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INFORMATION, COMMUNICATION AND SPACE TECHNOLOGY FOR MEETING DEVELOPMENT CHALLENGES

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Note by the secretariat

SUMMARY

Information and communication technology is increasingly becoming an indispensable tool in achieving international development goals such as the Millennium Development Goals in the areas of education, health care, gender equality, environmental protection and partnerships.

The LDCs and LLDCs are facing a number of impediments in taking advantage of new technologies. Landlocked LDCs face a double burden of poverty combined with geographical isolation and distance to markets and LLDCs often face severe geopolitical challenges. In the effort to overcome some of these challenges, ICT is playing an increasingly important role. However, LDCs and LLDCs are facing difficulty in harnessing ICT to achieve international development goals owing to lack of awareness of what ICT has to offer, inadequate telecommunication infrastructure, unaffordable access and lack of legal and regulatory policy frameworks, as well as inappropriate content and applications and lack of government priority.

For ICT to serve as an engine for achieving the international development goals in the LDCs and LLDCs, it will be critical for the countries to develop national ICT strategies that put in place an effective policy framework. Furthermore, ICT should be an integral part of national development strategies and be integrated into poverty reduction and rural development strategies. ICT policies should be focused on poverty reduction, removal of barriers to access and use, investments, transparency and telecommunication reforms. To be able to access information available, everyone should acquire the necessary skills to use ICT. Therefore, capacity-building is a precondition to use and maintain ICT. Development of locally relevant applications and content will be critical to attain sustainability and feasibility of ICT initiatives. As the LDCs and LLDCs cannot meet their basic needs with their own resources, partnerships with the private sector, NGOs and the international donor community, including the United Nations, are needed to overcome the challenges.

Introduction

1. Information and communication technology (ICT) has become an indispensable tool for socio-economic development. ICT enables people to access, process, store, retrieve and disseminate information and knowledge more efficiently and therefore helps developing countries to compete more effectively in the knowledge-based global economy. Indeed, ICT is a major driving force behind globalization. ICT is not a techno quick fix but when applied strategically to development it can have a dramatic impact on progress - both by enabling sustained socio-economic growth and thereby meeting internationally agreed development goals and by building national capacity in the ICT sector with a possible export market focus.

2. Although there has been some progress in access to ICT and its applications in the Asian and Pacific region, there is still a widespread divide between countries and between communities within countries. The least developed countries (LDCs) have been slower than middle- and high-income economies to take advantage of new technologies. The landlocked LDCs face a double burden of poverty combined with geographical isolation and distance to markets, which make the challenges extraordinarily hard to overcome. Often, landlocked developing countries (LLDCs) which are not burdened by extreme poverty face other severe geopolitical challenges. In the effort to overcome some of these challenges, ICT is playing an increasingly important role.

3. This document examines the role of information and communication technology for development in the specific context of the least developed and landlocked developing countries and makes recommendations for Governments and the international community to help the countries to harness ICT in order to meet the international development goals, including those contained in the Millennium Declaration as well as the Brussels Declaration and Programme of Action for the Least Developed Countries.

I. Challenges facing the LDCs and LLDCs[1]

The challenges facing the LDCs

4. The challenges facing the LDCs are those associated with poverty and underdevelopment. One of the characteristics of LDCs is that the majority of their population live on less than a dollar per day - an amount insufficient to meet their basic needs in terms of food and nutrition, safe housing, health care and education. The resources available in the LDCs are few, often unequally distributed and often not adequate to achieve any form of sustainable development. Despite three decades of special attention from the international donor community, the situation has not improved much.

[1] The list of LDCs in the ESCAP region consists of 13 countries: Afghanistan, Bangladesh, Bhutan, Cambodia, Lao People's Democratic Republic, Maldives, Myanmar and Nepal in South and South-East Asia and Kiribati, Samoa, Solomon Islands, Tuvalu and Vanuatu in the Pacific Ocean. The LLDCs which are not LDCs are concentrated in Central Asia and there are 8 of them: Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan and Uzbekistan. A few days before the Asian tsunami, Maldives was in fact officially taken off the list of LDCs.

