase Internet Access for Low-Income Households

Country at a Glance: Colombia

Land area	1,038,700 square km	Population below poverty level	27.8% (2015 est)
Population	46.736.738 (July 2015 est)	Households with a PC/computer	42.2% (2015)
Urban population	76.4% (2015)	Households with internet access	35.7% (2015)
GDP per capita (PPP)	US$13,800 (2015)	Internet users	51.7% (2015)
Labour force	24.34 million (2015 est)	Internet access in schools (relative 1-7 4.01 (2014) scale, 7=best)	4.01 (2014)
Number of households	12.48 million (2012)	Mobile broadband subscribers	25.0% (2015)
Adult literacy rate	94.7% (2014)	Mobile phone subscriptions per 100 inhabitants	104.1 (2015)

Sources: CIA World Factbook, ITU and WEF data.

Introduction

In October 2010, the Minister of ICT from Colombia (MINTIC) launched an ambitious agenda called "Plan Vive Digital 2010 - 2014" (Live Digital)[23]. The plan presented an analysis of ICT in the country, highlighting the low broadband penetration: in 2010, only 4.6% of households had a fixed broadband subscription and only 2.6% of the population benefitted from mobile broadband.

The agenda also showed a large inequality across income groups. Colombia has an official classification of households "with similar social and economic characteristics"[24] called "Estrato" (strati) and there are six groups from the poorest (1) to the richest (6) in terms of home access to utilities and household characteristics. According to the Live Digital document[25], while strati 4, 5, and 6 had Internet and personal computer (PC) penetration above 56% and 70%, strati 1 and 2 had Internet penetrations of just 2% and 5%. In the best case, strata 2 households could reach 20% PC penetration.

A survey conducted by MINTIC in 2010[26] revealed that 39.9% of strati 1 and 2 claimed lack of affordability as the main reason for not having an Internet connection and 33.8% claimed the absence of a PC in the household as the reason. Based upon such numbers, and with 44 million households in Colombia in 2010, 11.5 million claimed affordability as the reason preventing them from accessing Internet and 9.1 million claimed lack of PC at home as the main reason. This situation represents a classic demand affordability problem regarding Internet and PC access.

Affordability and Subsidy Programmes

The Live Digital Agenda recognised the importance of addressing demand for increasing Internet penetration and reducing poverty. The Digital Agenda established five pillars, among them pillar two deals with encouraging supply and demand of digital services in order to reach critical mass.[27] Accordingly, two programmes were proposed to tackle affordability issues.

Programme #1 "Proliferation of devices"[28], addressed device affordability by keeping zero VAT and zero import tariff for personal computers, and promoted better access to financing and longer broadband contracts for subsidised devices. At least 20% of the total ownership cost of the device was eliminated with this initiative.

Programme #2 "Subsidies scheme for Internet access in strati 1 and 2"[29], permitted telecom companies to subsidise fixed broadband connections and PCs for strati 1 and 2 households. The mechanism was installed as part of the Law 1450 article 58.1 (2011). Instead of giving up resources to the Universal Service Fund (FONTIC), telecom companies could provide the service to end-users, and discount a subsidy from the end price, while also discounting their contribution to the USF. In other words, telecom companies were allowed to discount the price of fixed broadband connections and PCs and deduct the money from their USF contribution. This gives the programme attributes similar to a USO programme.

As part of programme #2, a maximum subsidy was established by MINTIC of $300 USD ($150 per home located at strati 1 and 2).

The impact of the combination of programme #1 and programme #2 can be illustrated using a hypothetical example as shown in the table below, based upon typical PC and broadband prices, interest rates, taxes and tariffs.

The table shows that the combination of the two programmes reduced the total ownership costs from 10.6% of income to 7.6% for low income households in Colombia.

Impact per Strata 2 Household of Programmes # 1 and #2 in Colombia

Total cost of ownership (BB+PC)	US$	Costs impacted by Programme # 1 & Programme # 2
PC cost*	$500	$450
PC tax (16%)	$80	$0
PC tariff (5%)	$25	$0
Interest charges (2 year)	$60	$45
BB cost (2 year)	$720	$570
BB tax (16%)	$115	$0
Total	$1500	$1065
% of monthly income strati 2**	10.6%	7.6%

* PC cost fell 10% due to programme 1 according to MINTIC and Intel. PC cost estimated on average selling price (ASP) at covered retail stores in Colombia by Intel during 2012 - 2013.

** Strati 2 income based upon Live Digital document 2, legal minimum wages per month.

Programme Impact after Three Years

Separating the impact of programme #1 and programme #2 is difficult because they are integrated programmes. However, the most relevant impact of this policy was the increased broadband connections in strati 1 and 2. According to the official statistics portal of ICT "Colombia TIC"[30], in Colombia there were 185,895 connections in strati 1 and 816,378 broadband connections in strati 2 in mid-2011 (i.e. slightly more than 1 million connections in strati 1 and 2).

