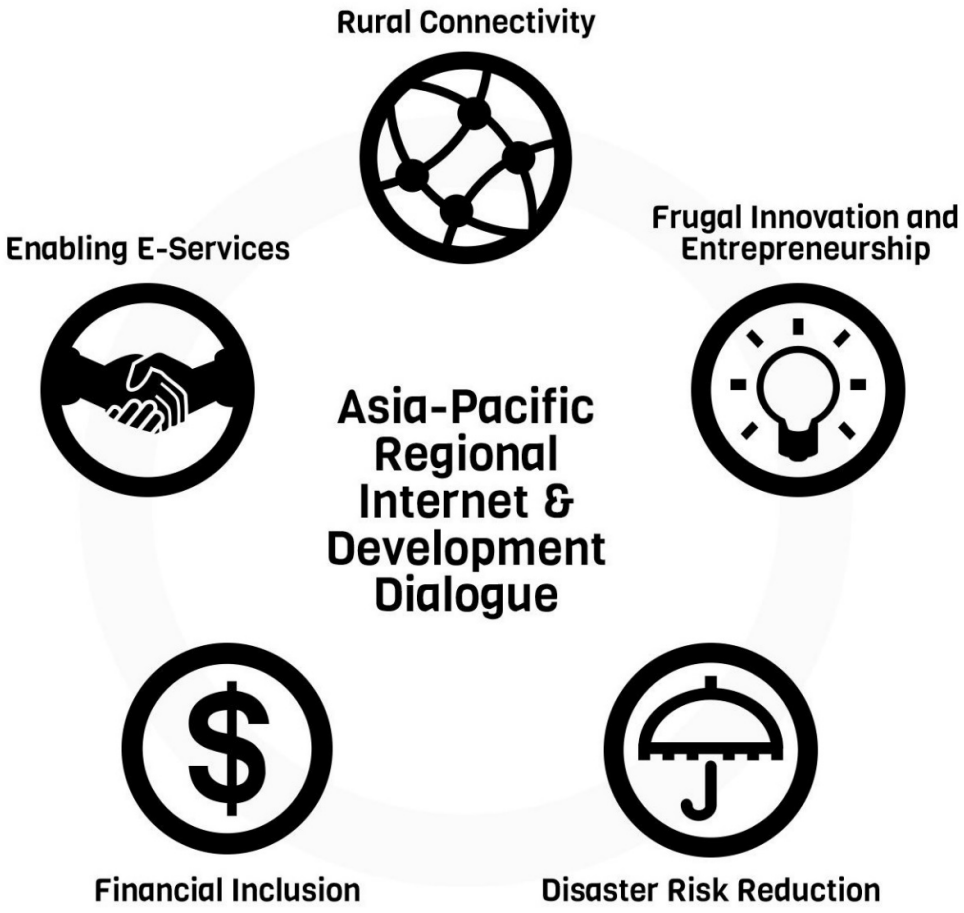
Internet Society




3-4 October 2016
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## Overview

**Rural Connectivity**

Rural connectivity is important for alleviating poverty and achieving the sustainable development goals, but there are many challenges to overcome. Asia-Pacific's digital divide is widening and broadband growth has generally been slow. Yet, innovative approaches and solutions to developing the ICT infrastructure in rural and remote areas are available, including the Asia-Pacific Information Superhighway. Which of these approaches can be scaled up and how?

**Enabling E-Services**

The Internet is not being used even when it is available due to barriers related to: (1) affordability; (2) awareness and digital skills; (3) locally relevant content and services; and (4) security, privacy and trust. The underlying causes of unequal access, adoption and use of the Internet must be understood and addressed. Security, privacy and trust issues need to be considered right from the start when formulating a strategy to enable Internet adoption and use. What is the regional strategy for addressing these issues and enable e-services?

**Frugal Innovation and Entrepreneur-ship**

Innovation is essential for economic growth and addressing socio-economic challenges, but innovation efforts in the Asia-Pacific region are not focused on driving social impact. Furthermore, frugal innovation that originates from local communities in emerging economies is not mainstreamed in national and global development agendas. Inclusive innovation is not only about making innovations available to vulnerable populations, but empowering those communities to realize their own innovative potential. Women's barriers to entrepreneurship—from access to finance and credit, to opportunities to acquire skills—need to be addressed in order to realize the potential contribution of women to development. What is the regional strategy to address these complex issues?

**Financial Inclusion**

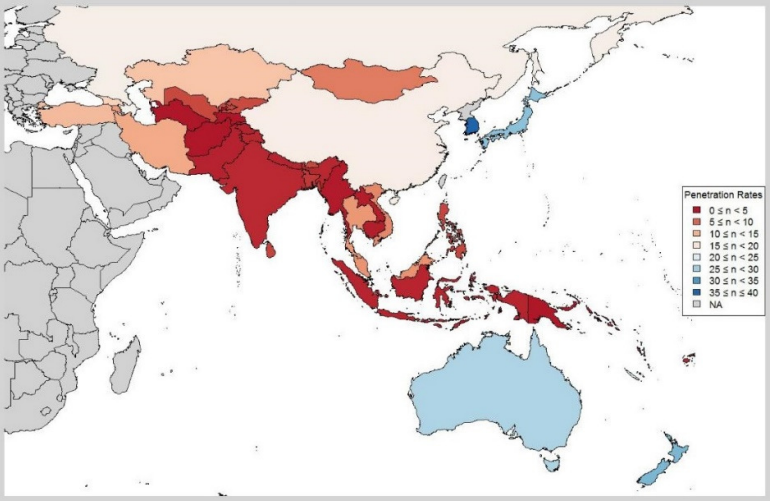
Financial inclusion is high on the global and regional development agenda, and the importance of ICT for achieving financial inclusion goals is widely recognized. Although the rapid growth in mobile phone adoption has resulted in its innovative use to deliver financial services, existing barriers to providing and accessing financial services remain, and new barriers and risks are introduced. What should be Asia-Pacific's regional framework for digital financial inclusion, and what are the mechanisms to ensure that regulatory procedures are harmonious across Asia and the Pacific?

**Disaster Risk Reduction**

The Asia-Pacific is the most disaster prone in the region, but the ICT infrastructure in most countries is not designed to be resilient to disasters. ICT can play an important role in all phases of the disaster risk management cycle, but the use of ICT in disaster risk management needs to be gender sensitive and inclusive. What are the priority strategies for the application of ICT in disaster risk reduction?

## A. The Issues

### 1. Asia-Pacific's digital divide is widening, and broadband growth has generally been slow[1]




**20 countries**

**< 2% broadband adoption**

- Low-income countries
- Have unaffordable or expensive broadband access
- Almost all are categorized in the lower half of the Worldwide Governance Indicators' Regulatory Quality Index
- Made negligible progress in broadband adoption over the last 15 years.

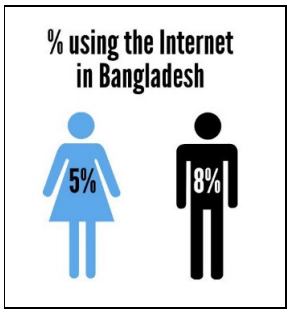
**Map showing fixed broadband subscriptions per 100 inhabitants in Asia and the Pacific in 2015**

Asia-Pacific is home to the world's top connectivity performers like Australia, Hong Kong (China), Japan, Republic of Korea, New Zealand and Singapore.

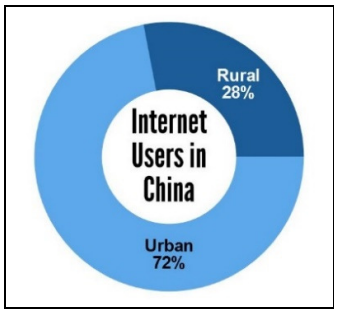
Yet, in 20 countries of the Asia-Pacific less than 2% of their population have adopted fixed broadband in 2015. The figure above summarizes the common characteristics of these 20 countries.

The region's digital divide is widening, with no sign of the divide narrowing.

The gender digital divide is proving incredibly difficult to overcome.[2]




There is also an urban-rural digital divide.[3]




Rural and remote areas are often not connected because they are not always commercially viable for private operators.

[1] ESCAP, *State of ICT in Asia and the Pacific* (Bangkok, 2016).
[2] ITU Statistics, http://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2016/Gender_2012-2015.xls.
[3] ESCAP, *Building e-Resilience in China: Enhancing the Role of Information and Communications Technology for Disaster Risk Management* (Bangkok, 2016).

A fundamental challenge—30% of developing Asia's rural population, amounting to around 650 million people, have no access to electricity.[4]

Moreover, the terrain of many rural areas in the Asia-Pacific region, with the world's tallest mountains, low-lying flood prone regions, vast deserts, and far-flung archipelagos, present immense challenges to infrastructure building that require innovative solutions.

The consequences of these divides are profound. As the world becomes more interconnected, and the ICT infrastructure, particularly broadband, underlies economic growth and social development, those without access to the ICT infrastructure will be further disadvantaged.

## 2. Although Asia-Pacific is a leader in poverty reduction, rural poverty persists

Rural connectivity is important because:

- 55% of Asia-Pacific's population live in rural areas[5]
- Among those living in extreme poverty (<$1.25/day), 73% (687 million people) are in the rural areas.[6]
- In almost all rural societies, women are the primary caregivers. At the same time, they perform a large part (and often most) of the agricultural work and produce the bulk of the developing world's food crops, yet they earn less than men.[7]
    - ICT can be used to empower women. For example, in a survey conducted across low and middle-income countries, four in ten women have increased income and professional opportunities due to owning a mobile phone.[8]
- Agriculture sustains the majority of rural livelihoods, but this sector is stagnating; food security is a pressing concern, especially with the threats of climate change.[9]
    - ICT can revitalize the agriculture sector and improve rural livelihoods. Japan is addressing its food security challenge by using cloud-based crop production and management systems to attract tech-savvy young professionals into farming. The use of this system means that those with little experience in agriculture can become farmers.[10]

## 3. Rural connectivity faces many challenges[11]

### Supply side

- Limited financial resources, in general
- Limited in-country infrastructure, especially national fibre optic networks, and limited or very expensive infrastructure for international connectivity
- Limited amount of spectrum available for wireless broadband

[4] International Energy Agency, World Energy Outlook, 2011.
[5] ESCAP, *Economic and Social Survey of Asia and the Pacific 2016* (Bangkok, 2016).
[6] IFAD, *Rural Poverty Report 2011* (Rome, 2010).
[7] Ibid.
[8] Cherie Blair Foundation for Women, *Women & Mobile: A Global Opportunity - A study on the mobile phone gender gap in low and middle-income countries* (GSMA, London, 2010), http://www.cherieblairfoundation.org/uploads/pdf/women_and_mobile_a_global_opportunity.pdf.
[9] Food and Agriculture Organization of the United Nations, "FAO Priority Framework for Asia and the Pacific (2010-2019)," September 2010, http://www.fao.org/docrep/meeting/019/k8736e.pdf.
[10] TRPC, *Going Digital: The Status and Future Potential of Internet-Based Economies in Asia* (2015), http://trpc.biz/wp-content/uploads/TRPC_GoingDigital_Whitepaper20150605.pdf.
[11] ITU and UNESCO, *The State of Broadband 2015* (Geneva, 2015).