5. As described by the United Nations Conference on Trade and Development (UNCTAD), the challenges facing LDCs include:

- Absence of sustained economic growth and a high level of income inequality;
- Limited domestic resources available for investment in public goods and governance;
- Exclusion from the increasingly complex international relationships;
- Reliance on primary commodity exports and the related rise of financially powerful market intermediaries supported by global supply chains;
- Establishment of exclusionary trade blocks with high entry barriers;
- Unsustainably high level of hard currency foreign debt and debt-service payment;
- Weakness of country infrastructures, especially in ICT.

6. The donors have not succeeded in applying approaches to structural reforms largely owing to failures from believing that "one size fits all" (e.g., structural adjustment programmes in the 1980s) and the LDCs have not been able to take sufficient ownership of donor-initiated programmes to tailor them to their own specific needs.[2] Despite an inadequate analytical foundation for effective poverty reduction in the LDCs and continued disagreement among experts on the relationship between economic growth and poverty, there seems to be agreement that poverty reduction is dependent on sustained economic growth at both the macro and micro levels.

The challenges facing the LLDCs

7. One major challenge for landlocked countries is in relation to trade and access to world markets. Technological advancements in the transport sector has helped landlocked countries with some obstacles but they are still facing immense structural obstacles in accessing global markets.

8. In comparison with coastal neighbours, the landlocked countries are often lagging behind in terms of trade and overall human development. In some cases, their hardships are even worsened by border disputes among neighbours, internal unrest and corruption.

9. Four countries in the ESCAP region are both LDCs and landlocked: Afghanistan, Bhutan, the Lao People's Democratic Republic and Nepal. These four face challenges of a different kind. The challenges are closely linked to the fact that they are LDCs rather than to their landlocked location. Bhutan, Nepal and the Lao People's Democratic Republic are all largely dependent on their neighbours. For both Bhutan and Nepal, India is the main trading partner, while the Lao People's Democratic Republic's main trading partners are Thailand, Viet Nam and increasingly China. The relations with these neighbours are relatively good; this reduces the cost for transport but puts

[2] International Telecommunication Union, *The Application of Information and Communication Technologies in Least Developed Countries for Sustained Economic Growth* (Geneva, ITU, 2004), p. 11.

landlocked countries in a very weak position for any form of negotiations with their coastline neighbours.[3]

10. The poor infrastructure in countries like the Lao People's Democratic Republic and Nepal complicates domestic transport to transit countries such as India and Thailand, which both have a fairly well-functioning infrastructure. For example, goods entering the Lao People's Democratic Republic by train from Thailand must be loaded onto trucks as the Lao People's Democratic Republic does not have a railway system.

11. The distance to the coast is a key factor in measuring progress. However, there are a number of other factors relating to the dependence on the transit countries which keep landlocked countries trapped and make it difficult for them to perform in terms of human development. These factors include:

- Dependence on neighbours' infrastructure;
- Dependence on sound cross-border political relations;
- Dependence on neighbours' peace and stability;
- Dependence on neighbours' administrative practices.[4]

12. Each landlocked country faces a unique set of challenges and priorities. Strategies and policies which focus on mitigating the negative consequences of being landlocked need to address country-specific obstacles to accessing global markets and region-specific challenges to market integration.[5]

13. There is an urgent need for transport infrastructure, regional market integration and harmonization of trade procedures. ICT can play an important role in accelerating these processes, which eventually help the landlocked countries to better achieve the international development goals. For this purpose, LLDCs need to focus on improving the communication infrastructure and promotion of ICT applications related to trade and transport that will eventually reduce transport costs.

II. ICT as an integral part of achieving development goals

14. At the United Nations Millennium Summit in September 2000, the 189 Member States of the United Nations committed themselves to eight Millennium Development Goals through signing the Millennium Declaration. By adopting the Goals, the member countries and the donor community have committed themselves to reducing poverty and improving education, health, gender equality and environmental sustainability by 2015 by achieving a range of essential targets. In line with growing

[3] Ibid., p. 66.

[4] Ibid., p. 31.

[5] Ibid., p. 52.

recognition that ICT plays an important role in development, the eighth goal, regarding partnerships for development, calls for making the benefits of new technology, especially ICT, available in cooperation with the private sector. The year 2005 is a crucial one since all United Nations Member States will meet to measure progress and agree on how to best achieve the Goals by meeting the targets through specific programmes and projects, also described as the Millennium Project.

