Business Impact of Broadband connectivity

Banjul 11-13 october 2023

Day 3

IMPACT OF BROADBAND CONNECTIVITY

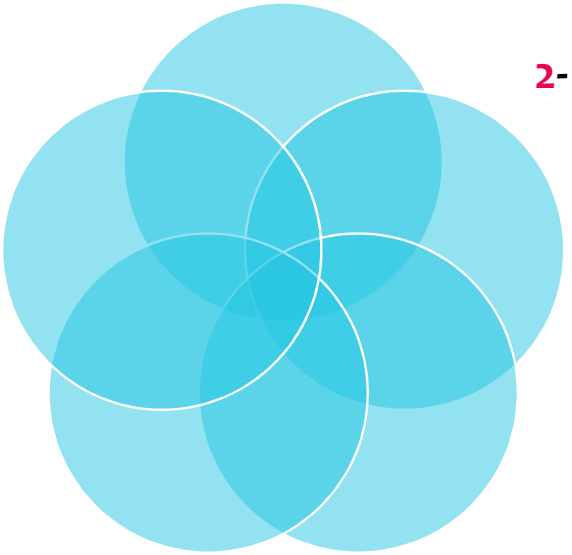
1- Summary of Local Broadband Plan case study

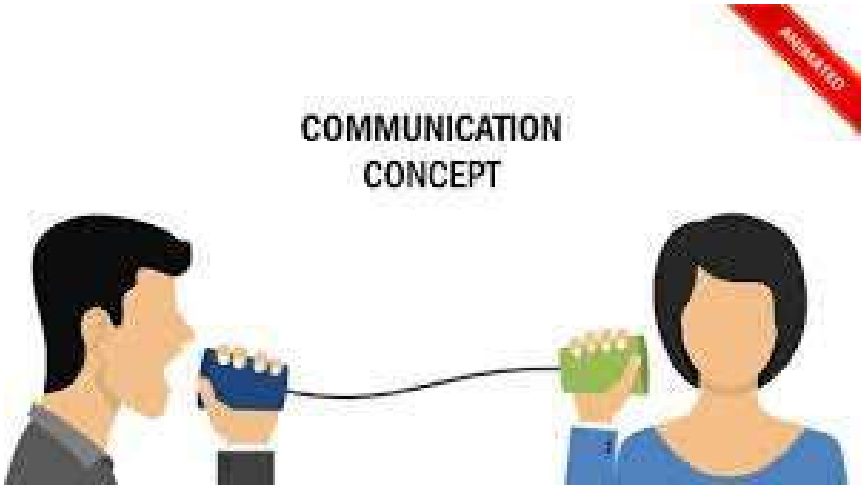
2- Economic impact of broadband connectivity

3Broadband impact on Health, Education, Agriculture, job creation: India Case

4 –Broadband regulatory Persepective

5 Questions Discussions





Mains Points of Day 2

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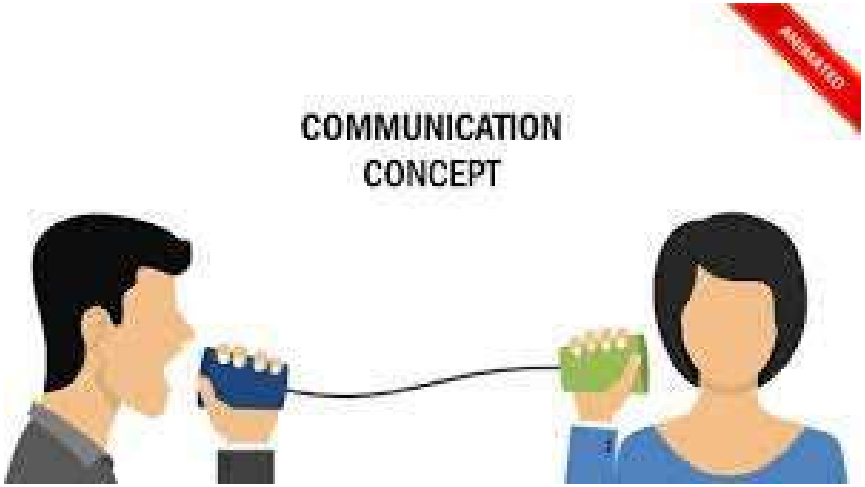

- Banjul 11-13 october 2023

Session 1

Summary of Local Broadband Plan case study

Following the exercise presented by the group on top of the main question about:

The Regulatory Ressources needed to increase the penetration rate or boost broadband connectivity, all the group point out the same concerns?

We can summarize on following point :

- Facilitate the deployment of new infrastructure.
- Redeployment of 800 Mhz for rural area
- Respect of License obligation
- Enforcing regulations that require operators to allocate a portion of their resources to underserved areas.
- Allowing Tax incentives :
- Light Licenses

Session 1

Summary of Local Broadband Plan case study

- Sharing the costs of Infrastructure development :
- Periodically review and update regulations to accommodate technological advancements.
- Provide mobiles for the users to pay on installment basis Offers frequencies on low bands with low spectrum fees to allow for greater coverage footprint.
  - Collaboration with ministry of energy should be encouraged to benefit from stable electricity within the entire region.
  - Promulgation of necessary legal instruments to improve the regulatory environment
  - Technology neutrality
  - Interconnection regulations to ensure competitive pricing - Open Market

Session 2

Regulation that really drives economic growth through the fast adoption of technology

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The arrival of 5G and the emergence of new tools with machine learning have transformed the landscape of Information and Communication Technologies (ICT), now being the fundamental basis of all economic sectors and key to national growth.