By 2015, at the end of programme #2 (the programme must last only three years according to the law) there were 473,890 connections in strati 1 and 1,873,581 connections in strati 2. That means that connections in low income households (strati 1 and 2) increased 2.3X in three years, going from 1.0 million to 2.35 million households connected – an impressive increase for a three-year period.

Strati 4, 5 and 6 households were not impacted by broadband VAT reductions or subsidy policy, and those strati can be used as control group. By 2011 there were 703,119 connections according to Colombia TIC. By 2015 connections increased to 965,023, which means 1.37x. Thus the growth in connections was significantly higher in households impacted by programmes #1 and #2. Without these programmes it is unlikely that overall Internet penetrations in Colombia would have increased from 30% to 50% between 2010 and 2014.

It is also important to notice that this policy did not include subsidies for mobile connections and instead, was focused on fixed connections and PCs. One reason for this decision was that it was not feasible from a technical standpoint to tie a mobile subscriber to a specific household strati, i.e. with mobile connections, MINTIC may end up subsidising higher income people or multiple people per household. At the same time, the benefits of programme #1 only cover PCs and tablets, which means that the combined impact of programme #1 and #2 can't be replicated with smartphones. Also, the programmes were focused on increasing household penetration numbers and smartphones are individual user devices, while PCs can be shared among household members.

3.3 Overcrowding in Senegal's Universities Called for a Creative Solution Focused on Virtual Learning

Country at a Glance: Senegal

Land area	192530 square km	Population below poverty level	46.7% (2011 est)
Population	13.98 million (July 2015 est)	Households with a PC/computer	10.3% (2015)
Urban population	43.7% (2015)	Households with internet access	6.3% (2015)
GDP per capita (PPP)	US$2500 (2015)	Internet users	20.9% (2015)
Labour force	6.515 million (2015 est)	Internet access in schools (relative 1-7 4.01 (2014) scale, 7=best)	3.85 (2014)
Number of households	1.56 million (2012)	Mobile broadband subscribers	14.1% (2015)
Adult literacy rate	57.7% (2014)	Mobile phone subscriptions per 100 inhabitants	83.6 (2013)

Sources: CIA World Factbook, ITU and WEF data.

Introduction

Senegal addressed overcapacity in its universities through a programme that provides subsidised personal computers (PCs) and broadband connections to enable virtual learning. With over 45,000 new students eligible for admission each year, Senegal's universities couldn't keep pace with growing demand. Universities had reached over 300% of their planned physical capacity. For example, the University of Dakar was built for a capacity of 17,000 students, but had 85,000 students enrolled and studying in dire conditions. While the government had built four more universities, in different cities, they could only absorb 30% of the student population. This situation was impacting the quality of education, teaching and research provided by higher education, with direct impact on the student job readiness upon completion of their education.

Greater capacity, increased student access, improved learning standards, and updated programmes were essential. A special programme was put in place by the World Bank for the Ministry of Higher Education in Senegal, aimed at significantly improving universities' performance. For the first time, "Performance Contracts" were signed between universities and World Bank, and funded through a World Bank loan to the Ministry of Higher Education. Some of the main elements of those performance contracts were to modernise the universities' ICT infrastructure and develop a mechanism of integration of ICT into the teaching and learning process.

Programme Design

The "Performance Contracts" addressed five key areas for the universities:

1. Greater internal efficiency
2. Use of information technologies in educational strategies
3. Stronger ties to the labour world
4. Better quality instruction
5. Improved governance

The Ministry of Higher Education and the World Bank worked together with the private sector through the "Performance Contracts" framework to reinvent the higher education system in Senegal. Goals include using technology as an enabler and creating a student-centric programme that makes technology affordable and accessible to students.

Students in university campuses can purchase a PC through a programme that reduces the cost, mitigates risk to lenders and shares costs. While the government approved a tax exemption for student PCs, the Ministry pays a portion of PC costs (up to 50%, capped to $135) and allows students to use their monthly scholarships to secure loans at local banks. When bankers were initially reticent to offer loans to students who lack income or collateral, loans guarantees were provided by the World Bank and the Ministry, therefore reducing the commercial bank credit risk. A local reseller put it all together, providing PCs, and tracking student and financial information to ensure the integrity of the programme. A mobile network operator further enhanced the programme with a discounted student offer that included a wireless 3G dongle at $4 per month. Students could repay the cost of the PC at an average $10 a month for a year.

It was critical for the success of the programme to address the affordability issue for the student, but also to create a model that would be sustainable and scalable in the long run. The public-private partnerships allowed each party to gain tangible value from participating in the programme. As a result, the government made it a policy for every new student to have access to his own PC, and voted an annual budget of $2 million for the annual student PC subsidies.

Impact on Higher Education in Senegal and Development of the Senegal Virtual University

All universities in Senegal now offer ubiquitous Wi-Fi, affordable PCs, software, and an increasing portfolio of digital classes. Nearly 30,000 students now have laptops to access content, create new material and collaborate with peers. In 2013, the first Senegal Virtual University was created and enrolled 2064 students. In 2014, enrolment reached 7,000 students with 10,000 more registrants expected in 2015. By 2016, the Senegal Virtual University has become the second largest university in the country.