- Inadequate coverage of wireless broadband networks
- Limited prospects for economic growth

**Demand side**[12]

- Low levels of purchasing power, and relatively high service prices
- Low levels of education, especially regarding ICT skills
- Limited availability of (and high taxes on) consumer electronic equipment
- Limited availability of relevant local content

## B. The Opportunities

### 1. Studies show that demand is forthcoming when supply is available

**If policymakers can find ways to encourage the requisite investment in the ICT infrastructure to enable greater coverage at affordable prices, demand will be forthcoming.**

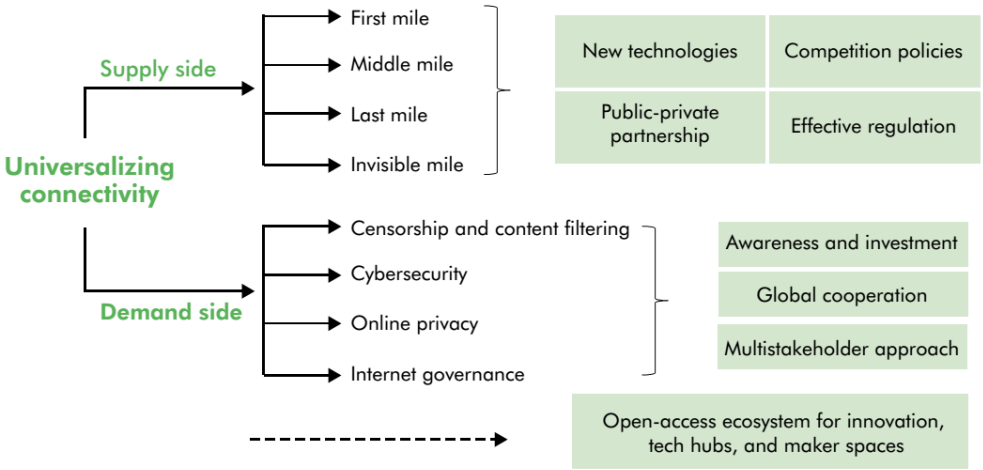
The real demand for Internet access is frequently hidden, due to the failure of the supply side of the market to be responsive, shows a series of studies by the Internet Society and other organizations for Africa, and the ASEAN and Central Asia subregions.[13]

This is called "latent demand", which is only able to appear as "revealed demand" when the supply side is actively growing the market.

**A strong positive correlation between telecommunications investment and broadband adoption is found in the latest ESCAP report.**[14]

Nevertheless, conducive government policies and regulations will continue to influence private telecom operators' investment in the ICT infrastructure. On a regional level, the Asia-Pacific Information Superhighway initiative aims to improve broadband connectivity.

Below is a useful framework to consider the opportunities for improving connectivity that looks at both the supply and demand aspects.




**A Framework for Improving Connectivity**
*Source: World Bank, World Development Report 2016: Digital Dividends (Washington D.C., 2016)*

[12] Demand-side issues are discussed in detail in the Issues Paper on Enabling E-Services.
[13] See http://www.unescap.org/resources/unleashing-potential-internet-central-asia-south-asia-caucasus-and-beyond and http://www.internetsociety.org/doc/unleashing-potential-internet-asean-economies.
[14] ESCAP, *State of ICT in Asia and the Pacific* (Bangkok, 2016).

## 2. Mobile access to the Internet will bring the unconnected online

The emerging economies of Asia-Pacific are leapfrogging to mobile-first connectivity, with many first time users going online via mobile devices.

Although mobile Internet coverage and adoption in emerging economies of Asia-Pacific has been low, forecasts show that this is likely to change with increasing investments in mobile network coverage.

In emerging economies of the Asia-Pacific 3G population coverage is only 13%.[15]

GSMA estimates capex investments of nearly $600 billion until 2020 increasing 3G and 4G coverage levels to 93% and 69%, respectively, with most of this driven by reaching previously uncovered sub-urban and rural areas.[16]

But even with this investment, it will still leave many hundreds of millions of people unconnected unless more innovative solutions are broadly adopted to reach those in rural and remote areas.

## 3. There are innovative approaches and solutions to developing the ICT infrastructure in rural and remote areas, including the Asia-Pacific Information Superhighway[17]

| | The first mile (the point at which the Internet enters a country) | The middle mile (the national, intercity Internet backbone of a country) | The last mile (the connection between users and their nearest Internet point of presence) | The invisible mile (other, less visible network components and potential bottlenecks) |
|---|---|---|---|---|
| **Network components** | International Internet access, including submarine cable landing stations, satellite dishes, domain name registration | National backbone and intercity network, including fibre backbone, microwave, IXPs, local hosting of content | Local access network, including local loop, central office exchanges, wireless masts | Non-visible network components, including spectrum, border crossings, databases, SIM cards, cybersecurity |
| **Market competition** | • Authorization of satellite dishes<br>• Designation of domain name registry and registrars<br>• Licensing of competing international service providers and orbital slots<br>• Authorizations for landing stations, and access (co-location) to international gateway facilities | • Licensing/ authorization of nationwide facilities-based operators and service provider<br>• Interconnection arrangements<br>• Infrastructure sharing arrangements<br>• Cross-sectoral participation (such as cable TV and alternative infrastructures, and co-deployment and cohabitation of fibre and transport infrastructure) | • Licensing/ authorization of local facilities-based operators and service providers<br>• Authorization of mobile virtual network operators<br>• Authorization of value-added network service providers, including for mobile money<br>• Unbundling the local loop | • Market mechanisms (such as auctions and resale) for spectrum assignments, especially for 3G and 4G bands<br>• Arrangements for access to essential network facilities, including national numbers, address database |

[15] 3G Population Coverage for developed Asia Pacific is 99%. Internet Society, *Global Internet Report 2015* (2015).
[16] GSMA, "Closing the coverage gap: A view from Asia," June 2015, https://www.gsmaintelligence.com/research/?file=e245c423854fcfd38eeae0a918cc91c8&download.
[17] The Asia-Pacific Information Superhighway is an initiative of ESCAP to improve regional broadband connectivity, through a dense web of open access cross-border network infrastructure, creating a cohesive land- and sea-based fibre infrastructure with the ultimate aim of increasing the international bandwidth for developing countries in the region, to lower broadband Internet prices and to bridge the digital divide in the region.

| | | | | |
|---|---|---|---|---|
| | | • Licensing mobile virtual network operators | | |
| **Public-private-community partnership** | • Privatization/ liberalization of international gateway<br>• Development of government data centres<br>• Participation in international cable and satellite consortia<br>• Regulation of legal intercept | • Privatization of the incumbent operator<br>• Industry consultation on a network master plan<br>• Establishment of national and local IXPs<br>• Local hosting of content, including government data centre<br>• Network co-financing<br>• Low-cost loans to operators to support fibre deployment to rural areas | • Dominantly private operation and ownership, with public-private partnership approach where market fails (as in rural areas)<br>• Stakeholder consultation on a national broadband plan<br>• Universal service obligations (as for emergency services and accessibility for disabled)<br>• Community-based wireless networks, e.g., Wireless For Communities Initiative in India, Nepal and Pakistan[18] | • Negotiation of transit and access to virtual landing stations (for landlocked countries)<br>• CSIRTs at national and institutional levels<br>• Open access to short code numbers, as for SMS |
| **Effective regulation** | • Open access to international facilities<br>• Open to foreign ownership and investment<br>• Avoiding excessive import and excise taxes<br>• National representation at relevant national and regional bodies, such as ITU, ICANN and WTO | • Coordinating rights-of-way for linear infrastructures<br>• Safeguards on significant market power<br>• Open access rules for national backbone<br>• Promotion of local content and hosting | • Open access rules for local loop and central office exchanges<br>• Coordination of planning permission for public works among operators and utilities, and authorizations for construction of wireless masts<br>• E-waste recycling guidelines | • Spectrum management, including arrangements for allocation of bands and re-farming<br>• SIM card registration arrangements<br>• Data protection and privacy guidelines |

**A Framework for the Supply of Internet Service**
*Source: World Bank, World Development Report 2016: Digital Dividends (Washington D.C., 2016), with additional actions and initiatives added*

## C. Alignment with the SDGs

The Sustainable Development Goals (SDGs) recognize the multi-faceted and cross-cutting roles of ICT as the foundational infrastructure for sustainable development and as a development enabler. SDG Target 9.c aims to significantly increase access to ICT and strives to provide universal and affordable access to the Internet in least developed countries by 2020.

The 2030 Agenda for Sustainable Development also commits to the devotion of resources to developing rural areas and sustainable agriculture and fisheries, supporting smallholder farmers, especially women farmers, herders and fishers in developing countries, particularly least developed countries. SDG Target 2.a calls for increased investment in rural infrastructure.

The role of national broadband policy has been fully recognized by the group of Landlocked Developing Countries (LLDCs) with the adoption of the *Vienna Programme of Action for LLDCs for the Decade 2014-2024* with the specific objective that all LLDCs should make broadband policy universal.

[18] Internet Society, "Wireless for Communities," http://www.internetsociety.org/what-we-do/where-we-work/asia/south-asia/wireless-communities.

## D. Guiding Questions to Formulate the Region's Strategy

- Which of the good practices for extending connectivity to unserved and under-served areas should be scaled up or replicated?
- What are the conditions required for their successful upscaling / replication of the ICT infrastructure that is cost-effective, inclusive, resilient and green?
- What innovative financing mechanisms are available or should be developed?
- What is the regional strategy for reducing the retail cost of connectivity?
- What is the regional strategy for ensuring that women have equal access to broadband?
- The key to rural connectivity is collaboration and effective incentivization between government and the private sector. What are the successful models for collaboration that can be adopted?
- What are the targeted strategies for least developed countries, landlocked developing countries and small island states?