ICTs have moved far beyond the realm of simple "communications" to become the fundamental foundation of all economic and social sectors. At the same time, new challenges arise for regulatory bodies such as data protection and privacy, blockchain, the implications of Artificial Intelligence (AI) technology and much more.

The success of ICT depends on the existence of the basic conditions for its operation. With the right networks and services in place and an enabling regulatory framework, ICTs have the potential to dramatically transform access to education, healthcare, environmental management and agriculture, opportunities for commerce and entrepreneurship, provision government services and much more.

The regulation of the fifth generation should be flexible, light and much more open to the association.

Session 2

SPECTRUM, INFRASTRUCTURE AND ECONOMY FOR A SUCCESSFUL DEPLOYMENT AND ADOPTION OF WIRELESS NETWORKS

- Sufficient spectrum must be allocated and the blocks must be contiguous so that the networks work optimally and thus better costs and therefore prices can be achieved. Top spectrum limits must be increased to have reasonable and internationally competitive quantities.
- A spectrum balance must be ensured between the Operators so that real competition can occur.
- Also, the 4G and 5G networks will coexist for several years, so the implementation of new technologies and much more agnostic spectrum will be needed.
- Therefore it is necessary that all the Spectrum gets assigned as **technologically neutral**, and that means that it is the Operators who decide where and how to use it.
- In other words, the spectrum should not be assigned by service or technology (Voice, Data, Video, 2G, 3G, 4G, 5G), otherwise flexibility is lost and the very concept with which the technology was developed is deviated, negatively affecting its gradual adoption and therefore, the potential business it was supposed to create.

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Session3

Spectrum Regulatory Recommendations

- Create a tax environment where the adoption of new technologies is encouraged instead of being considered as a luxury service. On the side of the Operators in the import of equipment and the network deployment, and for the Users with the terminals/devices
- Spectrum below 1 GHz is essential for rural coverage due to its propagation and penetration characteristics; currently the 700MHz has been assigned in many countries and progress is being made in the 600MHz.
- The cost of licensing and use for the Operator should be much less than what currently exists for 800MHz, 850MHz and 900MHz, considering that the income from rural areas will be much lower
- Allow the Re-Framing of bandwith for Broadband connectivity

Session 2

Spectrum Regulatory Recommendations

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- Reserve prices and moderate annual charges must be established to allow the development of the industry. In other words, the objective should be, for example, Coverage and Convergence, not the maximum income
- Avoid measures that increase risks for operators, in other words, give security to investments.
- Licensing the spectrum as soon as it is needed.
- Avoid measures that increase risks for operators, in other words, give security to investments
- Publish long-term plans to award spectrum, marking the technological route well and that these plans give priority to welfare and economic growth instead of revenues for the State.

Session 2

Spectrum Regulatory Recommendations

It is necessary to install fiber in all possible places as it is the fundamental basis for the transport of eLTE and especially 5G.

- Encourage the migration of customers who are in 2 or 3G to 4G and later to 5G; as well as things connected in other old-fashioned technologies, to the Narrow Band of the Internet of Things.
- Make utility poles available for operators for the eLTE and 5G deployments.
- Guarantee the right of way through a homogeneous national legislation and not by municipality, with fast approvals for the installation of sites.
- Put an import rate of ZERO to infrastructure equipment and terminals, in order to lower the costs of the service and the devices, promoting their rapid adoption.

Session 2

Spectrum Regulatory Recommendations

- Promote financing for infrastructure and devices.
- Deploy Narrowband Internet of Things to drive a standardized ecosystem by driving new services to vertical markets.

All the necessary spectrum must be assigned in a timely manner and with neutral technology.

- It is necessary to foresee the construction of pipelines for Fiber in everything that is built or maintained, whether roads or buildings.
- Consider tax exemptions as incentives for the installation of new infrastructure (including upgrades in current infrastructure).

Session 2

Spectrum Regulatory Recommendations

- Enable demand subsidies for Rural Areas coverage as well as the implementation of services related to education, health and productivity.
- Tax exemptions, especially in activities that will boost economic growth, education and health services
- Eliminate specific taxes that distort access to devices and wireless services.
- Transform the use of Universal Access / Service Funds to connectivity projects Rural Areas or any regarding the non-connected.
- Promote public-private partnerships for connectivity projects.
- Encourage investments, through a tax system with broad, simple and transparent bases, with a stable and predictable design that generates less costs for companies and creates greater certainty for investments.

Session 3

Economic impact of broadband connectivity

Broadband connectivity can unlock immense economic benefits. By empowering workers with information, internet access can kick-start economic growth and improve productivity, create jobs and lift hundreds of millions of people out of poverty.

The economic impact of broadband begins from the inception of infrastructure deployment and cascades down to multiplied benefits at every stage. The main impact results from the building of broadband networks which creates large number of jobs, directly and indirectly.

The subsequent impact results from the advantages of organisations and customers being connected. The utilisation of broadband by enterprises leads to a multifaceted efficiency gain, which adds to an increase in GDP.

Economic impact of broadband connectivity

On the other hand, utilisation by households drives an increase in the disposable family income. Beyond these immediate advantages, which contribute to the increment in GDP, households receive a benefit in terms of consumer surplus, determined by the difference between what the customer is ready to pay for broadband service and its cost.