Students and educators are excited and optimistic about future possibilities and the Senegalese government is committed to maintaining and expanding the programme. As Atou Seck, Senior Education Specialist with the World Bank noted: "It is important to really understand the fact that this project is transformative. It is not just about the organisations. Champions [of the project] believed that this project could drive major improvements in higher education. And it is working." Aboubakry Niane, the Director of Finance at the Ministry of Higher Education and Research, commented on the programme by noting: "When Senegal analysed its higher education systems, there were weaknesses in the quality of education, use of ICT and student performance. We developed a strategic plan to improve the system. The performance contract with the World Bank is aligned with that strategic plan. These are shared goals. After two years, we are starting to see changes...real changes inside the university system."

3.4 Republic of Korea's Information Network Village (INVIL) Project has Narrowed the Digital Divide and Provided a Basis for Economic Self-Reliance in Rural Regions

Country at a Glance: Republic of Korea

Land area	96,920 square km	Population below poverty level	14.6% (2013 est)
Population	49,115,196 (July 2015 est)	Households with a PC/computer	77.1% (2015)
Urban population	82.5% (2015)	Households with Internet access	98.8% (2015)
GDP per capita (PPP)	$36,500 (2015 est.)	Internet users	91.5% (2014 est.)
Labour force	26.89 million (2015 est)	Internet access in schools (relative 1-7 4.01 (2014) scale, 7=best)	6.25 (2014)
Number of households	17,339,422 (2010)	Mobile broadband subscribers	106.5% (2015)
Adult literacy rate	97.9% (2008)	Mobile phone subscriptions per 100 inhabitants	118.5 (2015)

Sources: CIA World Factbook, ITU and WEF data.

Introduction

The digital divide limits the opportunity for social participation, which makes it difficult to improve the quality of life and lessens social unification. The Korean government has pursued universal access service, so that everyone can enjoy Internet service at affordable prices. One approach to achieve this aim is to establish 'community access' which can occur in schools or community centres equipped with basic IT equipment (PCs, printers, etc.). In this regard, Korea has successful national programmes that have been operational in the rural areas and islands.

The Information Network Village (INVIL) aims at enabling rural communities to become self-sustainable through the provision of high speed Internet access. This project is a governmental programme jointly promoted by the Ministry of the Interior and local governments aiming at enabling rural communities to become self-sustainable through the provision of high-speed Internet access. The project created information network environments and improved the income of residents in the country's rural areas (isolated and mountainous regions). Since the project was first launched in 2001, 358 villages have been created and are operational (as of 2015). This project is considered successful in that it does not simply provide the opportunities for online access in rural areas, but also contributed to job creation and bridging economic development gaps.

Objectives

The objectives of INVIL are:

- To narrow the digital divide among regions and social classes through

ICT infrastructure in rural areas and training of local inhabitants

- To provide a basis for economic self-reliance in rural areas
- To create higher income and quality of life in a sustainable way for rural citizens

Governments helped INVIL to pursue direct transactions between residents and urban consumers through e-commerce, which in turn helped establish self-sustainable communities. As a result, the rural economy was vitalised through the use of information technologies and rural income increased. In order to create the demand for continued growth, the project includes the following activities.

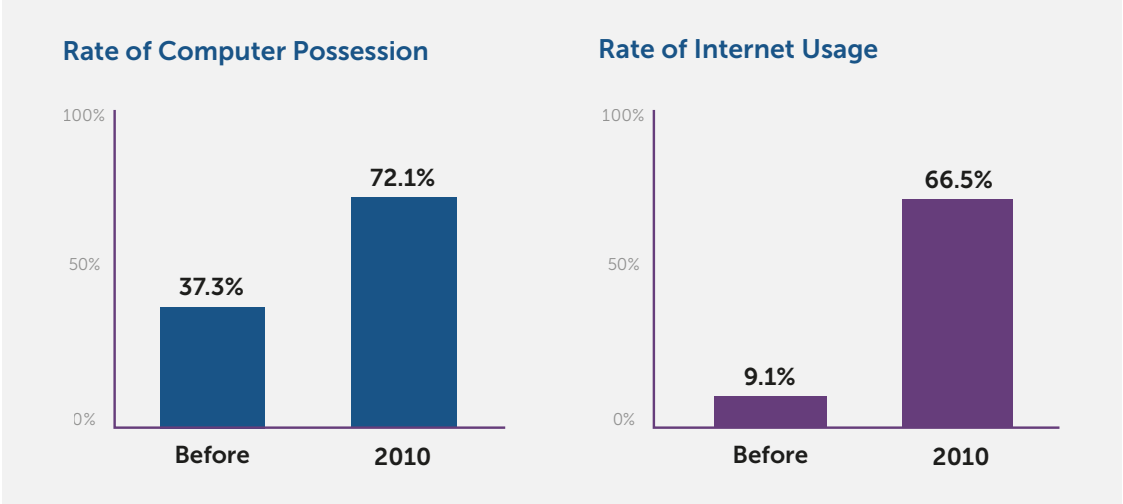
- Establish the IT infrastructure
- Build the Village Information Centre
- Distribute free PCs to households
- Develop information content and operating organisation
- Incorporate participatory management systems and also contribute to the social integration of immigrants
- Develop websites for villages to conduct promotional marketing independently