15. As stated in the Brussels Declaration and Programme of Action, it will be of paramount importance for the success of the Millennium Development Goal campaign that special attention be given to the LDCs and LLDCs as these countries are facing challenges of a complex nature which will be difficult to overcome in the short period of time that the campaign prescribes.

16. ICT can help countries to achieve the Goals. Although there has been a long debate on the relationship between ICT and poverty reduction, growing evidence suggests that ICT can play an important role in poverty reduction and is a powerful economic, social and political tool for the poor. ICT increases efficiency and productivity and provides farmers and entrepreneurs with market information that enables them to compete more effectively in a knowledge-based global market and also helps them to increase their market coverage.

17. Education is fundamental to development as knowledge, information and communication are crucial elements for human development and therefore for socio-economic activities. ICT can contribute to education by providing various channels (e.g., distance education, e-learning, teleconferencing) to bring education to populations unable to access it, such as rural populations or women facing social barriers. In addition, ICT can improve the quality of teaching by bringing teachers together through networks to share teaching materials and experiences and improve the administrative procedures at schools.

18. ICT-enabled education opportunities for women can empower them by equipping them to participate actively in socio-economic activities. As ICT is a great tool for information dissemination, awareness on gender equality can be raised and enhanced.

19. Improved health care depends heavily on awareness-raising. When applied to disease prevention and epidemic response efforts, ICT can provide considerable benefits and capabilities. ICTs proved to be crucial in containing SARS during 2003. Public broadcast media such as radio and television have a long record of effectively facilitating the dissemination of public health messages and disease prevention techniques in developing countries. The Internet can also be utilized to improve disease prevention by enabling more effective monitoring and response mechanisms. Furthermore, the Internet can be used to monitor daily cases of severe diseases and help to coordinate mass vaccination programmes when threshold levels are reached.

20. ICT helps health-care workers to provide remote consultation, diagnosis and treatment and collaborate with colleagues without travelling long distances. This telemedicine application is of particular benefit to developing countries and/or populations in remote areas where trained health-care workers are scarce. Moreover, health-care workers in rural and remote areas can access relevant medical training through ICT-enabled delivery mechanisms such as distance education.

21. Environmental sustainability is a complicated issue. Collection of data which are processed and translated into user-friendly language and format provides better understanding of complex issues such as climate change, biodiversity and natural disasters. Through ICT-enabled information dissemination, it is possible to increase people's understanding of environmental issues and their policy implications. Satellite-based remote sensing technologies and geographic information systems enable more effective monitoring, resource management and mitigation of environmental risks. Many lives could have been saved in the recent Asian tsunami if an ICT-based early warning system had been in place.

22. Satellite communications uniquely connect communities inadequately served by terrestrial means of infrastructure and if combined with a delivery mechanism through community e-centres, radio, TV and loudspeakers, space technologies can make a dramatic difference in meeting development goals.

23. In such ways, ICT is an instrument that enables individuals and communities to share their knowledge across borders, which will put all countries in a better position to tackle problems and challenges and become more competitive. If applied within existing development strategies and programmes, ICT has the potential to accelerate the development process.

24. The Asia-Pacific region is basically rural and is home to the largest population, especially the largest poor population, among all regions in the world. A large number of them reside in the LDCs and LLDCs. Information and communication technology plays an important role in the Millennium Project for all developing countries, but perhaps even more so for the LDCs and LLDCs. It is widely agreed that ICT has a significant impact on creating sustained economic growth and reducing poverty. Some experts argue that without the approaches to poverty reduction that ICTs have to offer, most of the LDCs will not be able to achieve the Millennium Development Goals on time.

III. World Summit on the Information Society

25. To build a people-centred, inclusive and development-oriented information society where everyone can create, access, utilize and share information and knowledge, and to harness the potential of ICT to promote the Millennium Development Goals, the first phase of the World Summit on the Information Society was convened in December 2003. The Declaration of Principles and Plan of Action adopted at the Summit call for multistakeholder cooperation and partnership that includes

Governments, the private sector, civil society and international financial institutions at the regional level, in order to ensure that everyone can benefit from the opportunities that ICT can offer.