Expanding internet access can also lead to a more fundamental advancement in the structure of the Indian economy. A move from agriculture based to a knowledge based economy where information can be shared without barriers could be unlocked with access to the internet. Skills and knowledge would become a key rather than just access to resources. People and enterprises would have the ability to develop specialised expertise and new business models.

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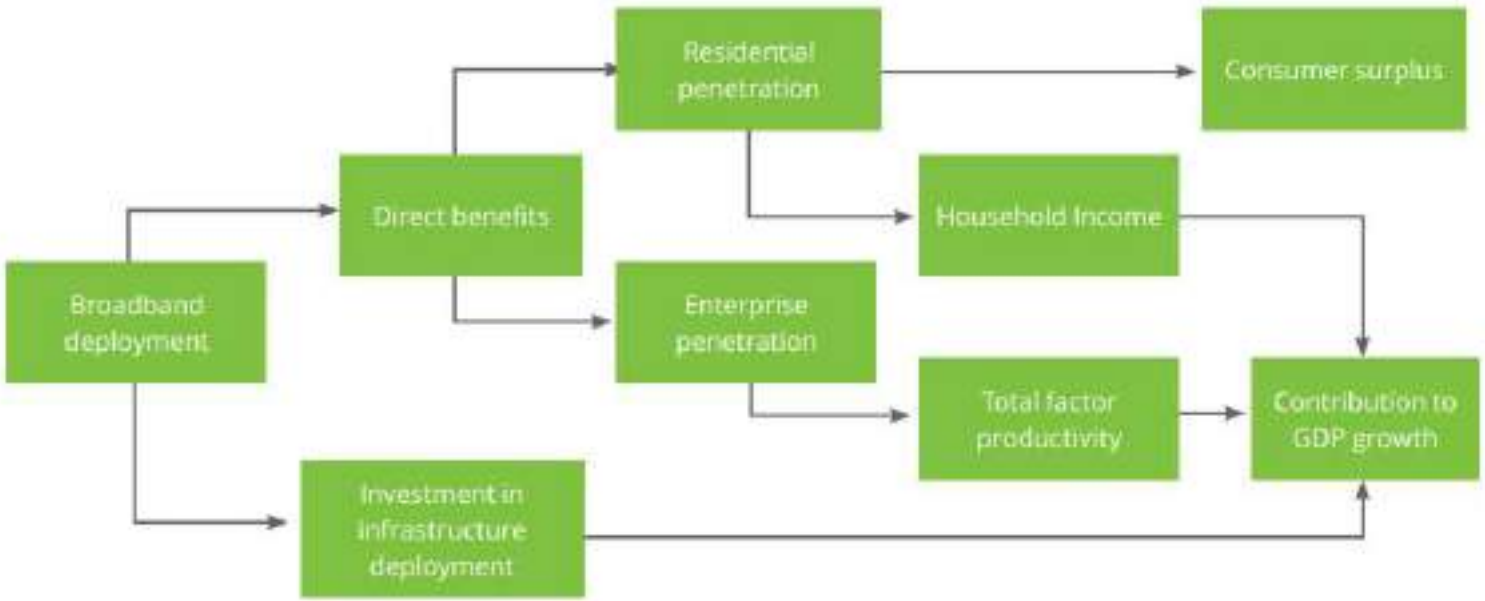
Economic impact of broadband connectivity

Cascading effects of broadband development on GDP



Source: ITU-BB-Reports_Impact-of-Broadband-on-the-Economy

Economic impact of broadband connectivity

In September 2018 ITU conducted a global study on the economic contribution of broadband, digitization and ICT regulation.

It provides substantial evidence regarding the impact of broadband and digital transformation on the economy as well as the impact of institutional and regulatory variables on the growth of the digital ecosystem.

- It has based on a large set of advanced and emerging economies, and showed effects for countries based on their level of development:
- Fixed broadband economic impact is guided by a return-to-scale effect2, according to which its economic impact is higher in more advanced economies than in emerging economies.
- The economic impact of mobile broadband depicts a saturation effect, according to which its contribution is higher in less developed countries than in more developed ones.
- The impact of the digital ecosystem on more advanced economies is higher than in developing countries.
- The regulatory and policy framework has a consistent impact on the development of the digital ecosystem, regardless of the country's level of development

Impact on GPD per Capita

This evidence was considered significant for policy makers and regulators in particular with regards to two key issues:

- Which technologies should become a policy priority in terms of adoption?
- How to ensure that, beyond broadband adoption, policies are deployed to stimulate the development of the digital ecosystem?
- The conclusions generated by this research has prompted calls to conduct studies that delve deeper into these effects, focusing on specific regions of the world.

The effects identified on a global scale **three main impacts**:

1. The economic contribution of fixed and mobile broadband;
2. The economic contribution of digitization (a variable that subsumes broadband technology within a larger set of digital ecosystem components);
3. The impact of policy and regulatory frameworks on the growth of markets for digital services and applications.

Impact on GPD per Capita

Economic impact of fixed broadband

Based on a model run for 139 countries (general fixed broadband model), an increase of 10 per cent in fixed broadband penetration yielded an increase in 0.8 per cent in gross domestic product (GDP) per capita. The sample was split between high, medium, and low income countries to test whether fixed broadband contribution still existed and whether the impact increased or decreased by level of economic development for:

- Countries with GDP per capita higher than USD 22 000 (50 countries);
- Countries with GDP per capita between USD 12 000 and USD 22 000 (26 countries);
- Countries with GDP per capita lower than USD 12 000 (63 countries).