## A. The Issues

### 1. The Internet is not being used even when it is available

In Asia in 2014, 3G and 4G coverage reached 2.8 billion people, but 1.5 billion (more than half) of them were not using mobile Internet.

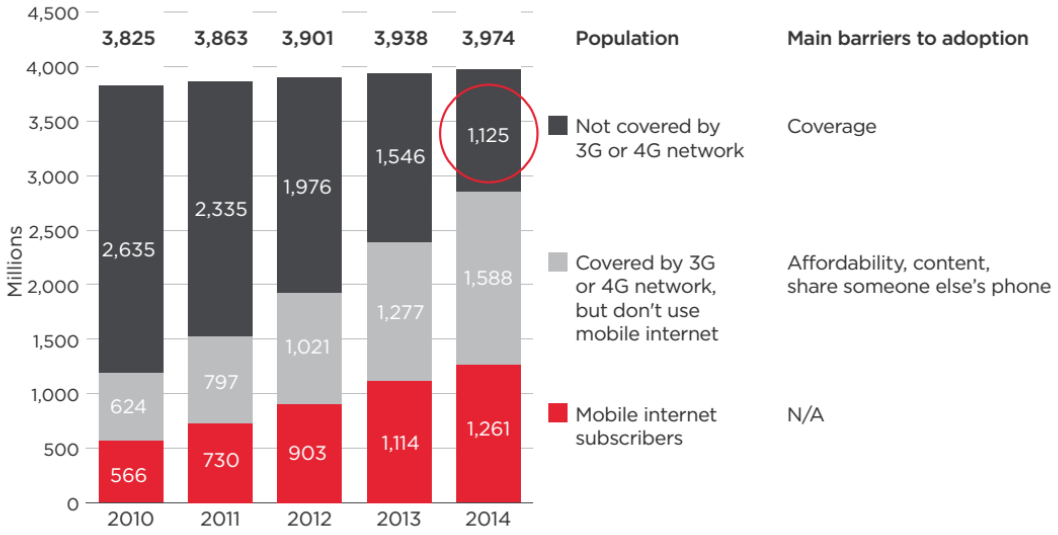



**Chart showing the coverage of 3G and 4G networks in Asia, including those who are covered but not using the Internet**
*Source: GSMA, "Closing the coverage gap: A view from Asia," June 2015, https://www.gsmaintelligence.com/research/?file=e245c423854fcfd38eeae0a918cc91c8&download.*

This means that in addition to coming up with innovative solutions to "supply" connectivity to rural and remote areas where it is economically unviable,[19] emphasis must also be placed on addressing demand-side issues such as:

- **Affordability** – Cost of connectivity[20] and smart devices, taxes levied on the ICT sector, income disparity
- **Awareness and digital skills** – Adult literacy and digital literacy, ICT in national education curricula, advanced ICT skill development, lifelong learning
- **Locally relevant content and service** – Content in local languages, apps and online services developed within a country, particularly for underserved population groups, providing an environment for businesses to compete fairly and innovate
- **Security, privacy and trust** – Security of ICT systems, protection of users, capacity building and cooperation in tackling these issues

Below are findings from a global study by GSMA that surveyed the perceived barriers to mobile Internet adoption among non-Internet users. According to the study, the top three barriers are: (1) lack of awareness and locally relevant content; (2) lack of digital literacy and skills; and (3) affordability.

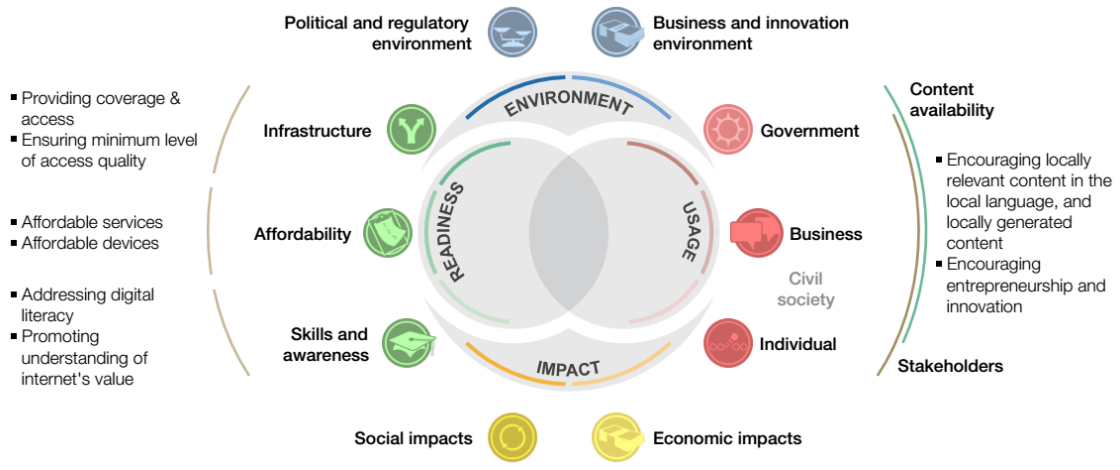
[19] See Issues Paper on Rural Connectivity.
[20] The Broadband Commission's target is for countries to offer basic fixed broadband services at <5% of monthly gross national income per capita.

| BARRIER | LACK OF AWARENESS AND LOCALLY RELEVANT CONTENT | LACK OF DIGITAL LITERACY AND SKILLS | AFFORDABILITY BARRIER | LACK OF NETWORK COVERAGE | SECURITY AND TRUST BARRIER | OTHER |
|---|---|---|---|---|---|---|
| CHINA | 30% | 89% | 11% | 0% | 2% | 15% |
| INDIA | 80% | 21% | 23% | 3% | 4% | 9% |
| INDONESIA | 75% | 10% | 46% | 2% | 3% | 12% |
| PHILIPPINES | 51% | 27% | 13% | 8% | 1% | 22% |
| THAILAND | 88% | 23% | 22% | 1% | 2% | 3% |
| VIETNAM | 80% | 20% | 24% | 0% | 1% | 12% |

High perceived barrier → Low perceived barrier

**Findings from the GSMA Intelligence Consumer Survey 2015 in selected Asian countries on the perceived barriers to mobile Internet adoption**
*Source: GSMA, The Mobile Economy Asia Pacific 2016 (2016)*

The framework below is useful for considering the barriers and opportunities for Internet adoption and use.




**Framework for Accelerating Internet Access and Adoption**
*Source: World Economic Forum, "White Paper - Internet for All: A Framework for Accelerating Internet Access and Adoption," April 2016*

## 2. The underlying causes of unequal access, adoption and use of the Internet must be understood and addressed

In addressing the barriers to Internet adoption and use (described above), it is important to understand and incorporate the underlying inequalities, including gender divides in education, income, ownership of resources and decision-making.

For instance, most women do not have land titles or power over their household's economic decision-making. This means that the benefits of ICTs in community-based e-agriculture initiatives may accrue to men unless women's participation is ensured by design.[21]

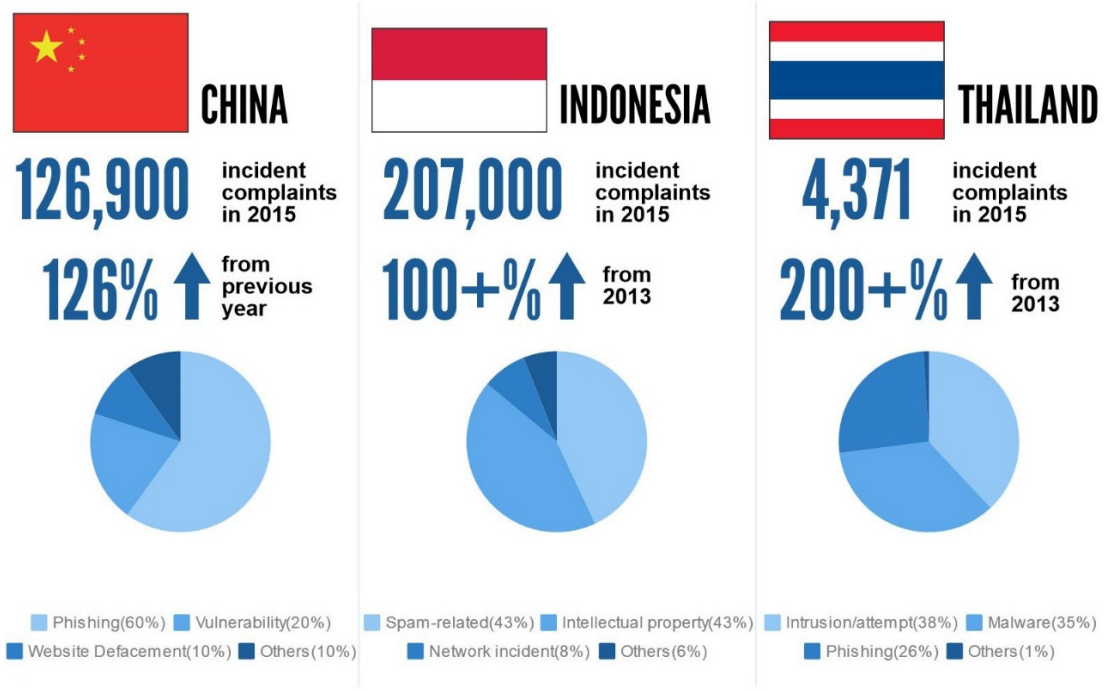
Wireless connectivity through community multimedia centres,[22] telecentres,[23] wireless for community (W4C)[24] and other similar initiatives in the region has contributed significantly to rural connectivity. But again, unless the demand aspects are covered, these public access points will not be fully utilized. In fact, they are often off-limits to women due to disapproval from family members and other socio-cultural reasons.

A comprehensive strategy for women's and girls' full participation in the digital economy and society is needed that considers the gender implications of implementing each aspect of the framework (shown above).

## 3. Security, privacy and trust issues need to be considered right from the start when formulating a strategy to enable Internet adoption and use

Ubiquitous access and adoption carry increased exposure to cyber risks that need to be managed. They include threats to privacy, security and trust.

Security and trust is a low priority issue for non-Internet users, according to findings from the GSMA Intelligence Consumer Survey 2015 (shown above).