Project Implementation and its Impacts[31]

The central government initiated the INVIL project as a standard model for implementing ICT infrastructure in rural communities in 2001. ICT technologies such as high speed networks, INVIL portal, e-commerce and smart devices were used to establish Information Network Village infrastructure.

• Reduce the Digital Divide

The government has implemented information network education to enable residents in rural areas to use the Internet. Many elderly people are not only receiving education over the Internet, but also researching and learning farming tips, shopping and enjoying a variety of informational content. By the end of 2014, a total of 358 villages were designated as Information Network Villages. Through the project, the number of residents who possess computers and use the Internet has increased dramatically, with a 72.1% PC penetration rate and 66.5% of Internet usage rate among rural residents as of 2010.



Information Network Village (2010), Ministry of Public Administration and Security, Republic of Korea

• Provide a Basis for Economic Self-Reliance

Through INVIL networks, rural communities are encouraged to adopt e-commerce for their products and services. The project enabled residents in rural areas to pursue direct transactions between residents and consumers. The use of e-commerce helped minimise distribution margins by cutting out the middle man and led to lower prices for fresh agricultural, fishing and mountain goods for the urban consumers, and increased profit margins for villages. The village residents are educated about product development, consumer service for increasing online sales and various online promotional methods.

Through the continued growth pursued by INVIL, residents' income levels rose and the sales revenue from e-commerce was up by 372% to KRW 20.9 billion (18.2 million USD) as of 2010, and by 637% to KRW 35.8 billion (35.8 million USD) as of 2014 compared to that in 2007.[32]

• Establish a Participatory Management System

An organisational structure to manage and promote the village's business is essential for continued growth. Hence, the Village Operation Committee has been established for encouraging autonomous management by residents. Also, the Central Council of INVIL, which consists of community leaders from all 358 villages, lead INVIL operation and management and made decisions on matters related to INVIL.

The INVIL project has been successful for over 15 years. The consistency in the guidance of central government and excellent collaboration between the local governments and the communities has played an important role in its success. The Korean government reviews the outcomes every year to ensure it achieves its long-term goal, 'self-sustainable village community enabling continued growth through information network environments'.

3.5 Stimulating Demand for Relevant Online Content in India

Country at a Glance: India

Land area	3,287,263 sq km	Population below poverty level	29.8% (2010)
Population	1,251,695,584	Households with a PC/computer	51.1% (2015)
Urban population	32.7% (2015)	Households with Internet access	9.5% (2011)
GDP per capita (PPP)	US$6,200 (2015)	Internet users	26.0% (2015)
Labour force	502 million (2015)	Internet access in schools (relative 1-7 4.01 (2014) scale, 7=best)	3.83 (2014)
Number of households	253 million (2013)	Mobile broadband subscribers	3.25% (2013)
Adult literacy rate	71.2% (2015)	Cell phone subscriptions per 100 inhabitants	81% (2015)

Sources: CIA World Factbook, ITU and WEF data.

Introduction

In Africa and Asia, the mobile phone constitutes an accessible device for using the Internet. At the end of 2015, 2.5 billion people in emerging markets were using Internet via mobile devices, and this number is expected to grow with 1.3 billion by 2020. GSMA further estimates that 90% of new mobile subscribers by 2020 will come from developing regions. India is forecasted to be the real growth driver, adding almost half a billion new connections over the next five years.[33] Initiatives aimed at increasing Internet adoption and use in India and in emerging markets would thereby benefit from leveraging the accessibility of mobile devices.

In India, approximately 70%[34] of consumers now have access to a mobile phone. Out of 240 million[35] Internet subscribers, 90%[1] of Internet traffic occurs via mobile handsets. On the other hand, mobile Internet adoption in the country is in a fairly nascent stage compared to the uptake in Asia in general. People who do subscribe generally experience inconsistent network coverage and are restricted to using slower networks as 4G roll out in the country to date has been confined to major urban centres.[36]

However, although limitations of reliable network connections remain problematic, the connectivity issue in Asia is not exclusively or even primarily about network coverage. The issue relates more to demand than supply. According to the latest GSMA consumer survey in Asia, of barriers to adopt and use mobile Internet, 72% of respondents across the six survey markets cited a lack of availability of locally relevant content as the main impediment. Similarly, in India, out of the 67% of respondents who had network coverage but did not subscribe to mobile broadband, 80% cited a lack of locally relevant content as the top barrier.[37] These findings

resonate with the GSMA's Mobile Connectivity Index, which measures the barriers and enablers to mobile Internet connectivity in markets.[38] India scores a low 33 out of 100 on the local content enabler, indicating a lack of availability and relevance of digital content to consumers.[39] It is critical that non-Internet users in India are incentivised to get online and that they find relevant content when they get there.