26. ICT enables people to access information and knowledge. To facilitate access to ICT, the Plan of Action requests Governments and other stakeholders to establish sustainable multi-purpose public access points (sometimes referred as community e-centres or telecentres) providing their citizens with affordable or free access to the Internet and other ICT-based services. Governments and stakeholders are also requested to develop capacity-building programmes in ICT to help their populations to acquire necessary ICT skills to benefit fully from the knowledge economy. The Plan of Action also calls for a structured dialogue involving all relevant stakeholders, including public-private partnerships, to devise e-strategies for the information society and for the exchange of best practices.[6]

27. In relation to ICT applications that can help in reaching the international development goals, the Plan of Action outlines priority applications that support sustainable development in the fields of public administration, business, education and training, health, employment, environment, agriculture and science that should all be developed within national ICT strategies. E-government applications cannot only increase the efficiency of government by streamlining processes, providing better services to citizens and increasing citizens' participation, but also make government processes transparent and accountable. ICT applications to business processes (e-business) can be a powerful tool for small businesses and rural entrepreneurs enabling them to compete in the knowledge-based global economy by providing them with market information and making their business processes more efficient. ICT applications can also improve the efficiency of cross-border trade and transport facilitation.

IV. Current status of ICT distribution in LDCs and LLDCs

28. The Millennium Declaration recognizes that ICT has an important role to play in achieving the goals described earlier. While it would be desirable to measure the current status in terms of how ICT contributes to and impacts on each Millennium Development Goal in each country, this is not possible owing to lack of such an indicator system at present. With regard to target 18 of the Millennium Declaration, key indicators have been identified to measure countries' overall

[6] These multistakeholder partnerships are requested to:
(1) Develop the information and communication infrastructure needed as a foundation for the information society;
(2) Provide access to information and knowledge to people anywhere in the world;
(3) Build capacity and the necessary skills to benefit fully from the information society;
(4) Build confidence and security in the use of ICTs;
(5) Create a trustworthy, transparent and non-discriminatory legal, regulatory and policy environment;
(6) Develop ICT applications that support sustainable development, in the fields of public administration, business, education and training, health, employment, environment, agriculture and science within the framework of national ICT strategies;
(7) Stimulate respect for cultural and linguistic diversity, through local content development;
(8) Recognize the important role of the media in the development of the information society;
(9) Develop mechanisms for preventing unethical uses of ICTs;
(10) Encourage international cooperation among all stakeholders.

achievement in ICT development. They have been categorized into four types of indicators: number of telephone lines; number of cellular subscribers; number of personal computers in use; and number of Internet users.

29. While these indicators are useful to estimate the rate of diffusion, penetration and access to ICT (excluding radio and TV) in each country, they do not reflect how and for what purpose the technologies are being used. This is a limitation when assessing the key challenges. As the information society is under constant evolution and ICT is a tool for development and not an end in itself, there is a need for indicators that focus on people and how they use technologies rather than on how much ICT is available. The four technology indicators do provide, however, an indication of where the LDCs and LLDCs stand in terms of ICT diffusion and penetration. ICT diffusion and penetration are a precondition for the LDCs and LLDCs to take advantage of the new opportunities that ICT can offer for development.

Fixed telephone line subscribers per 100 inhabitants

30. In the landlocked LDCs (Afghanistan is excluded for lack of data), the number of fixed telephone lines per 100 inhabitants increased by 15.03 per cent from 1998 to 2003. Bhutan has significantly more fixed lines than Nepal and three times more than the Lao People's Democratic Republic, which has had the highest increase in the number of fixed lines among the three as a result of expanding infrastructure to the provinces. These three landlocked LDCs have had a higher increase in fixed lines than the LDCs on average. Cambodia and Bangladesh have teledensity rates lower than 1 per cent, which is very low compared with the rest of the region. In Solomon Islands, the situation worsened from 1998 to 2003 with a decrease of 7 per cent. The average increase for the LDCs which are not landlocked is 4.6 per cent, with an average teledensity of 3.27 per cent. This is higher than the three landlocked LDCs with an average of 2.08, mainly because of very low penetration in Nepal and the Lao People's Democratic Republic. Maldives stands out positively with a penetration rate of 10.20 and an increase of 7.2 per cent from 1998 to 2003.