**The number and type of incident complaints received by the Computer Emergency Response Teams (CERTs) in China, Indonesia and Thailand in 2015**[25]
*Source: Asia Pacific Computer Emergency Response Team, APCERT Annual Report 2015 (2015), https://www.apcert.org/documents/pdf/APCERT_Annual_Report_2015.pdf*

[21] IT for Change, "Gender Equality in the Information Society," March 2014.
[22] See http://portal.unesco.org/ci/en/ev.php-URL_ID=1263&URL_DO=DO_TOPIC&URL_SECTION=201.html.
[23] See http://www.telecentre.org/.
[24] See http://wforc.in/, http://www.internetsociety.org/what-we-do/where-we-work/asia/south-asia/wireless-communities and http://www.internetsociety.org/tags/wireless-communities-w4c.
[25] Phishing is a form of fraud in which the attacker tries to learn information such as login credentials or account information by masquerading as a reputable entity or person in email, IM or other communication channels. http://searchsecurity.techtarget.com/definition/phishing.

Moreover, security, privacy and trust issues are not part of the World Economic Forum Framework above, although the reference does recognize their importance and recommends the incorporation of good cyberpractice when addressing digital skills and awareness.

But evidence shows that cybercrime incidences are growing. They could erode public confidence in e-commerce and e-government applications, and make Internet use less attractive. Therefore, it is crucial that security, privacy and trust issues are incorporated as part of the region's strategy to enable Internet adoption and use.

Women's and children's security online must also be incorporated.

In the Internet Society's 2014, 2015 and 2016 surveys on policy issues in Asia-Pacific, security and privacy are top concerns.

In the 2015 survey:[26]

- 95% believe that government policies for cybersecurity are necessary
- 95% believe that online privacy protection should be guaranteed by national law
- Cybersecurity is the topmost concern for females

In the 2016 survey:[27]

- Cybersecurity and privacy issues replace e-commerce and cloud computing (from the 2015 survey) in the top five most monitored policy areas
- Cybersecurity is the top issue that stakeholders believe needs attention from policymakers
- 59% believe that their privacy is not sufficiently protected when they use the Internet
- Only 9% think that government policies on Internet security fully reflect their own online concerns

**Asia-Pacific has focused on the legal aspects of cybersecurity, and done the least work in building capacity and promoting cooperation to tackle cybersecurity issues**, according to the International Telecommunication Union (ITU) Cybersecurity Index.[28]

Especially as substantial numbers of first-time users are coming online in the Asia-Pacific, they must be made aware of security and privacy issues as part of digital literacy, particularly related to financial cybercrimes as the region pursues the agenda of digital financial inclusion.

## B. The Opportunities

To get the most out of the digital revolution, ICT connectivity and the quality of connectivity provides the foundational backbone, but it also requires an enabling environment to develop the e-services and applications for sustainable development.

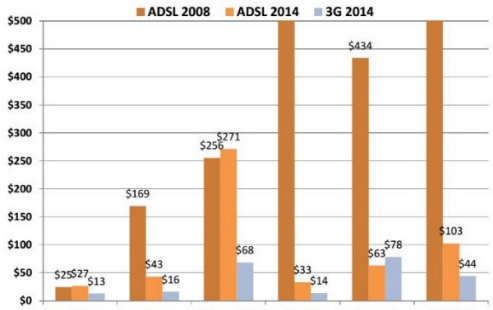
Numerous studies from the Broadband Commission, United Nations, World Bank and World Economic Forum have been undertaken to analyse the enabling conditions for building a digital economy and society. They have provided evidence that favourable policies and regulations do lead to increased Internet adoption and use, as well as encourage digital innovations to address social, economic and environmental challenges. Some examples are provided below.

[26] Internet Society, "The Internet Society Survey on Policy Issues in Asia-Pacific 2015: Final Report," July 2015, http://www.internetsociety.org/sites/default/files/APAC-Regional-Policy-Survey-Report-2015.pdf.
[27] Internet Society, "The Internet Society Survey on Policy Issues in Asia-Pacific 2016: Final Report," August 2016, http://www.internetsociety.org/doc/internet-society-survey-policy-issues-asia-pacific-2016.
[28] The other aspects measured include technical and organizational aspects. ITU, "Global Cybersecurity Index & Cyberwellness Profiles," April 2015, http://www.itu.int/dms_pub/itu-d/opb/str/D-STR-SECU-2015-PDF-E.pdf.

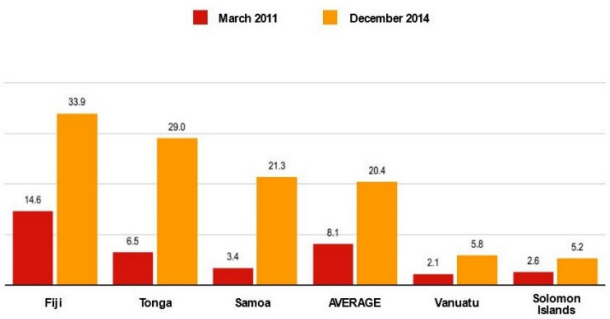
## 1. *Affordability:* In the Pacific Island countries, liberalization of the telecommunication sector has driven competition, leading to falling prices and rapid Internet uptake[29]

**Competition** is widely recognized as an effective mechanism to lower price.

Between 2000 and 2009, competition was introduced in telecommunication laws in the Pacific Island countries, resulting in falling prices for mobile calls and texts, and broadband (both mobile and fixed). The competitive impact of mobile broadband has driven down broadband costs across the region. While the average fixed broadband monthly subscription was USD 688 in 2008, it had dropped to USD 103 by 2014, a reduction of 85% caused by the pressure of new mobile broadband offerings. At USD 44 per month, average mobile broadband prices are 57% cheaper than entry-level fixed broadband plans in the region.




Entry-level broadband prices
1GB minimum data, USD




Facebook penetration

The availability of mobile broadband is resulting in rapid Internet uptake, particularly social media use. The number of Facebook users in the region grew over 2.5 times between March 2011 and December 2014.

Enhancing competition in telecommunication markets is one of the objectives of the Asia-Pacific Information Superhighway initiative, led by ESCAP.

## 2. *Affordability:* In Viet Nam, tax reductions led to growth in smartphone and Internet usage[30]

Reduction in mobile taxation from 10% in 2011 to 0% in 2014 resulted in:

- 7 million more mobile Internet subscribers
- 47% increase in smartphone connections
- 41% growth in active social media accounts

(compared to 2013 figures)

## 3. *Locally relevant content and service:* Bangladesh's Access to Information (A2I) Programme lead by example

The A2I programme is being implemented by the Prime Minister's Office as part of its Digital Bangladesh vision. It has resulted in the creation of over 5,000 digital centres throughout the nation, and in partnership with the private sector, created a range of e-services. It is reported that an average of 6 million e-services are delivered every month. Some significant impacts include the following:[31]

[29] Pacific Region Infrastructure Facility, *Economic and Social Impact of ICT in the Pacific* (Sydney, 2015), http://www.theprif.org/components/com_jomcomdev/files/2015/10/40/124-PRIF%20Pacific%20ICT%20Report%202015.pdf.
[30] GSMA, *The Mobile Economy Asia Pacific 2016* (2016).
[31] UNDP, "Report on the Mid-Term Evaluation of the Access to Information-II Project," November 2015.

- With the introduction of SMS-based registration for university admissions, the applications for women rose from 25% to 33% of the total.
- Online registration of over 1.4 million workers seeking foreign employment in 2013 saved them from extortion by intermediaries that ranged from USD1,230 to USD2,460 per worker.
- Over 78,000 "unbanked" citizens (70% women) gained financial access as a result of mobile banking services.

### 4. *Awareness and digital skills:* Emerging lessons

The World Bank documented four principles that successful digital literacy programmes have in common:[32]

- They are mainstreamed into the non-ICT curriculum. They emphasize ICT as a tool rather than a subject.
- They focus on teachers' digital literacy.
- They go beyond ICT into the beginnings of "computational thinking"—the problem solving skills and techniques software engineers use to write programs.
- They are embedded in local content.

**Digital literacy programmes also need to be gender sensitive.** Girls are more likely than boys to be denied access to formal education, therefore there needs to be alternative ways of reaching girls. Women face more barriers than men when participating in digital literacy programmes due to their multiple roles, gender stereotypes and cultural norms, and women-targeted training may be needed.

## C. Alignment with the SDGs

The 2030 Agenda for Sustainable Development recognizes that the spread of ICT and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide and to develop knowledge societies. Relevant to this theme are the following sustainable development goal targets:

- SDG Target 5.b aims to enhance the use of enabling technology, in particular ICT, to promote the empowerment of women.

- SDG Target 9.c aims to significantly increase access to ICT and strive to provide universal and affordable access to the Internet in least developed countries by 2020.

- SDG Target 17.8 aims to fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular ICT.

## D. Guiding Questions to Formulate the Region's Strategy

- What is the regional strategy for:
  - Making connectivity and devices more affordable?
  - Accelerating the development of locally relevant content and services?
  - Scaling up efforts in raising awareness and building digital skills?
  - Addressing online security, privacy and trust issues?

- What is the role of government in enabling e-services?

- What are the good practices for mainstreaming ICT adoption in national sector policies and plans, including in agriculture, education and health sector policies and plans?

[32] World Bank, *World Development Report 2016: Digital Dividend* (Washington D.C., 2016).

## The Issues

### 1. Innovation efforts in the region are not focused on driving social impact

**Innovation is essential for economic growth and addressing socio-economic challenges.** This is widely recognized and it is enshrined in the Sustainable Development Goals (SDGs – see Section C below). The four other Issue Papers touch on the importance of innovation. Innovation is required to address rural connectivity challenges and enable e-services. An often cited case of innovation that has disrupted the finance industry and contributed to financial inclusion in a significant way is the provision of financial services through mobile phones, particularly to unserved and underserved populations in rural areas. In the area of disaster risk reduction, many innovations have saved lives.

**What is innovation?** Innovation means coming up with new ways of doing things. It refers to changing processes or creating more effective processes, products and ideas. Being innovative does not only mean inventing. Innovation can mean changing your business model and adapting to changes in your environment to deliver better products or services.[33]

**In the business and economics sector, there is a clear global shift in focus towards innovation as a catalyst for economic growth.** Economist Joseph Schumpeter's definition of entrepreneurship places an emphasis on innovation, such as: new products, new production methods, new markets and new forms of organization. Wealth is created when innovation results in new demand.[34]

From this viewpoint, one can define the function of the entrepreneur as creating new wealth-producing resources, or rediscovering some older ideas, and designing new ways of combing resources, with the end goal of accruing financial, and at times, social gains.[35]

**Innovation is increasingly based on digital technology and on the new business models it allows.** This is one of the key messages of the World Economic Forum (WEF) *Global Information Technology Report 2016*.[36] Businesses that have been able to leverage digital technologies for innovation have prospered.