Impact on GPD per Capita

Economic impact of fixed broadband

The results supported the hypothesis that the economic contribution of fixed broadband increases with economic development:

- Higher income countries: 10 per cent increase in broadband penetration yields 1.4 per cent increase in GDP growth.
- Middle income countries: 10 per cent increase in broadband penetration yields 0.5 per cent increase in GDP growth.
- Low income countries: while the coefficient of fixed broadband impact was similar to the middle impact countries, it was not statistically significant.

Impact on GPD per Capita

Economic impact of mobile broadband

The impact of mobile broadband on the world economy is higher than the impact of fixed broadband.

However, for mobile broadband, the level of economic contribution was the opposite, with little or no impact in countries with higher than USD 22 000 GDP per capita. For other countries, an increase of 10 per cent in mobile broadband penetration yielded an increase in 1.8 per cent to 2.0 per cent in GDP.

- High income countries: no economic impact was detected.
- Middle income countries: An increase of 10 per cent in mobile broadband penetration yields an increase in 1.8 per cent in GDP
- Low income countries: An increase of 10 per cent in mobile broadband penetration yields an increase in 2.0 per cent in GDP.

Impact on GPD per Capita

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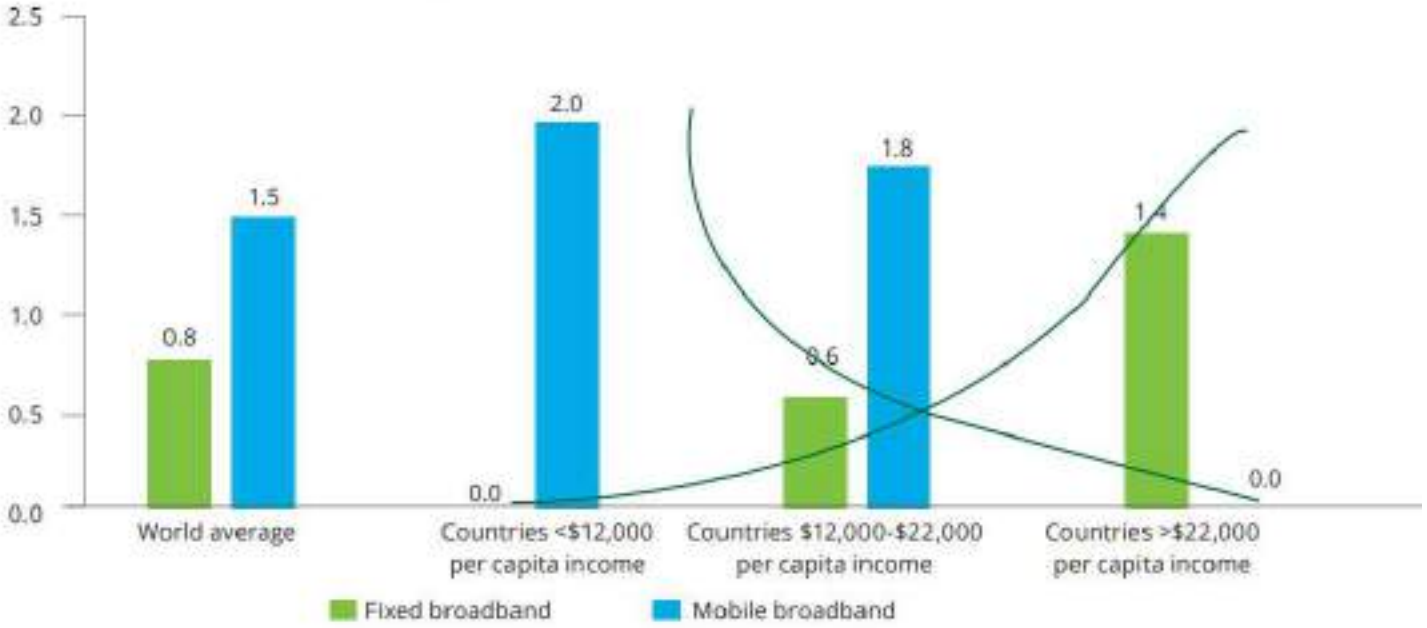
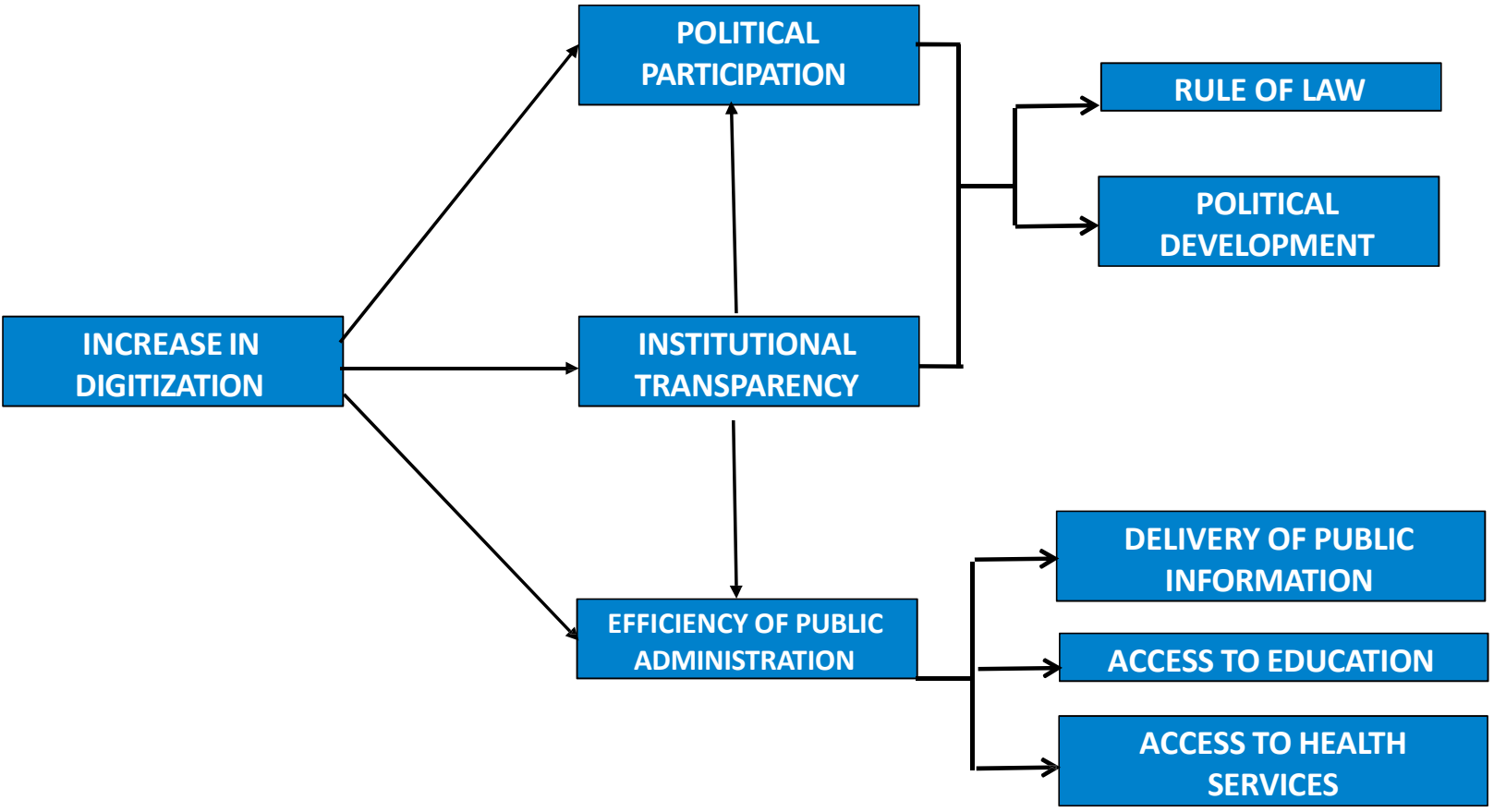
Economic impact of broadband worldwide