31. The teledensity of landlocked countries which are not LDCs is significantly higher than the LDCs, with an average of 8.79 in 2003. Armenia, Azerbaijan and Kazakhstan have a relatively high teledensity of around 13.0 per cent and Tajikistan has the lowest rate, 3.7 per cent, which is lower than the rates of Samoa and Maldives, both LDCs. Both Kyrgyzstan and Turkmenistan saw a decrease, resulting in a low average increase for the entire group of 1.8 per cent from 1998 to 2003. This is also low compared with the world average, which increased 5.2 per cent in the same period.

	Country	HDI[a] rank	Telephone lines (per 100)		Mobile subscribers (per 100)		PCs (per 100)	Internet users (per 100)
		2004	2003	1998-2003 (%)	2003	1998-2003 (%)	2003	2003
Landlocked LDCs	*Afghanistan*	NA	-	-	-	-		
	Bhutan	134	3.56	16.8	1.13	-	1.36	2.04
	Lao People's Democratic Republic	135	1.12	18.3	1.00	71.0	0.33	0.27
	Nepal	140	1.57	10.0	0.21	-	1.37	0.34
	Average		**2.08**	**15.03**	**0.78**	**71.0**	**1.02**	**0.83**
LDCs which are not landlocked	*Bangladesh*	138	0.55	10.7	1.01	78.7	0.78	0.18
	Cambodia	130	0.26	4.9	2.76	57.8	0.23	0.25
	Kiribati	NA	-	-		-	0.78	-
	Maldives	84	10.2	7.2	14.91	126.0	7.12	5.34
	Myanmar	132	0.72	6.9	0.13	50.8	0.56	0.05
	Samoa	75	6.53	7.5	1.50	16.2	0.67	2.22
	Solomon Islands	124	1.49	-7.0	0.22	9.2	4.05	0.52
	Timor-Leste	158	0		-	-	-	..
	Tuvalu	NA	-	-	-	-	-	
	Vanuatu	129	3.15	2.0	3.76	104.1	1.48	3.61
	Average		**3.27**	**4.6**	**3.47**	**63.2**	**1.96**	**1.74**
Landlocked countries which are not LDCs	*Armenia*	82	14.8	0.2	3.01	71.0	1.58	5.26
	Azerbaijan	91	11.35	6.4	10.69	91.3	-	3.69
	Tajikistan	116	3.70	0.1	0.73	157.6	-	0.06
	Kazakhstan	78	13.04	4.7	6.43	142.5	-	1.57
	Kyrgyzstan	110	7.75	-0.3	1.04	150.4	1.27	2.98
	Mongolia	117	5.27	4.2	8.89	121.1	7.73	5.81
	Turkmenistan	86	7.71	-1.6	0.17	28.5	-	0.17
	Uzbekistan	107	6.70	0.9	1.25	64.3	-	1.92
	Average		**8.79**	**1.8**	**4.05**	**103.3**	**3.53**	**2.68**
Other regions	*Developing countries*		96		10.10		-	0.41
	Least developed countries		7		1.0		-	0.28
	High-income OECD		590		65.00			45.05
	World		**175**	**5.2**	**18.40**	**33.4**	**9.97**	**11.25**

[a] Human development index in UNDP, *Human Development Report 2004: Cultural Liberty in Today's Diverse World* (New York, UNDP, 2004).

Source: Data from ITU telecommunication indicators database.

Mobile subscribers per 100 inhabitants

32. Unfortunately, data on the number of subscribers in landlocked LDCs for 1998 are available only for the Lao People's Democratic Republic, which makes it difficult to estimate trends. Although the Lao People's Democratic Republic experienced an increase of 71 per cent from 1998 to 2003, it

still has more fixed lines than mobile subscribers. However, the numbers are very close (around 1 per 100 people).

33. The majority of the countries have experienced a dramatic increase in mobile subscriptions, with the landlocked countries which are not LDCs showing the highest average increase at 103 per cent. Kazakhstan, Maldives, Mongolia and Vanuatu have seen the biggest increases, surpassed only by Tajikistan, which saw an increase of 157.6 per cent but had started from a very low level in 1998. Together with Turkmenistan, Solomon Islands and Myanmar, Nepal has a rate below 1 subscriber per 100 people. Among the LDCs that are not landlocked, Bangladesh stands out with explosive growth in mobile subscriptions of about 79 per cent between 1998 and 2003.