The WEF survey found that businesses' capacity to innovate has increased steadily across all regions of the world over the last five years, largely because businesses, in this digital era, are faced with pressure to innovate continuously and scale fast in order to remain competitive.[37]

**Yet, business innovation using digital technologies has largely focused on entertainment.**

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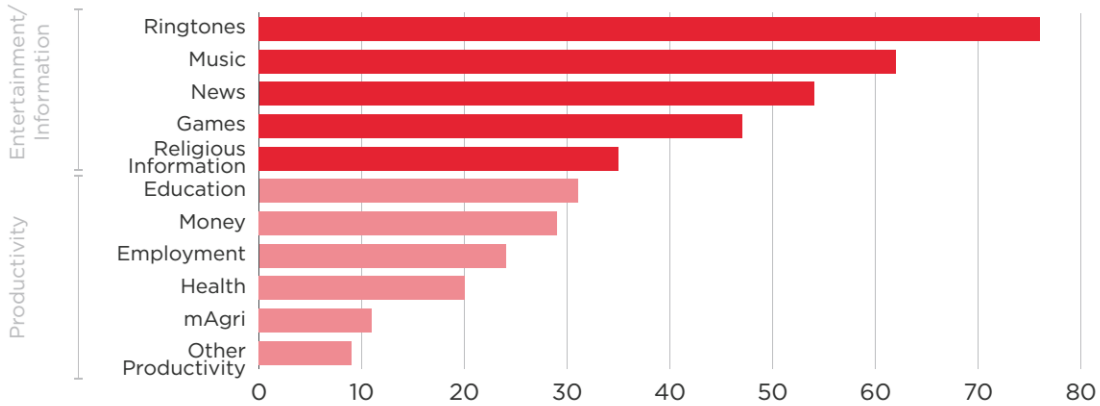
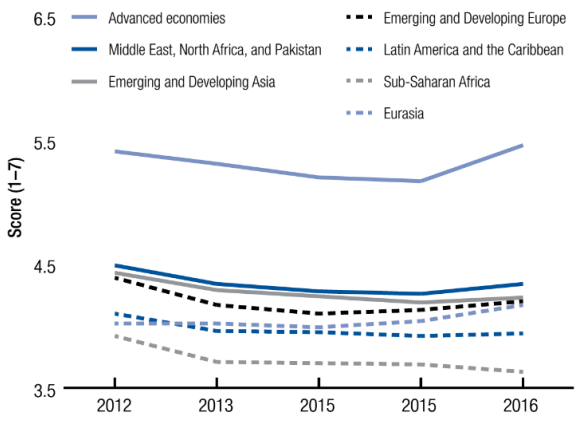
[33] Australian Government, "Research and innovation," 9 August 2016, https://www.business.gov.au/info/run/research-and-innovation.
[34] Quick MBA, "A Definition of Entrepreneurship," http://www.quickmba.com/entre/definition/.
[35] UN-APCICT/ESCAP, *Women and ICT Frontier Initiative: Enabling Role of ICT for Women Entrepreneurs (Core Content, Module 2)* (Incheon, 2016).
[36] WEF, *The Global Information Technology Report 2016* (Geneva, 2016).
[37] Ibid.

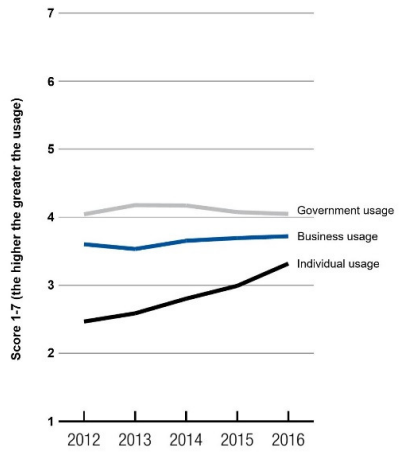



**Type of Internet services offered by mobile operators in emerging Asian markets**
*Source: GSMA, "Mobile Internet usage challenges in Asia - awareness, literacy and local content", July 2015.*

**There is a worrying gap in the use of innovative digital solutions to drive social impact.** The chart below show a declining impact of ICT on access to basic services (e.g. health, education, financial services) in emerging and developing Asia, based on the WEF Executive Opinion Surveys in 2012-2016.[38]




**Governments are seen to be falling behind in terms of using ICT for social impact.**[39] The chart below shows the upward trend on government usage of ICT until 2013 is slowly being reversed in emerging and developing Asia.[40]




## 2. Frugal innovation is not mainstreamed in national and global development agendas

Traditionally, the practice is to innovate for the "top of the pyramid" that has the greatest purchasing power, with eventual trickle down effects. These innovations tend to incur costly product design and development, making them unaffordable to “bottom of the pyramid” consumers. Moreover, traditional innovation practices tend to involve top-down transfer of knowledge and technology, from advanced to emerging economies. Frugal innovation originates from local communities in emerging economies.

[38] Ibid. The survey asked over 14,000 business executives, "In your country, to what extent do ICTs enable access for all individuals to basic services (e.g., health, education, financial services, etc.)? [1=not at all; 7= to a great extent].
[39] Ibid.
[40] Ibid.

Frugal innovation:[41]

- Targets the low-income groups, then makes its way up to other levels to benefit all users.
- Uses local knowledge, innovation and resources.
- Is driven by local communities and/or inventions designed to meet specific local needs.
- Often fulfils needs that are neglected by mainstream businesses.
- Solutions are cheap but it does not mean low quality. In fact, solutions need to be highly robust given the extreme environments in which the innovation functions. Further, the innovation needs to be very intuitive to use and require very little servicing.
- Is context specific. Whether or not these innovations can also be used in other contexts has to be considered on a case-to-case basis.

**Frugal innovators are typically excluded from the traditional innovation process that engages research and development (R&D) institutions, and hi-tech companies.** Apart from a handful of case studies about frugal innovations, they are not captured in national databases and in country performance indicators.

**India has attempted to address this issue by establishing the National Innovation Foundation (NIF).** NIF has developed a database of technologies, innovations and traditional knowledge practices from 575 districts in the country. It has established a Fabrication Laboratory with the help of the Massachusetts Institute of Technology to support product development. A pro bono arrangement with patent firms has helped NIF to file over 743 patents on behalf of innovators.

**ESCAP proposes a conceptual framework for science, technology and innovation that calls for two policy shifts:**

i. Innovation policy for inclusive and sustainable development must move beyond its traditional focus on economic competitiveness to include social justice and environmental protection.
ii. Principles of openness and inclusivity must be integrated into innovation strategies to complement policies promoting competition as a driver of innovation

While scientists, technologists, innovators and entrepreneurs are considered the traditional sources of innovative activity, there is potentially an untapped resource of talent residing in “vulnerable” communities or under-recognized community sources.

Inclusive innovation is not only about making innovations available to vulnerable populations, but empowering those communities to realize their own innovative potential.

Governments need to recognize and support under-represented communities, including women, as significant sources of talent and innovative ideas.

The ESCAP science, technology and innovation framework below is useful for considering the principles and goals of innovation, the actors involved in innovation, and the support required by the different actors to innovate effectively.

[41] ESCAP, *Harnessing Science, Technology and Innovation for Inclusive and Sustainable Development in Asia and the Pacific* (Bangkok, 2016); Irmgard Jansen, "How can Frugal Innovation because Inclusive Innovation?" *The Practitioner Hub for Inclusive Business*, 3 December 2015, http://www.inclusivebusinesshub.org/how-can-frugal-innovation-become-inclusive-innovation-interview/; and Yasser Bhatti, "Frugal Innovation," 25 July 2011, http://www.frugal-innovation.com/category/basics/.


**ESCAP's Science, Technology and Innovation Framework for Sustainable Development**
*Source: ESCAP, Harnessing Science, Technology and Innovation for Inclusive and Sustainable Development in Asia and the Pacific (Bangkok, 2016)*

The Asia-Pacific Information Superhighway, led by ESCAP, intends to enable frugal innovation entrepreneurship by improving connectivity and lowering bandwidth prices, which will increase frugal innovators and rural entrepreneurs' access to the Internet.

## 3. Women entrepreneur's potential contribution to sustainable development is not fully leveraged

**In Asia and the Pacific, economic growth is highly dependent on entrepreneurial activities.** Small and medium enterprises comprise 98% of all enterprises in Asia-Pacific from 2007 to 2012.[42]

**However, women in the region are often driven to entrepreneurship out of necessity, to survive and support their families,** and are mostly engaged in labour intensive, low-value sectors that have relatively low barriers of entry but are highly competitive. They include industries in food, clothing and basic needs. These types of business engagement with low-growth potential bar women entrepreneurs in this region from transcending and transforming to high-growth areas of entrepreneurship.[43]

**Yet, women entrepreneurs are found to be socially committed,** irrespective of their businesses in developed or developing economies. Women are 1.17 times more likely than men to create social ventures rather than economic ventures, and 1.23 times more likely to pursue environmental ventures than economic ventures.[44]

[42] ESCAP, "Taking the next step: developing an action agenda for science, technology and innovation for sustainable development in Asia and the Pacific," for the First Session of the Committee on ICT, Science, Technology and Innovation, 9 August 2016, http://www.unescap.org/sites/default/files/pre-ods/CICTSTI1_7E.pdf.
[43] UN-APCICT/ESCAP, *Women and ICT Frontier Initiative: Enabling Role of ICT for Women Entrepreneurs (Core Content, Module 2)* (Incheon, 2016).
[44] Ibid.

**Women's barriers to entrepreneurship—from access to finance and credit, to opportunities to acquire skills—need to be addressed in order to realize the potential contribution of women to development.**

To create an innovation system for sustainable development, support will be needed to:[45]

- Nurture women's entrepreneurship skills, in particular, social entrepreneurship skills
- Connect entrepreneurs to peers, mentors and incubators
- Catalyze a culture shift to encourage entrepreneurship
- Improve the ease of doing business
- Improve access to finance
- Improve access to ICT

### 4. Frugal innovators and women entrepreneurs are not benefiting from digital technologies

**WEF's data reveals that the top innovation impact performers are all characterized by top ranks in business usage of digital technologies.[46]**

Digital technologies contributes to innovation by:

- Increasing market size – Online platforms can connect firms to a global consumer base.
- Reducing barriers to entry – Online services such as cloud computing and online marketing platforms are saving start-ups and small- and medium-sized enterprises a significant share of the fixed costs of running a business, facilitating entry and scaling.
- Acquiring and leveraging knowledge – this includes the basic use of mobile phones to communicate and network with consumers, the use of online search engines to conduct market research, and the use of big data to match products with consumer preferences.