Note: Y-axis reflects percentage impact on a country's GDP. Value expresses as impact on GDP of 10 percent increase in broadband penetration
Source: ITU (Katz and Callorda) 2018

POLITICAL IMPACT OF DIGITIZATION



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ECONOMIC **SOCIAL** **POLITICA**

BROADBAND

- Economic impact of infrastructure deployment
- Social and economic spill-overs of a general purpose technology

DIGITIZATION

- Economic, social, and political impact of utilization of broadband to transport digitized content

- Economic growth
- Employment
- Productivity

- Poverty reduction
- Consumer welfare

- Transparency
- Political participation
- Administrative efficiency

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	ECONOMIC	SOCIAL	POLITICAL
FIXED BROADBAND	• Primary platform for enterprise and government usage • Primary platform for creating /enhancing consumer markets • Household adoption	• Primary platform for enhancing quality of public services (health, education)	
MOBILE BROADBAND	• Primary platform in emerging markets • Individual adoption		• Primary platform for consumer access to information

	Broadband	Digitization
GDP Growth	• Output generated by network deployment (value added, multpliers, ”leaked investments”) • Spill-over effects	• Output generated by direct and indirect effects
Job creation	• Jobs generated by network deployment (direct, indirect, induced) • Spill-over effects	• Jobs generated by direct and indirect effects
Consumer surplus	• Willingness to pay minus price	• Willingness to pay minus pric

Infrastructure effect: Three types

EFFECT	DESCRIPTION	EMPLOYMENT EXAMPLES
Direct jobs and output	• Employment and economic production generated in the short term in the course of deployment of network facilities	• Telecommunications technicians • Construction workers • Civil and RF engineers
Indirect jobs and output	• Employment and production generated by indirect spending (or businesses buying and selling to each other in support of direct spending)	• Metal products workers • Electrical equipment workers • Professional Services
Induced jobs and output	• Employment and production generated by household spending based on the income earned from the direct and indirect effects	• Consumer durables • Retail trade • Consumer services

- **Infrastructure construction**: Broadband deployment requires additional labor for infrastructure construction, operator's new commercial offices, and technical personnel for installation and maintenance
  - The new demand for labor in a market with an unemployment rate that is already below 5% generates a shift in the demand curve for workers, leading to an increase in equilibrium wages
  - The rise in wages through this channel may reflect a need for better compensation for those workers who, given the low unemployment rates, should receive better wages to meet or exceed their reservation wage
- **Improved labor productivity**: Classic labor economics literature shows that wages in competitive markets equal marginal productivity. As a result, higher labor productivity should yield higher wages
- **Skill "signaling"**: Research shows that the effect of broadband deployment is greater for computer and Internet users. Thus, the introduction of broadband allows workers with digital literacy skills to signal the computer knowledge to potential employers and then use those skills in the workplace in return for higher wage
- **Reduced search costs**: the introduction of broadband can also help reduce the time required for an effective job search, leading to a reduction in unemployment periods and generating an increase in the migration of underemployed workers to full-time positions, which, in turn, results in higher labor income.