34. It should be noted that the bulk of the data available are from 2002 or earlier. Recent estimates in Cambodia show that the rate of mobile subscription is about 20-30 times higher than for fixed lines.

Personal computers in use per 100 of population

35. The available data on PC penetration shows that among the LDCs, one country, Maldives, stands out with 7 PCs per 100 people. Compared with the other LDCs, Solomon Islands shows a high rate of 4 PCs per 100 people. The landlocked LDCs have an average of 1 per cent but are drawn down by the Lao People's Democratic Republic with a very low rate of 0.33, which is only surpassed on the downward side by Cambodia among all LDCs. Among the landlocked countries which are not LDCs, Mongolia stands out with 7.7 PCs per 100 people, which is admirable when compared with the world figure of 9.9.

Internet users per 100 of population

36. The Lao People's Democratic Republic and Nepal have few Internet users compared with Bhutan, which is performing well with 2 users per 100 people. Overall, the landlocked LDCs have the lowest rates of Internet users among the three groups of countries. Myanmar and Tajikistan have the lowest rates, but Bangladesh, Cambodia and Turkmenistan also have fewer than 0.25 users per 100 people.

37. The LDCs in the Asian and Pacific region have more Internet users when compared with all LDCs in the world but are significantly below the world average, which is 11.25 users. In comparison, the high-income OECD countries have 45 Internet users per 100 people.

V. The digital divide - a key challenge in achieving the international development goals

38. One conclusion that can be drawn from the above is that teledensity is generally lower in the LDCs than in the landlocked countries. This does not mean that the landlocked countries have anything near a high ICT penetration rate but the challenges facing the LDCs are more severe than those facing the LLDCs. Being landlocked does not lead to low penetration but being an LDC is

usually accompanied by low penetration. The opposite picture is apparent for the richer nations – having a high GDP per capita usually means a high ICT penetration.

39. ICT is more widely available in the rich countries and this has created the so-called digital divide between the rich and the poor nations. According to the statistics, this divide is widening every day. The adoption of ICT in the LDCs is lagging behind when compared with the more developed countries, as growth in technology penetration under the current circumstances is often a result of growth in GDP per capita. The LDCs have few resources to buy the necessary equipment, and Governments often impose heavy import tariffs and duties on ICT goods or place heavy restrictions on the use of ICT services.[7] Heavy regulation of business is another issue that often discourages a viable enabling environment for innovation.

40. Where the ICT services have been able to expand in LDCs, that has usually been limited to the larger cities, except for a few cases where ICT services are provided at rural community e-centres established through ICT initiatives supported by either Governments or international communities. Most often the urban periphery, district town and rural areas are excluded from ICT access. In the case of Cambodia, for instance, there is almost no ICT service coverage outside the large provincial towns.

41. One trend however, is the explosive growth rate of mobile telephone subscriptions in almost all developing countries, including the LDCs, which can be seen as a reflection of the demand for communication facilities. Cambodia has experienced the world's fastest growth in mobile subscriptions. It was also the first country to experience a rate of mobile subscriptions exceeding fixed line subscriptions. Today, the rate of mobile communication is about 20-30 times higher than the fixed line rate. A similar picture can be seen in other LDCs. More people are getting access to telephony and this will have a positive impact on development. However, many of the ICT services that can help in achieving the Millennium Development Goals are still better provided by fixed line infrastructure or high-speed satellite connections. Nevertheless, the success of mobile telecommunication in developing countries proves what can be achieved in a few years with only limited investment.

42. Experience has shown that even when monopolies are removed, fixed line telephony does not seem to be able to bridge the domestic digital divide. Despite the success of mobile telephony, attention is often placed on fixed line (narrowband) technology instead of new wireless and broadband technologies, which are becoming cheaper to install and more conducive to development.

43. While there is a clear digital divide between the LDCs and LLDCs and the developed world, it is the divide within the countries themselves that poses the biggest risk of missing out on new opportunities. In most cases, the adoption of ICT is limited to an educated elite, a divide that might grow despite the fact that the divide between countries may be narrowing. In a large number of LDCs,

[7] VoIP (Voice over Internet Protocol) is one good example: it is still illegal in a range of LDCs.

ICT penetration is limited to the capital and Internet connections in rural locations are often set up to serve a development project with foreign representation or a local government department within the structure of line ministries in such areas as health and education.