Thus, the opportunity for Internet expansion in India relies heavily on efforts to create and enhance access to local digital content that is meaningful to people's lives. Ways to enhance availability of locally relevant content can include localising the online content languages, enhancing local content innovation, for example through supporting innovation hubs or incubator programmes, and digitising existing offline resources that are of direct relevance to people's lives.

In the case of India, the country's m-governance platform is one example of how to provide locally relevant content to the population. As an online gateway of public information and on-demand services of importance to the local citizen, it encourages Internet adoption for gaining access to the mobile platform.

India Introduces m-Governance: Mobile-Seva

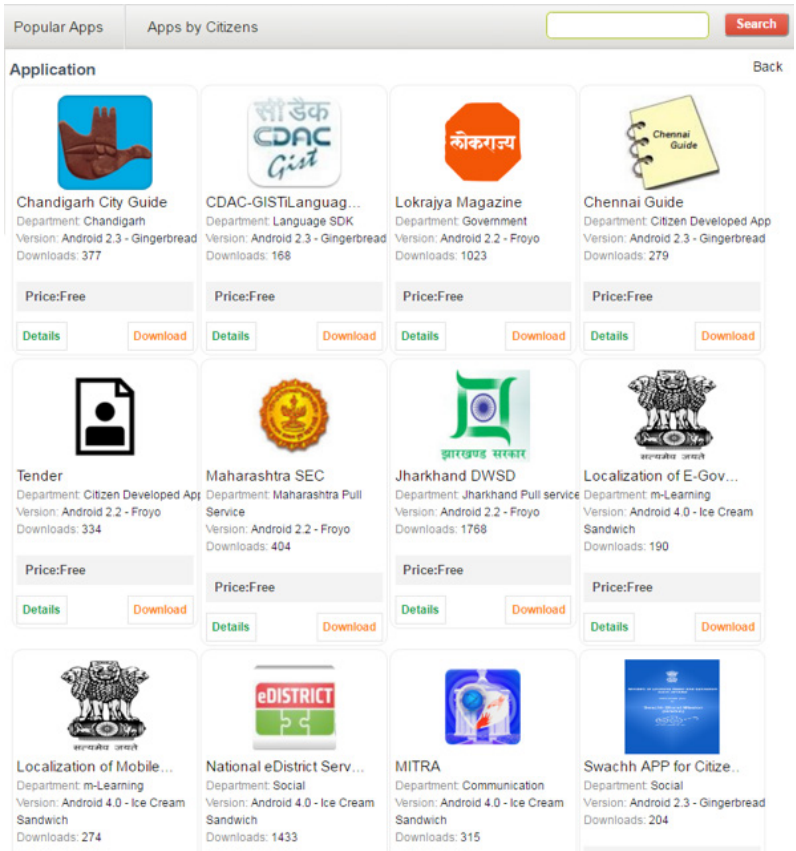
Between 1990 and 2006, India went through a process of digitising services of various government departments with the vision to provide public services to consumer's fingertips through national digital governance. This process eventually resulted in India's m-government service portal in 2011, Mobile-Seva or m-Seva (translation: mobile-help), which utilises the web and mobile networks to deliver information and services to consumers and businesses. Through m-Seva, users can access a portfolio of services, ranging between national ID and passport applications, through to electoral information and employment exchange services.

Overview of Available Public Services via Mobile Seva

m-Seva applications also have mobile payment services integrated, so that citizens can use transactional government services and make various government payments through systems including mobile wallets, SMS based Mobile Money Identifier and credit/debit card transactions.[40] This element makes the process of regular government transactions faster, safer and less time consuming for citizens, in particular for people in remote areas.

A key services access channel of m-Seva is the 'Mobile AppStore'. The AppStore was launched in 2012 and hosts over 800 government applications that integrate local user diversity, for instance via availability of content in 12 different languages. The app content is accessible via android and smartphone. The government applications provide useful information and interaction on a wide array of topics. Examples include applications for birth, death and caste certificates, electricity payments, women's emergency button, software apps for monitoring blood pressure, optimising costs for animal husbandry, monitoring improvements in government rural sanitation coverage, and information on voting and polling stations, child rights, farming techniques, among others. The most popular applications to date include Right to Information-Directory, Polling Station Location and Ministry Directory.[41]

The Mobile Seva AppStore interface



Impact

The m-Seva governance platform and AppStore have become a highly accessible public services gateway available in all Indian states via mobile Internet. m-Seva applications cater for the population's demand for online locally relevant content, which from an Indian consumer perspective is the largest barrier to Internet adoption.[42] m-Seva has become well-known in all parts of India, and also unconnected groups are benefitting through using the mobile offline features of the platform. In this regard, m-Seva is soldiering the ground for offline populations to come online via a digital platform they are already familiar with and want to continue using.