**But with the rural-urban digital divide and gender digital divide,[47] frugal innovators and women entrepreneurs are not able to fully leverage the potential of digital technologies to innovate and grow their enterprises.**

## The Opportunities

### 1. New finance models are contributing to innovation for sustainable development

The Addis Ababa Action Agenda of the Third International Conference on Financing for Development contains firm commitments made by Member States to foster social innovation—of which social enterprise and impact investment are two key pillars. Some achievements include the following:[48]

- Over half of the impact investors in Asia have increased their investments since 2011.
- Republic of Korea – 353% growth in the number of social enterprises in Seoul between 2012 and 2015.
- Malaysia – Implementing its Social Enterprise Blueprint 2015-2018.
- Thailand – Thai Social Enterprise Office established in 2010, Social Enterprise Promotion Act passed, and National Taskforce on Social Impact Investment created.

[45] ESCAP, *Harnessing Science, Technology and Innovation for Inclusive and Sustainable Development in Asia and the Pacific* (Bangkok, 2016)
[46] WEF, *The Global Information Technology Report 2016* (Geneva, 2016).
[47] See Issues Paper on Rural Connectivity.
[48] ESCAP, "Taking the next step: developing an action agenda for science, technology and innovation for sustainable development in Asia and the Pacific," for the First Session of the Committee on ICT, Science, Technology and Innovation, 9 August 2016, http://www.unescap.org/sites/default/files/pre-ods/CICTSTI1_7E.pdf.

- Viet Nam – Revised its Law on Enterprise to provide a legal definition of social enterprise.
- Indonesia and Philippines – In the process of establishing policies to promote social entrepreneurship.
- Pakistan – Establishing a Centre for Social Entrepreneurship.
- Australia – Government established a Social Enterprise Development and Investment Fund.

## 2. Two trends with the potential to fuel innovation are big data and open data

**Big data** is being gathered from mobile devices, software logs, sensor networks and other devices, and are being analyzed to reveal trends and associations that can be used to improve decision-making. Big data can also be used to provide innovative value-added services such as job matching and increasing agricultural productivity.

**Open data** is freely and easily accessible, machine-readable, and explicitly unrestricted in use. Governments are, or could be, important sources of open data on population, public budgets, education and health facilities, weather and trade. At least four companies valued at over USD1 billion—Zillow, Zoopla, Waze, and the Climate Corporation—process and resell open data about real estate, traffic conditions and weather.[49]

Yet sustained, impactful, scaled-up examples of big and open data in the developing world are still relatively rare. Most big data are in private hands—large telecom and Internet companies—which are reluctant to share it for fear of jeopardizing customer privacy or corporate competitiveness. Public agencies, too, are reluctant to share data, because of lack of technical skills, inadequate resources, and unwillingness to expose data to scrutiny.[50] Overcoming these barriers will be critical for spurring innovation and entrepreneurship.

### Alignment with the SDGs

The SDGs recognize that innovation is one of the major drivers of productivity, inclusive economic growth and job creation, and call on businesses to apply their creativity and innovation to solve development challenges. Goal 9, and specifically Target 9.b, focuses on fostering innovation in developing countries. Other relevant targets include the following:

- Target 8.3 calls for promoting development-oriented policies for innovation, entrepreneurship and the growth of micro-, small- and medium-sized enterprises, and specifically mentions the need to support access to financial services.

- Target 17.6 aims to enhance North-South, South-South and triangular regional and international cooperation on science, technology and innovation.

### Guiding Questions to Formulate the Region's Strategy

- How can policies and interventions be shaped to encourage frugal innovations?
- What specific measures need to be taken to engage women in innovation efforts?
- In the context of a widening digital divide, what is the regional strategy for ensuring that frugal innovations and entrepreneurship are able to leverage digital technologies, including big data and open data?
- What is the region's strategy for developing human capital for innovation and entrepreneurship?

[49] World Bank, *World Development Report 2016: Digital Dividend* (Washington D.C., 2016).
[50] Ibid.

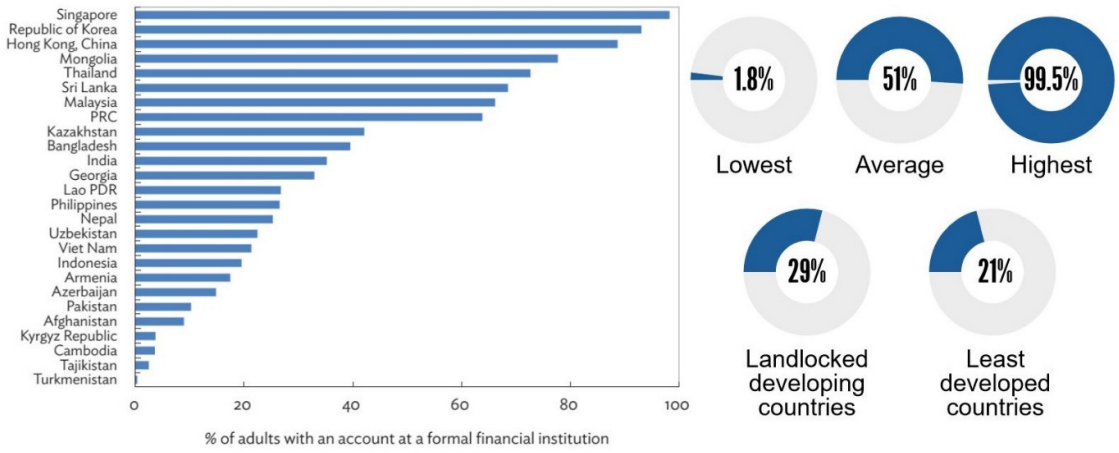
**Financial inclusion** means that financial services—such as deposit and savings accounts, payment services, loans and insurance—are accessible and affordable to all people, and they are actively using the financial services to meet their specific needs.[51]

There is global consensus that financial inclusion is a critical enabler and accelerator of poverty reduction, inclusive growth and entrepreneurship, and contributes to strengthened resilience to crises and disasters, and the effects of climate change.

## A. The Issues

### 1. Large disparities in access to and use of financial services persist in the Asia-Pacific region

Of the two billion unbanked[52] adults around the world, more than half live in the Asia-Pacific region. South Asia alone accounts for about a third of the world's unbanked adults. The charts below show the regional disparities in bank account ownership.




**Bank account penetration rates in Asia-Pacific countries**
*Source: Md. Ezazul Islam, "Financial Inclusion in Asia and the Pacific," Discussion Paper for First High-Level Follow-Up Dialogue on Financing for Development in Asia and the Pacific, March 2016 (based on 2014 Global Findex data)*

**Bank account penetration rates have generally been lower for women,** with a gender gap in the range of 10 to 25 percentage points in countries like India, Myanmar, Pakistan and Turkey.[53] A MasterCard survey in India reported that 58% of the respondents found it difficult to access credit, savings and jobs because of their gender.[54]

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[51] Global Partnership for Financial Inclusion, *Global Standard-Setting Bodies and Financial Inclusion for the Poor: Toward Proportionate Standards and Guidance* (Washington, D.C., 2011).
[52] The unbanked refers to those who do not have a bank account at a formal financial institution.
[53] ESCAP, "Statement at the Side-Event on Accelerating Financial Inclusion in Least Developed Countries in Asia and the Pacific," 16 May 2016, http://www.mdgasiapacific.org/speeches/cs72-statement-side-event-accelerating-financial-inclusion-least-developed-countries-asia.
[54] MasterCard, "The Connectors Project: Engaging Economic Inclusion Roles in India," 2015, https://insights.mastercard.com/theconnectorsproject/assets/documents/RegionalReport-India-English.pdf.

**Women's access to financial services is important** because it helps women assert their economic power, which is key to promoting gender equality. Female-controlled finances are more likely spent on necessities such as food and water, as well as child welfare, including school fees and health care.[55]

## 2. There are many barriers to providing and accessing financial services

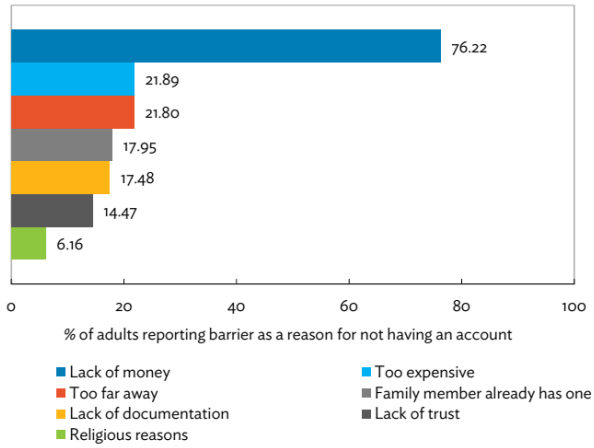
The rapid growth in mobile phone adoption has resulted in its innovative use to deliver financial services. Digital financial services have contributed significantly to financial inclusion. But existing barriers to providing and accessing financial services remain, and new barriers and risks are introduced.

### Supply-side barriers

- Poor banking infrastructure, particularly in rural and remote areas
- Many countries do not have a national financial inclusion strategy
- Lack of access to ICTs, particularly mobile phones and the Internet
- Regulatory constraints preventing innovation, e.g., absence of a licensing authorization framework for non-banks

### Demand-side barriers

The Global Findex Survey asked adults without an account at a financial institution why they do not have one.[56]




*Note:*
"Too expensive" refers to high interest rates or high requirement of minimum balance.

"Lack of documentation" refers to lack of ID, proof of domicile and/or reference letter required to open an account.

*Other barriers include:*
- Socio-cultural constraints, e.g. preventing women from owning an account
- Lack of suitable financial products
- Lack of collateral to secure loans
- Inadequate financial literacy or education
- Inadequate consumer protection, including challenges related to liability, redress and rule enforcement

## 3. The financial service landscape is becoming increasingly complex

The financial inclusion providers' landscape has evolved from state banks, non-governmental organizations, microfinance institutions and cooperatives, and insurance companies to a broader range of providers that now includes mobile network operators, payment companies, and e-commerce and Internet companies.

These providers are coming up with new business models, and creating and offering innovative bundled products and services that are both financial and non-financial.

[55] Consultative Group to Assist the Poor, "Achieving the Sustainable Development Goals: The Role of Financial Inclusion," April 2016, http://www.cgap.org/sites/default/files/Working-Paper-Achieving-Sustainable-Development-Goals-Apr-2016_0.pdf.
[56] Meghana Ayyagari and Thorsten Beck, "Financial Inclusion in Asia: An Overview," ADB Economics Working Paper Series No. 449, September 2015.