SOCIAL IMPACT OF DIGITIZATION

INCREASE IN DIGITALIZATION + **ECONOMIC GROWTH (Per Capita GDP)** + **QUALITY OF LIFE (Welfare Index)**

ECONOMIC GROWTH (Per Capita GDP) − **SOCIAL INEQUALITY**

SOCIAL INEQUALITY + **ACCESS TO BASIC SERVICES (Human development Index)**

Economic impact of digitization

The economic impact of digitization was tested by relying on an endogenous growth model4 that linked GDP to the fixed stock of capital, labour force, and the CAF Digital Ecosystem Development Index. The approach followed in this case was similar in terms of first testing the economic contribution for a sample of 73 countries worldwide (the general digitization model) and then splitting it for countries from the Organization for Economic Co-operation and Development (OECD) and non-OECD countries.

Economic impact of digitization

According to the general digitization model, an increase of 10 per cent in the CAF Digital Ecosystem Development Index resulted in a 1.3 per cent growth in GDP per capita. When the sample was split between advanced and emerging economies, economic impact increased with development:

- OECD countries: An increase of 10 per cent in the CAF Digital Ecosystem Development Index resulted in a 1.4 per cent growth in GDP per capita.
- Non-OECD countries: An increase of 10 per cent in the CAF Digital Ecosystem Development Index yielded a 1.0 per cent growth in GDP per capita.
- Furthermore, a single variable model with country and period fixed effects indicated that digitization also has an impact on labour and total factor productivity. An increase in the digitization index of 10 per cent yielded an increase in labour productivity of 2.6 per cent and in total factor productivity of 2.3 per cent.

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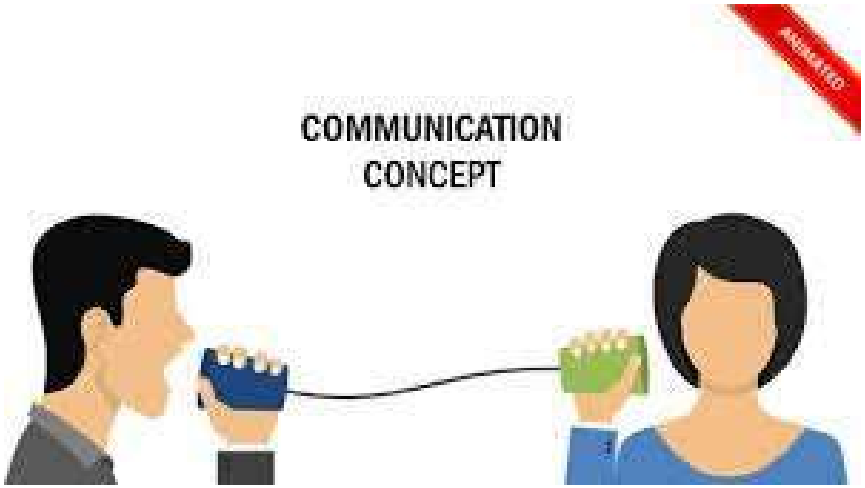
Session 1

2-– Broadband impact on Health, Education, Agriculture, job creation: India Case



- Broadband can provide many opportunities for the health sector:
  - Improving youth mental health and aged care services
  - Monitoring health conditions
  - Enabling shared electronic health records

- Broadband technologies are revolutionising the delivery of health care. Convergence with other technologies towards Digitally Enabled Personalized Medicine

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- Mobile and broadband technologies for **ameliorating social isolation** in older people
- **Smart Homes** for the Elderly – recent developments in Korea

Youth Mental Health

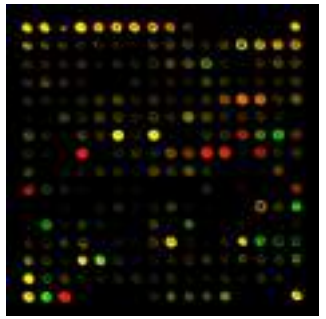
- HORYZONS: Online Recovery for Youth Onset Psychosis

- *Individual Electronic Health Records*
- *The **Telestroke** Study*
- *Haptic **Tele--Rehabilitation***
- ***Teledentistry***
- *Virtual visits: Investigating the acceptability of webcam consultations for young adults' **sexual health***
- *Wireless broadband monitoring of **knee osteoarthritis***
- *Overcoming geographical barriers for community health*
- *Interpreter mediated cognitive assessments using video conferencing software*
- *SeeCare **IPTV**: Personalised Health Literacy Demonstrator*
- ***Mobile Augmented Reality***
- *Interpreter mediated **cognitive assessments** using video conferencing software*
- *High resolution **monitoring of atmospheric pollutants** to identify their impact on population health*
- *Overcoming geographical barriers for community health*
- *Using video--conferencing to pilot an education and clinical support package for rural GPs in Mildura*