Since launch, the m-governance platform has seen high traction among the population, with over one million downloads of the government applications,[43] and the Andhra Pradesh state government alone has seen over 241 million transactions for their services.[44]

M-Seva has made significant impact on people's lives in India. People in rural areas who previously travelled far distances to participate in elections, access public health advise, apply for birth certificates and use other public services, are now able to do so within minutes any time of day, at home via their mobile phones. An independent evaluation of m-Seva found that rural farmer communities and people living in disaster prone areas have been the greatest beneficiaries of the service.[45] In addition, citizens have become more empowered through more transparent delivery of government services and more responsive and accountable governance through efficient communication and information via mobile and online tools. In recognition of the successful m-governance approach, the Indian government received a United Nations public service award in 2014, which celebrates service initiatives of innovating governance for sustainable development and people's well-being.[46]

3.6 Kenya Establishes Digital Learning Programme to Drive Primary Education

Country at a Glance: Kenya

Land area	569,140 sq km	Households with a PC/computer	12.3%
Population	46 million	Households with Internet access	16.9%
GDP, GDP growth (US$ bn; %)	63.3; 5.9 (2015)	Gross primary, secondary and tertiary school enrolment	59% (2005)
GDI per capita	1,340	Fixed-broadband subscriptions broadband (per 100 people)	0.2
Number of households	93,000	Mobile phone subscriptions per 100 inhabitants	73.8
Adult literacy rate (% 15 and above)	72% (2010)	Population covered by mobile cellular network	89%

Reference: World Bank Group: Little data book on ICTs (2015); Kenya national Bureau of Statistics: Economic Survey 2016

Introduction

In 2007, the Government of Kenya published its "Vision 2030" which mapped the country's national strategic blueprint for the period 2008 to 2030[47]. The aim of the blueprint was to transform Kenya's economy into an industrial hub that will offer its citizens a higher quality of life and promote an economically participative citizenry. The vision is anchored on three strategic pillars that would directly address the triple challenge of unemployment, poverty and inequality. The first is the economic pillar that aims to improve the prosperity of Kenyan nationals through economic development programmes (achieve 10% per annum GDP growth rate); the second pillar is the social pillar that aims to invest in the citizens of Kenya and build a just, cohesive and equitable society; and the third is the political pillar that aims to realise a democratic political system that is founded on the rule of law and protects the right and freedoms of all citizens of Kenya. The Vision 2030 would be realised through the implementation of a series of well-defined projects under each strategic pillar. To ensure successful implementation of above intent, the Government of Kenya established the Vision Delivery Secretariat (VDS) that would manage the Vision 2030 office and oversee the delivery of the programme.

Under the social strategic pillar, Kenya made a commitment to invest in education and training in order to provide globally competitive quality education to its citizens. The goal is to systematically reduce the burden of illiteracy by improving access to education and increasing the transition rate from primary to secondary schools. Kenya also sought to achieve 80% adult literacy and to increase school enrolment rate to 95%. Through its strategy Kenya aimed to achieve high international ranking in the development of mathematics, science and technology skills. To achieve the above, Kenya aimed to implement the following strategies:

- Integrating early childhood development into primary education
- Reforming secondary curricula
- Modernising teacher training
- Strengthening partnerships with the private sector

The Government of Kenya would work in partnership with the private sector to raise funding to support the above-mentioned initiatives. Six flagship projects would be established to support the above initiatives for education and training:

- Building of 560 new secondary schools
- Recruitment of 28,000 teachers
- Establishment of computer supply programmes to equip students with modern IT skills
- Building of primary boarding schools in each constituency
- Rollout of voucher system in schools located in poor districts
- Establishment of "Centres of Specialisation" for each economic growth sector

It is expected that the interventions highlighted above would go a long way to overhaul the education system and ensure that one million children that are out of schools could be accommodated by the system.

Delivery Model for Equipping Students with ICT skills

The Government of Kenya realised very early in its planning process that if ICT is to be an effective learning tool, teachers would need to be able to use it effectively and therefore any investment in the ICTs for education would have to be complemented with a similar commitment of resources into teacher development to ensure that the delivery model works end-to-end[48]. Through this realisation Kenya undertook to integrate ICT into its curriculum ahead of its commencement of the delivery programme of laptops to schools.

Having successfully integrated ICT into its curriculum, Kenya sought to implement a plan to deliver 1.2 million laptops to students and classroom equipment to 23,000 schools country wide (GEM report: 2016). In November 2015, the ICT Authority published a request for proposal (RFP) for the delivery of the following equipment as part of a digital learning solution for each of the identified primary schools:

- Teachers digital device
- Student digital device
- Special needs education learner digital device
- Server and routers
- Projector

Following the completion of the evaluation process in January 2016, the winning bidders were required to demonstrate the feasibility of their proposals through a proof of concept (POC) involving 150 preselected schools. The selected schools were spread across 47 counties in order to draw significant experience across the various political jurisdictions. Furthermore, the schools were selected evenly to represent three distinct demographics of urban, peri-urban and rural schools. Nine schools were allotted to special education schools.