**Indonesia's Agri-Fin Mobile Programme: A Case Study**[57]

Indonesia's smallholder farmers have been provided with a mobile-based bundle of agricultural and financial services under the Agri-Fin Mobile Programme to increase farmers' income through improved yields.

The bundled services include agricultural advisory services (where users receive regular agriculture- and market-related information and can send questions to experts), financial advisory services and financial literacy training, saving and loan products, and mobile and e-payment services, including domestic remittances.

Mercy Corps, a non-governmental organization, brought together different organizations to offer the bundled services, including software developers, banking and microfinance institutions, government and private companies working in the agriculture sector, a university and mobile network operators.

The programme has been running since 2012 in West Java, Central Java, East Java and West Nusa Tenggara provinces in Indonesia, and also in Uganda and Zimbabwe. As of March 2015, 72,000 farmers in Indonesia are using the bundled services (of which 40% are female).[58]

**The multi-providers have implications for regulators:**

- Innovative digital financial services typically involve multiple providers that will be storing and managing customer's data and funds. There may be risks related to real-time accuracy and reconcilability of records.
- When products are bundled, regulation and monitoring becomes more complicated, requiring coordination among regulators.
- There is a need to ensure fair play among both bank and non-bank providers.
- Agents and agent networks, the customer interface for digital financial services, introduce new risks including fraud, agent error, poor cash management by the agent and poor data handling.
- The quality and reliability of the ICT infrastructure and system affect the risks of disrupted service and lost data, and risk of privacy or security breach.
- In the event the consumer suffers a loss, liability can be unclear due to the multiple providers involved in service delivery.

## 4. A micropayment system that is available to all is needed to enable those at the bottom of the pyramid to participate in the global marketplace

ICT has the potential to increase market size by connecting rural artisans and producers to a global consumer base but they may not be able to fully reap the benefits of ICT without a micropayment system that works for them.

Current mobile and online payment systems have high transaction fees. Paypal is not available in all countries and requires a bank account. The problem with mobile payments is that there is no global standard, and economies are building mobile on top of their existing systems, which creates interoperability issues. These issues make these payment solutions inaccessible to most rural artisans and producers.

[57] Mercy Corps, "Agri-Fin Mobile: Lessons Learned on Service Delivery, Marketing and Capacity Building," 2015, https://www.shareweb.ch/site/Agriculture-and-Food-Security/focusareas/Documents/ras_agri-fin_mobile_report.pdf.
[58] The programme reported that they were able to achieve this percentage after providing face-to-face financial literacy training to targeted women. Previously only 5% of the users were female.

Alipay that does not charge a transaction fee has revolutionalized e-commerce in China, and could be a possible business model for enabling the bottom of the pyramid to participate in the global marketplace.

## B. The Opportunities

### 1. Financial inclusion is high on the global and regional development agenda

**G20 leaders** established the Global Partnership for Financial Inclusion in 2010 and approved the Financial Inclusion Action Plan.

**Asia-Pacific Economic Cooperation (APEC) Finance Ministers' Process** has a dedicated forum looking at financial inclusion issues.

**In the Association of Southeast Asia Nations (ASEAN) Framework on Equitable Economic Development,** the promotion of financial inclusion is a key objective.

### 2. The importance of ICT for achieving financial inclusion goals is widely recognized

In the past decade, ICTs have reduced costs, expanded the scale and deepened the reach of financial services, particularly to unserved and underserved groups, including women, the poor, the young, the elderly, farmers, small and medium enterprises, and other groups.

As part of the Global Partnership for Financial Inclusion, in July 2016 G20 leaders endorsed eight High-Level Principles for Digital Financial Inclusion[59] as recognition of the need to use ICT to achieve financial inclusion goals. These eight principles are:

i. Promote a Digital Approach to Financial Inclusion
ii. Balance Innovation and Risk to Achieve Digital Financial Inclusion
iii. Provide an Enabling and Proportionate Legal and Regulatory Framework for Digital Financial Inclusion
iv. Expand the Digital Financial Services Infrastructure Ecosystem
v. Establish Responsible Digital Financial Practices to Protect Consumers
vi. Strengthen Digital and Financial Literacy and Awareness
vii. Facilitate Customer Identification for Digital Financial Services
viii. Track Digital Financial Inclusion Progress

As part of Principle 8 to track progress, new indicators have been added to the set of G20 Financial Inclusion Indicators to measure the use, availability, and quality of digital financial services. These indicators are included in the World Bank Open Data Portal.[60]

Additionally, one of the key pillars of the Asia-Pacific Information Superhighway (AP-IS) initiative pursued by ESCAP focuses on digital inclusion of underserved areas. Intent on bridging the gaps in ICT access, the AP-IS initiative is aimed at improving regional broadband connectivity for the ultimate purpose of increasing coverage, availability, reliability and affordability.

[59] Key actions for each of the principles are proposed. See https://www.gpfi.org/sites/default/files/G20%20High%20Level%20Principles%20for%20Digital%20Financial%20Inclusion.pdf.
[60] See http://www.gpfi.org/data.

## 3. Good practices and insights from implementing digital financial services[61]

Numerous studies have documented the good practices and lessons learned from various digital finance projects, as well as provided policy and regulatory insights that will lead to financial inclusion.

### Policy and Regulatory Insights

- Financial inclusion cannot be achieved without addressing gender inequality and the gender digital divide.

- Harmonize laws, standards and guidelines in the region.
  - The legal and regulatory framework should be risk-based and fair, and allow for new entrants; and should not impose excessive, non-risk-based compliance costs.

- Reform tax regimes and import restrictions that hinder the widespread uptake of new technologies.

- Develop sound consumer and data protection framework to build trust and confidence in the use of digital financial services. This should include promoting financial and digital literacy, fraud prevention, dispute resolution mechanisms and data privacy.

- Ensure interconnection and interoperability among different platforms and service providers so that users can interact across platforms without technological barriers or extra charges.
  - In the region, mobile network operators in Indonesia, Pakistan, Sri Lanka and Thailand have interconnected their services, for example.

### Good practices

- Digitize recurrent payments from government agencies to individuals and small businesses (e.g., payrolls, social benefit transfers and humanitarian aid).
  - In addition to cutting costs, this can reduce leakage, and has the potential to introduce a large part of the population into the digital financial system.

- Provide access to reliable identity data using ICTs, including biometrics (e.g., fingerprinting and iris scans), to leapfrog traditional, paper-based forms of identification.
  - Advancing access to digital identification could facilitate financial inclusion among women, as women are less likely than men to have the formal identification required for account opening. In Pakistan, the government implemented a biometric ID system to ensure that certain government payments could only be collected by women beneficiaries. Women using the new ID cards reported having higher status and more bargaining power in their families.

- Standard classroom-based financial education aimed at the general population does not have much of an impact on financial inclusion. Instead, well-designed targeted interventions that use teachable moments, such as starting a job, having a baby or purchasing a major financial product, have shown to have a measurable impact.

- Community workers to nurture women's appreciation for, and trust in, digital services are critical to increasing women's adoption of digital financial services. Examples include *Infoladies* in Bangladesh and knowledge workers in Community eCentres of the Philippines.

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[61] Global Partnership for Financial Inclusion, "G20 High-Level Principles for Digital Financial Inclusion," 2016; John D. Villasenor, Darrell M. West and Robin J. Lewis, *The 2016 Brookings Financial and Digital Inclusion Project Report: Advancing Equitable Financial Ecosystems* (Washington D.C.: Center for Technology Innovation at Brookings, 2016); World Bank, *Global Financial Development Report 2014: Financial Inclusion* (Washington D.C., 2014); World Bank, *World Development Report 2016: Digital Dividend* (Washington D.C., 2016).

- Engagement in multinational knowledge-sharing networks and in public-private partnerships can help to develop successful and sustainable approaches to digital financial inclusion.

- In credit markets, especially those for informal enterprises and low-income borrowers, the lender usually has limited information about a potential borrower's ability to repay a loan, thus impeding lending. Digital technologies can help estimate credit scores from digital footprints.
  - Alifinance, a subsidiary of the Chinese e-commerce firm Alibaba provides loans to vendors on its e-commerce platform. Alifinance's credit scoring model is based on at least three months of vendor's online activity and makes loan decisions automatically and almost instantly.

## C. Alignment with the SDGs

Both the global economic slowdown and the 2030 Agenda for Sustainable Development have catalysed renewed interest in financial inclusion, as an effective mechanism for productivity enhancement and economic empowerment. Improving access to financial services is a cross-cutting target of many of the SDGs, particularly reducing poverty (SDG1), ending hunger (SDG2), achieving gender equality (SDG5), ensuring decent work and economic growth (SDG8), and promoting industrialization (SDG9):

SDG Target 1.4 – Ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.

SDG Target 2.3 – Double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.

SDG Target 5.a – Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws.

SDG Target 8.3 – Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services.

SDG Target 8.10 – Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all.

SDG Target 9.3 – Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets.

## D. Guiding Questions to Formulate the Region's Strategy

- What should be Asia-Pacific's regional framework for digital financial inclusion?
- What are the mechanisms to ensure that regulatory procedures are harmonious across Asia and the Pacific?
- Which business models and innovations could be replicated or scaled up to accelerate financial inclusion? And what are the requirements that need to be in place to successfully implement them?
- How can we develop scalable financial and digital literacy programmes, particularly for excluded and underserved groups?

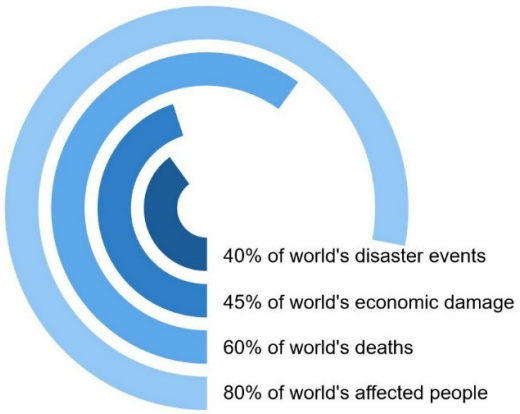
## A. The Issues

### 1. Asia-Pacific is the most disaster prone region in the world

**8 of 10** countries most at risk are in the **Asia-Pacific**

| Rank | Country |
|---|---|
| 1 | Vanuatu |
| 2 | Tonga |
| 3 | Philippines |
| 4 | Guatemala |
| 5 | Bangladesh |
| 6 | Solomon Islands |
| 7 | Brunei Darussalam |
| 8 | Costa Rica |
| 9 | Cambodia |
| 10 | Papua New Guinea |

Between 2005-2014, Asia-Pacific accounted for:




Sources: Alliance Development Works and United Nations University, *World Risk Report 2016* (2016); and ESCAP, *Asia-Pacific Disaster Report 2015* (Bangkok, 2015)

With climate change, the frequency and intensity of disasters may increase, impeding progress towards sustainable development.