Health Informatics: Towards Digitally Enabled Personalised Medicine

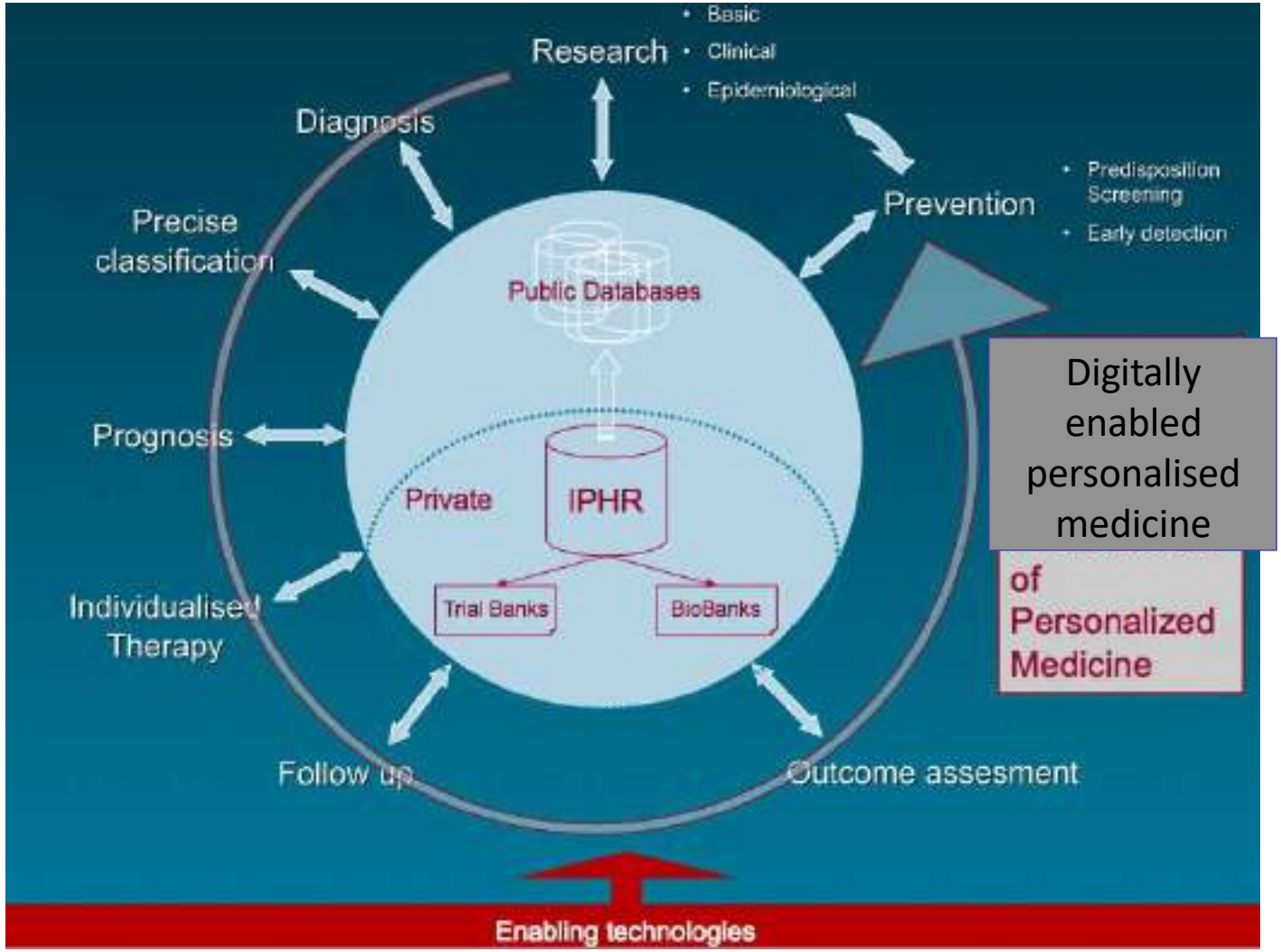
- New converging areas make feasible for the first time the idea of an integrated digital infrastructure for medicine, reaching the citizen, that will make feasible the concept of personalized medicine
  - Nanotechnology
  - Biotechnology
  - Information Technologies
  - Cognitive science

- Broadband technologies and networks
- High performance computing (and A.I. systems)
- Ubiquity of smartphones, tablets, …
- Sensors, imaging and wearables
- Personal genome sequencing, genetic testing and epigenetics
- Metagenomics and the Human Microbiome Project
- Social networks and the Quantified Self
- Knowledge management on genetic diseases and systems biology modelling



- Smartphone ECG system to provide physicians and patients with hospital--quality heart rhythm monitoring outside of the hospital setting

- Personalized medicine refers to the tailoring of medical treatment to groups of patients with similar genetic or molecular profiles.
- Ultra high speed broadband networks will be required to transmit enormous volumes of data from patients' homes to health practitioners and vice versa in a timely manner, and to enable the processing of this deluge of data.
- Personalised medicine offers enormous opportunities for improving preventive, diagnostic and therapeutic solutions → improving healthcare outcomes, reducing costs and increasing patient safety.



Digitally enabled personalised medicine

of Personalized Medicine

Session 1

Broadband impact, job creation: India Case

Impact of broadband on job growth in India Broadband creates new jobs through several avenues: directly through the demand for labour from new technology-based enterprises; and indirectly through the demand from the wider ecosystem of companies that are created to support technology-based enterprises; for example network installation and maintenance providers and providers of other skill based services such as advertising and accounting. Importantly, the internet has the potential to create jobs that would not otherwise become available.