The implementation of the project will include multiple stakeholders that include the Ministry of Education, Ministry of Science and Technology, Ministry of Industrialisation and Enterprise Development, Ministry of

Energy and Petroleum, The National Treasury and the Office of the Attorney General (PC Tech Magazine (February 2016)[49]). The ICT Authority will act as the lead implementation agency with the overall accountability to ensure that the programme is implemented in time and within budget. Other external stakeholders involved in the project include: The Teacher Service Commission (TSC); Kenya Institute of Curriculum Development (KICD); Rural Electrification Authority (REA); Kenya National Union of Teachers (KNUT) and Kenya Primary Schools Head Teachers Association (KEPSHA). The cross-cutting collective of stakeholders would serve to elevate the programme as a national priority and ensure that it receives the required level of oversight by citizens of Kenya. In its completion the programme would also have the following components:

- Content for digital learning
- Capacity development for teachers and implementers
- An established local assembly for digital devices and accessories
- Broadband connectivity

Impact and Key Lessons from the Digital Learning Programme on Primary Education in Kenya

Since the introduction of free primary education by the Kenyan government, many students have managed to access the education system, setting Kenya to be on track to achieving goal number four of the Sustainability Development Goals. The Kenyan Government's Digital Learning school programme is expected to complement this effort by introducing the new avenue of eLearning to ensure that children in rural areas in particular have access to suitable education material.

Since the launch of the proof of concept, a number of issues related to the programme have begun to arise. The Government has had to remedy issues related to electricity, connectivity infrastructure, content management and device security. A critical issue that was highlighted during the pilot phase was how devices would be powered in schools that were not connected to electrical grid. During a pilot conducted by eLimu, the service provider installed solar panels for electricity to power devices that were delivered in one of Nairobi's informal settlements. A key lesson from this is that the programme does not have to offer a higher priority to schools with existing electrification infrastructure, but could also prioritise according to severity of need and teacher readiness (Vincent Matinde: January 2015)[50].

From the pilot, the Government of Kenya was able to discover that students were quicker to acclimatise themselves with the devices, whereas teachers seemed to lag behind due to the superficial fear of new technology. A key finding was that more focus needed to be placed on the upfront development of teachers to ensure that they embrace the new technology and restrict the urge to fall back to previous methods of teaching and learning.

The Kenya Government has also learned about the important partnership that needs to be harnessed between publishers that provide content, and aggregators who have the technology, knowledge and expertise to convert content into digital material. Content authors, publishers and aggregators need to learn how to share revenue streams in an equitable manner for all stakeholders involved in the value-chain.

It is worth acknowledging that funding for the Digital Learning Programme will continue to present a challenge for the Kenyan Government going forward. One option is to consider the Universal Service Fund which has accumulated

to the amount of KES 2.9 billion (Lilian Ochieng January 2016)[51]. The Universal Service Advisory Council (USAC) aims to mobilise KES 1.5 billion of the USF to close the access gap, KES 500 million of which will be channelled to support connectivity in learning institutions. This allocation could be used to complement the efforts of the national digital learning programme to enhance its end-to-end effectiveness. This can be achieved by ensuring that the value chain for devices, equipment and training is sustainable over the long term.

Endnotes

19 The first phase, beginning in 2016, includes 14,000 families, and will be followed by a second phase in 2017-2018 that includes ~126,000 additional families. The investment over the next two years will be approximately $128 million.

20 ISPs participating in the programme include ICE, Tigo, Coopeguanacaste, Cabletica, Telecable, Coopesantos, and Coopelesca.

21 http://www.itu.int/net/pressoffice/press_releases/2016/17.aspx#.WBh9UtWLRaQ

22 Costa Rica's telecommunications regulator (Sutel) is an autonomous entity and funds the programme through FONATEL, but it is coordinating with the Costa Rican government.

23 See full Digital Agenda Document here: http://www.mintic.gov.co/portal/vivedigital/612/articles-1510_recurso_1.pdf

24 https://en.wikipedia.org/wiki/Social_class_in_Colombia

25 Digital Agenda Document, Page 8.

26 Digital agenda Document, Page 9.

27 Digital Agenda Document, Page 14.

28 Digital Agenda Document, Page 24.

29 http://www.mintic.gov.co/portal/vivedigital/612/w3-propertyvalue-654.html

30 http://estrategiaticolombia.co/estadisticas/stats.php?&pres=content&jer=1&cod=&id=8#TTC

31 This section refers to 'Information Network Village (2010)' presented by Ministry of Public Administration and Security.