44. If ICT is not more widely accessible at the rural level, the majority of the population in the LDCs will still be unable to access market information that is crucial for crop selection and agricultural productivity. Without broader distribution of ICT, schools and hospitals will remain isolated and not be able to benefit from a wide spectrum of information-based opportunities. They will miss out on opportunities to keep abreast of new knowledge essential for combating diseases such as malaria and HIV/AIDS. Access to ICT is also increasingly becoming a key to enhancing education and human skills, which is required to transform developing economies into service-based (and information-based) economies. In addition, without access to ICT, the LDC populations will, to a large degree, remain unemployed or be employed in the informal economy.

45. Basic service institutions such as hospitals and schools in developing countries often lack the funds to establish Internet connections and also frequently lack basic infrastructure in the form of electricity and fixed line telephony. Universities lack the systems, equipment and teachers to train their students in telecommunication, IT network systems, computer science and software applications.

46. Broad diffusion of ICT within the countries requires a certain degree of affordability that is lacking at present. This can only be achieved through subsidy schemes and higher competition in the telecom market. Equally important is that development projects make ICT an integral part of their development strategies for poverty reduction and rural development. The benefits of ICT will not emerge automatically but are fostered through creation of awareness and thereby demand.

47. Universal access is in fact becoming more and more feasible due to the rapidly declining cost of networking and telecommunications technologies. This declining cost, particularly in the case of wireless and mobile, has hastened the adoption of these technologies. Promising new experiments in wi-fi and wi-max combined with satellite connections, shared access and open source software that could lead to commercially viable models for providing rural access should be explored more.

48. The community e-centre (CeC) concept, a shared access approach to providing affordable ICT services to rural communities, could be a viable option for universal access for LDCs and LLDCs. The major purpose of CeCs is to improve connectivity and provide access to information to people in rural and underserved areas. CeCs aim to provide various levels of ICT services and user support. Typical services provided are basic telecommunication services (e.g., telephone, fax), Internet services, e-mail, access to local and national e-government services, community-based services (e.g., agricultural products monitoring and trading, tourism, local content development), business and commercial services (e.g., e-business, banking, procurement) as well as office tools (e.g., photocopiers, scanners). One of the important functions of CeCs is the provision of training to build the capacity of communities in the use of ICT. Depending on the availability of relevant services in

the countries, the CeCs provide facilities and equipment for expanding services to distance training and education and telehealth care.

49. In many developing countries, CeCs are not developed as stand-alone projects but form a part of the overall ICT development strategy to bridge the digital divide, with the national communication infrastructure backbone and the information network supported by the Government.

50. There is a real danger that LDCs and LLDCs might slip further behind the developed countries and the rest of the developing world in terms of their access to ICT. The consequence will be that the process will become more and more difficult to reverse. Action is therefore required to ensure that the gap does not widen. More importantly, the countries themselves must ensure that actions are taken to narrow the digital divide domestically and that access to ICT becomes more widely available, most notably in rural and remote areas.

51. The tools and policies for overcoming these challenges are available and are already deployed to a certain degree, but in a limited and non-systematic way. In conclusion, the existence of both global and in-country digital divides is an important challenge which policy makers in the international community, including multilateral agencies and bilateral donors, and LDC and LLDC Governments must overcome in order to ensure ICT's contribution to meeting the international development goals.

VI. Challenges for the LDCs and LLDCs in harnessing ICT for development

52. While the benefits of ICT are easy to identify, it is becoming evident that some countries are constrained in taking advantage of it. As indicated above, the least developed and landlocked developing countries are facing special constraints and obstacles not only in their integration into the region's economy but also in harnessing new information and communication technologies.

53. As pointed out by UNCTAD, ICT is at the centre of an economic and social transformation that is affecting countries worldwide. ICT and globalization have created a new economic and social landscape which is fundamentally changing the way that individuals, enterprises and economies function. It is crucial that the LDC and LLDCs not be left out of this transformation process, a new era of digital opportunities, for two reasons: ICT provides new opportunities and alternative means for poverty reduction in the context of the global economy and the current transformation process; and if the countries are not given digital opportunities they will most likely face further exclusion and marginalization as the forces of ICT and globalization could widen the gap and trap the LDCs in a vicious circle of poverty and exclusion.