### 2. The ICT infrastructure in most countries is not designed to be resilient to disasters

**Disasters can wipe out investments.** A World Bank study in 2009[62] found that a 10% increase in broadband penetration could cause between 0.43-1.38% in GDP growth. But the investment could be wiped out by disasters when it is not planned and designed to be resilient[63] to disasters.

**The insufficient investment in the ICT infrastructure is a risk factor.** During the 2015 Gorkha Earthquake in Nepal, the national core telecommunications backbone stayed functional. However, other components of their network, such as cell phone towers, suffered significant damage, making it very difficult to restore communications in hard-hit areas of the country. This experience helps illustrate the importance of proactive investment, as in the case of their fibre optic backbone, as well as a system approach that examines the complete service delivery chain.[64]

[62] World Bank, *Information and Communications for Development* (Washington, D.C., 2009).
[63] Resilience is defined by the United Nations as, "the ability of a system, community, or society exposed to hazards to resist, absorb, accommodate to, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions." United Nations Office for Disaster Risk Reduction, "Terminology". Available from http://www.unisdr.org/we/inform/terminology.
[64] ESCAP, *Enhancing E-resilience of ICT Infrastructure: Gaps and Opportunities in Disaster Management* (Bangkok, 2016), http://www.unescap.org/sites/default/files/Paper%20-%20Enhancing%20E-resilience%20of%20ICT%20Infrastructure.pdf.

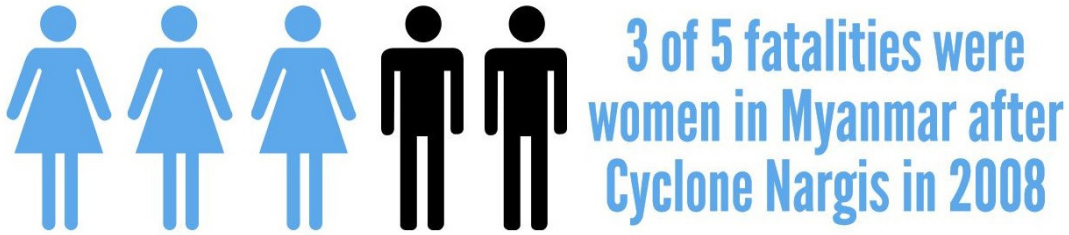
In a study commissioned by ESCAP,[65] **four critical factors for e-resilience** was identified. They include:

i. Knowing disaster risks when planning the ICT infrastructure
ii. Shortening the time and resources needed for restoration
iii. Designing for resilience to reduce disruption of services, including building in redundancy
iv. Ensuring last mile connectivity

**ICT is also embedded in a variety of other critical infrastructure such as the management of the electric grid, transport system and health care services.** With the increasing interconnectedness of these infrastructure components, it is crucial to plan holistically for building resilience. Power supplies are of particular importance to ICT systems.

### 3. The use of ICT in disaster risk management needs to be gender sensitive and inclusive

**Women are generally more vulnerable to disasters than men.[66]**




**Women tend to have less access to and control over resources, including ownership of mobile phones and access to broadband.** In low- and middle-income countries:[67]


**In both the ICT and disaster risk management sectors, women are underrepresented, which means their voices are often not heard and their knowledge not valued.**

Following the 2010 floods in Pakistan, women were either overlooked or were unable to be reached because their mobility was restricted.[68]

[65] Ibid.
[66] ESCAP, *Asia-Pacific Disaster Report 2015* (Bangkok, 2015).
[67] ITU and UNESCO, *The State of Broadband 2015* (Geneva, 2015).
[68] ESCAP, *Asia-Pacific Disaster Report 2015* (Bangkok, 2015).

**Similarly, other vulnerable groups are often overlooked, including:**

| | | |
|---|---|---|
| Children | Youth | Persons with disabilities |
| People living with HIV/AIDS | Older persons | Indigenous peoples |
| Migrants | Refugees | Internally displaced persons |
| Low-income groups | People living in remote areas | |

Therefore, planning the use of ICT for disaster risk management must be gender-sensitive and inclusive, otherwise such initiatives risk further marginalizing the vulnerable and those unconnected.

### 4. The lack of an integrated approach to disaster risk reduction

**Disaster risk reduction is a cross-cutting issue affecting multiple sectors** and thus, requires the cooperation and coordination of multiple sectors to plan and implement solutions.

**Most countries are affected by multiple hazards,** therefore a multi-hazard approach is required.

**Many disasters are transboundary,** which calls for cooperation between countries to collect and share disaster information in a standardized way, for early warning and other phases in disaster risk management.

Key challenges to an integrated approach are related to:

- Lack of political will and visionary leadership
- Lack of capacity
- Lack of standardized data, methodologies and tools
- Lack of financing instruments

## B. The Opportunities


**Phases in a Disaster Risk Management Cycle**
*Source: Alliance Development Works and United Nations University, World Risk Report 2016 (2016)*

### 1. ICT can play an important role in all phases of the disaster risk management cycle

| Risk analysis | Preparedness | Early warning | Emergency relief | Recovery and reconstruction |
|---|---|---|---|---|
| • Geographic information system<br>• Sensing technologies, space-based technologies, drones, mobile phones, big data, crowdsourcing for data collection and monitoring<br>• Geo-DRM portal<br>• Databases, e.g. DesInventar, DisDAT, EM-DAT | • E-learning<br>• Online portals, e.g. ReliefWeb, PreventionWeb<br>• Awareness raising using different media<br>• Sahana Open Source Disaster Management Software | • ICT-enabled early warning system<br>• Communication between national and local authorities and communities<br>• Disseminating warning messages via cell broadcasting and SMS | • Linking emergency operation centres, first responders and survivors<br>• Robotics for search & rescue<br>• Mobile and airborne base stations for communication<br>• Crisis mapping<br>• Social media<br>• E-cash and e-vouchers for relief supplies | • Rapid prototyping technology, e.g. 3D printing, laser cutting<br>• Tracking of aid<br>• Crowdfunding |

### 2. Women are agents of change

Women often have a strong body of knowledge and expertise that can be used in disaster risk reduction and climate change adaptation, although they are often not acknowledged or tapped into sufficiently.

Numerous studies and initiatives have shown that gender equality and women's empowerment are vital for disaster risk reduction.[69]

Numerous studies and initiatives have also shown that ICT, when applied in a gender-sensitive manner, can help alleviate some of the barriers faced by women and contribute to women's empowerment.[70]

### 3. Ongoing regional cooperation efforts serve as opportunities for learning and innovation

Examples include:

**The Asia-Pacific Information Superhighway Initiative** is developing a masterplan and regional cooperation framework that incorporates e-resilience.

**The ASEAN Coordinating Centre for Humanitarian Assistance** is using various online tools to coordinate emergency response among its member countries.[71]

**The ESCAP Regional Drought Mechanism** takes advantage of the data, imagery and expertise from the region's spacefaring countries, particularly China, India and Thailand, by sharing it with countries prone to drought, so that they can also benefit from these tools even when they have no space programme of their own.

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[69] See http://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Environment/PB3-AP-Gender-and-disaster-risk-reduction.pdf, http://www.justmeans.com/blogs/the-role-of-women-in-disaster-risk-reduction and https://www.gdnonline.org/resources/HFA2%20Key%20Area%204%20paper-%20Women%20and%20Gender%20equality%20in%20DRR.pdf.

[70] See http://www.eldis.org/vfile/upload/4/document/1409/Gender%20and%20ICTs%20briefing%202014.pdf, http://www.intel.com/content/dam/www/public/us/en/documents/pdf/women-and-the-web.pdf and http://www.cherieblairfoundation.org/programmes/mobile/.

[71] See http://www.ahacentre.org/content/tools.

**The ESCAP/WMO Typhoon Committee** has been established for over forty years, and has resulted in the set up of four other similar organizations in other tropical cyclone basins around the world.[72]

**The Pacific Catastrophe Risk Assessment and Financing Initiative** is a regional programme that provides disaster risk modelling and assessment tools, as well as risk financing instruments to Pacific Island countries.[73]

**The Regional Flood Information System in the Hindu Kush Himalaya region** established hydrometerological stations across Bangladesh, Bhutan, Nepal and Pakistan to collect real- or near-real-time data on river levels, rainfall and other data, which is disseminated through a web-based platform.

**The Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES)** is an international and intergovernmental institution with 12 member states and 19 collaborating countries.[74]

**The Asia-Pacific Telecommunity (APT)** has been facilitating pilot projects and studies on disaster risk reduction among its member countries. The APT also organizes annual workshop on disaster management and communications.

## C. Alignment with the SDGs

**Resilience is a central element in the Sustainable Development Goals (SDGs)**, which includes building the resilience of the poor and vulnerable to reduce their risk to disasters (Targets 1.5, 11.5, 11.b and 13.1), as well as building resilient infrastructures (Goal 9). This goal calls for investments in infrastructure, including the ICT infrastructure, and the need to develop quality, reliable, sustainable and resilient infrastructures. A resilient ICT infrastructure that comprises of optical fibre, satellite and wireless links is crucial for supporting all phases of the disaster risk management cycle. The use of ICT to promote the empowerment of women is enshrined in SDG Target 5.b.

**The Sendai Framework for Disaster Risk Reduction specifically emphasizes the importance of ICT** to enhance measurement tools and the collection, analysis and dissemination of data (24f), and to " strengthen the utilization of media, including social media, traditional media, big data and mobile phone networks, to support national measures for successful disaster risk communication," (25c).

## D. Guiding Questions to Formulate the Region's Strategy

- ICTs have been used to manage disaster risk for many years, but how effective are they? What lessons have we learned?
- With climate change and the possibility of more frequent extreme events, what are the priorities for the application of ICT in disaster risk reduction?
- Which ICT initiatives should be replicated / scaled up across the region, and what strategies are needed to ensure that they are sustainable, gender sensitive and inclusive?
- How can we ensure that ICT infrastructure design and planning incorporate the four critical factors for e-resilience?
- How can ICT facilitate cross-sectoral coordination? What specific national/local experiences and systems can be replicated or scaled up?
- What are the priority strategies for ensuring women's contribution as agents of change in disaster risk reduction?

[72] See http://www.typhooncommittee.org.
[73] See http://pcrafi.sopac.org.
[74] See http://www.rimes.int.