32 Information White Paper, 2011, p.434, Annual Report on National Informatization, 2015, p.477

33 GSMA, Mobile Economy Report 2015

34 United Nations, E-Governance Survey 2014

35 Ministry of Communication & Information Technology, Government of India, Towards Smart Governance: Mobile Governance in India

36 GSMAi

37 GSMA Connected Society, GSMAi, 2016, Digital inclusion barriers in Asia

38 Indicators used are: gTLDs per capita (Generic top level domain), ccTLDs per capita (Country specific top level domain), E-Government score, Facebook penetration, The number of edits on Wikipedia per internet user in the country, Number of Wikipedia articles, The number of the top 10m websites accessible to the local population, Accessibility of top 100 mobile apps

39 GSMA Connectivity Index

40 Center for Development of Advanced Computing, 2014, Mobile Seva Subsystems

41 Ministry of Communication & Information Technology, Government of India, Mobile Seva AppStore

42 GSMA Connected Society, GSMAi, 2016, Digital inclusion barriers in Asia

43 Ministry of Communication & Information Technology, Government of India, Mobile Seva AppStore

44 United Nations, E-Governance Survey 2014

45 Narsee Monjee Institute of Management Studies, 2013, Mid-Term Evaluation: Mobile Seva

46 India Today, 24 June 2014, Indian govt's initiative 'Mobile Seva' wins UN award

47 www.Vision2030.go.ke

48 https://gemreportunesco.wordpress.com/2016/03/04/kenyas-primary-schools-or-those-with-electricity-to-get-laptops-any-time-now/

49 http://pctechmag.com/author/almuc/

50 http://www.idgconnect.com/author/660

51 http://allafrica.com/stories/201601220833.html

4 Conclusions and Recommendations

4.1 Conclusions

The benefits of ICT and broadband connectivity are maximised when people are actively using the technologies in their daily lives. However, a majority of global citizens are still not online, which emphasises the need for interventions on a large scale. While broadband infrastructure deployment is the first step, it is not the only issue, given many still don't subscribe when connectivity is present. As illustrated in this paper, there are many options to stimulate usage, from providing subsidies for subscriptions, devices, and/or content, to engaging citizens with information and training on technology use. The first step in the process is for countries to evaluate their local data on deployment and adoption trends and focus efforts on closing the gaps in the lagging demographic groups or geographic regions using targeted initiatives.

Governments should establish policies and initiatives that are supported by data and have tangible, measurable results and realistic objectives and timelines. The policies should not favour particular technologies or market participants, and should ensure fair and efficient competition in the marketplace. The policies should also be flexible, to accommodate changing market conditions.

The list of recommendations provided below can effectively lead to the enabling environment required to encourage more people online. Since this paper is focused on increasing broadband demand, it is assumed that supply-side issues with the deployment of broadband infrastructure – whether wireless or wireline – are addressed with e.g. technology-neutral spectrum policy, open and competitive markets, and incentives rather than mandates. In locations where both supply and demand are lacking, simultaneous and mutually-reinforcing initiatives can lead to rapid uptake.

4.2 Recommendations

1. Establish government subsidies for broadband demand, which may be most effective when targeted at certain demographics or vulnerable populations.

2. Expand the use of Universal Service Funds for broadband adoption, including subsidies for devices, content and training. Universal Service Obligations (e.g. conditions on spectrum auctions to incentivise adoption by vulnerable demographics) could also be an effective means of reaching vulnerable and underserved populations. Despite past lack of use in several countries there are successful models where USFs have been impactful for expanding broadband adoption.

3. Subsidies that lead to self-sufficiency by the recipients are more sustainable longer-term. For example, a simultaneous online job training programme, or programmes using e-commerce platforms to broaden the market for agricultural products in farming communities, can help increase recipients' income so that they progress toward no longer needing the subsidy. At that point, the subsidy can be re-targeted to previously unaddressed members of the population.

4. Public-private partnerships can increase the efficiency and sustainability of broadband adoption programmes. However, the private entities need not be limited to network operators and could also include, for example e-learning content or application developers, schools, medical facilities, etc.

5. Perform a comprehensive review of broadband and ICT deployment and adoption status and trends, and keep up to date so that progress can be tracked. The data should be broken out into demographic and geographic groups so that the most vulnerable populations can be identified and prioritised, and improvement trends monitored.

6. Incentivise the development of relevant Internet content and applications in the local language. Besides private companies, partnerships with schools and universities can help fulfil this objective.

7. Study international examples, such as the case studies presented in this paper. While programmes with a long history can be valuable for conveying lessons learned and programme execution processes, even newly-initiated programmes can provide insight into innovative new approaches and methods. Regional sharing of case study results, such as via regional conferences or workshops, should be encouraged.

8. Increase awareness of what can be done with online content, applications, and services, through public awareness campaigns. This can include getting people comfortable with e-commerce, e-banking (or mobile payment) transactions, and e-government services.

9. Provide training classes for basic online usage skills (e.g. using a search engine) and digital literacy. This can be especially important for adults with a fear of technology. For children, these skills can be part of school curriculum (keeping in mind that the adult teachers often need such training upfront).

10. Ensure that schools have sufficient broadband capacity and ICT equipment in classrooms for each student. Make the equipment available after hours for adults to partake in training classes.

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