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Jobs created due to broadband network construction

- Employment generated in the short term in the course of deployment of network facilities for telecommunications technicians, construction workers, and civil and RF engineers
- Employment generated due to businesses buying and selling material and services to each other for e.g., metal products workers, electrical equipment workers, and professional services

Session 3

Broadband impact, job creation: India Case

The increase in broadband penetration has branching network effects that impact job growth in three ways.

- Development of new technologies and applications expedite innovation.
- Enhanced productivity due to utilisation of advanced, complex and structured processes enabled by broadband
- Outsourcing employment with remote service delivery and information processing.

The enhanced productivity also leads to reduction in jobs as automation replaces human labour. However, this effect is neutralised by the additional jobs created in order to further advance technology and due to new business opportunities created by the application of these technologies. For instance, ML and AI implementation would replace traditional blue collar jobs but it would also open more up opportunities such as the creation of the AI based services. Outsourcing of jobs enabled by broadband also results in additional job creation

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IoT and AI applications

- A study by Broadband India Forum highlighted that IoT and AI apps are expected to generate more than 2.8 million jobs in rural India in the next 8-10 years (2.1 million in agriculture as a result of smart farms and 0.7 million in rural health care as a result of IoT based applications)

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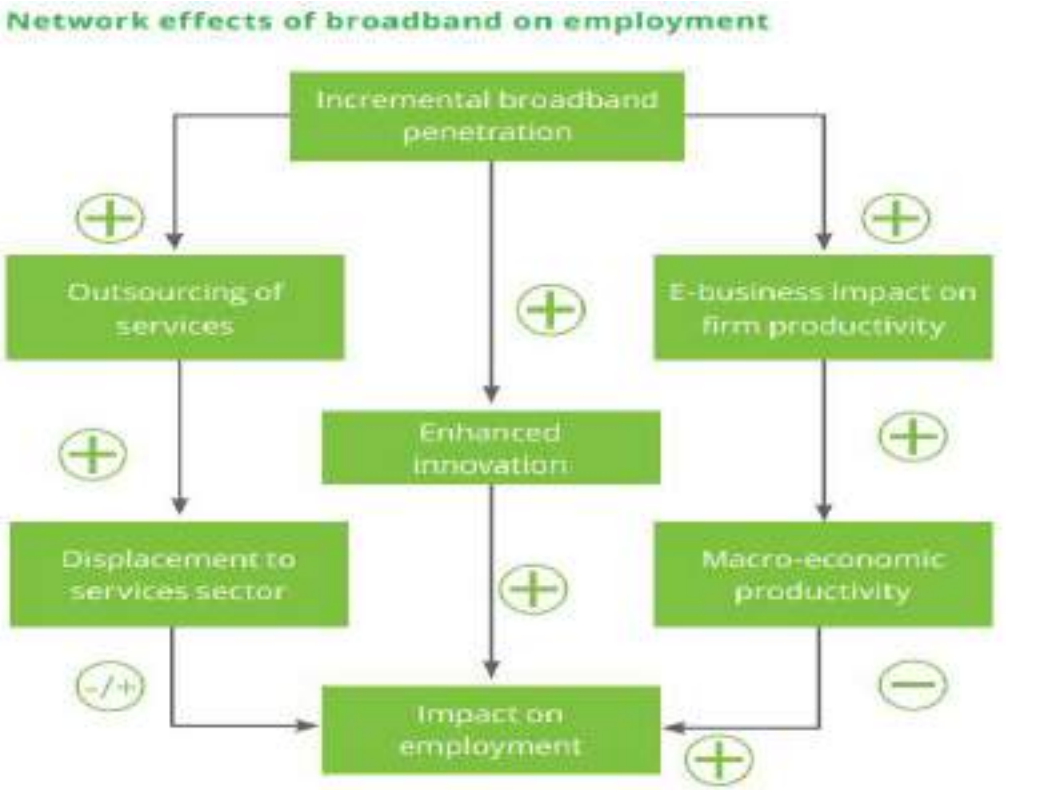
Broadband impact, job creation: India Case



Source: Adapted from a model originally developed by MICUS in a report for the European Commission (see Fornefeld et al., 2008), mentioned in ITU-BB-Reports_Impact-of-Broadband-on-the-Economy

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Broadband access spurs jobs in hard-to-reach areas

- Expanding broadband access stimulates self-employment opportunities in areas with limited economic activity
- Rise in e-commerce spawned several e-logistics companies, opening up opportunities for drivers
- Industries are exploring innovative ways to partner with broadband service providers to gain access to rural workforce

Source: Secondary Research, Deloitte Analysis

Session 1

Broadband impact, job creation: India Case

Overview	Indian cloud-based customer operations software company provides cross-functional team collaboration to deliver exceptional customer support	Indian SaaS company providing web based business tools including an online office suite, IoT management platform and suite of IT management software	Indian online education technology and online tutoring startup that develops personalized learning programs for K-12 students	Indian network centric B2B trade platform, designed specifically for MSMEs in India. It brings traders, wholesalers, retailers and manufacturers on to a single platform
Employees	2,700	8,375	9,000	7,000
Growth	Telephony, chat and support software saw 100 percent increase in first 6 months of 2020		7.5 million more users since March 2020	

Source: Organization's data sources from respective official websites, names undisclosed

Merci de votre attention

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