54. Despite the benefits of the global economy, the LDCs have not been able to fully adopt ICT as a tool for socio-economic development. The reasons are many and depend on the nature of the LDC, but among some of the important factors are:

- Little awareness and understanding of what ICT has to offer in relation to development;
- Inadequate telecommunication infrastructure, ICT penetration and slow Internet connectivity;
- Unaffordable access to ICT products and services;
- Lack of an enabling legal and regulatory framework;
- Inadequate human capacity and technical skills to adopt new technologies;
- Lack of local content and appropriate applications focused on development needs;
- Lack of entrepreneurship and policy incentives for small and medium enterprises;
- Lack of government priority, investments, transparent governance structure and institutional set-up supporting innovation and ICT adoption.

55. LDCs and LLDCs should develop appropriate policies and applications to address these factors. In the context of landlocked countries, specific policy/application choices should also address the challenges of being landlocked. For example, ICT can be used as a tool to increase competitiveness within sectors that do not rely on heavy transport and to help to reduce the cost of cross-border trade and transport through improving efficiency by ICT-based cross-border processes.

56. A wide range of factors are influencing the LDCs' socio-economic development, preventing them from taking advantage of ICT. Some of these factors are political stability, infrastructure, literacy and basic health as well as special geographical factors such as being landlocked or mountainous. A higher ICT penetration cannot eliminate such problems but, used for the right purpose and in the right context, ICT can make a significant difference.

VII. Recommendations

57. As there is not any typical LDC or LLDC, there are no blueprint solutions either; different sets of recommendations are therefore required for each country. This document does not intend to provide individual recommendations for each country as this would require a different approach. Instead the document will point to some key strategic directions and actions that will be applicable to all LDCs and LLDCs in the Asian and Pacific region.

National strategies

58. For ICT to serve as an engine for achieving the international development goals in the LDCs and LLDCs, it will be critical that the countries develop national ICT strategies and put in place an effective policy framework to capture the full benefits of new ICTs. Creating the right policy environment requires coherence with other existing policies in trade, labour, education, telecommunication, etc.[8] All countries face different challenges. Countries must identify their

[8] J.M. Figueres-Olsen and F. Paua, "Crafting the environment for networked readiness", in S. Dutta, B. Lanvin and F. Paua, eds., *The Global Information Technology Report 2002-2003* (New York, World Economic Forum, 2003), pp. 26-43.

specific challenges and niche opportunities as essential steps for shaping and paving the road for developing specific policy directions that are in close coherence with national development goals and other priority policy areas.

59. ICT policies that recognize poverty reduction and improved social inclusion as integral parts would strengthen the achievement of development goals for LDCs and LLDCs. Similarly, ICT strategies should be integrated into national development strategies that recognize ICT as an integral part of poverty reduction and rural development.

ICT policies

60. Policies and regulations should be designed to encourage and stimulate growth of ICT by building capacity in all dimensions: supply, demand and governance. Furthermore, without enabling policy frameworks that support a transparent and inclusive policy process, it is difficult to promote fair and open competition among service providers as well as to strengthen the institutional capacity to enforce and implement ICT-friendly policies. Giving one national ICT service provider or satellite operator preferential treatment keeps competition low and leads to higher prices. The recommended first step is to establish the policy that ICT development (e.g., investment, skills, usage, infrastructure) is a national priority.

61. One of the best ways to promote ICT use is to remove or reduce barriers to use. Any government policy that makes computers more expensive will discourage ICT use and reduce its potential benefits. Lowering tariffs and taxes, eliminating other trade barriers and encouraging fair competition will help to make investment in ICT less prohibitive. For the majority of LDCs and LLDCs, however, this type of policy intervention must be designed and implemented very carefully, considering that they do not have adequate institutional capacity to deal with rapid change and competition.

62. ICT policies in the specific contexts of poverty reduction and mitigating social isolation would aim to stimulate macroeconomic growth, make markets more efficient, improve social inclusion and facilitate political involvement, and would typically include policies for telecommunication reforms, expansion of the physical infrastructure, the regulatory environment and legal framework, public-private partnerships, universal service and encouraging pilot projects concerned with replication models.[9] Countries should keep ICT policies flexible enough to adapt to the changing technology environment and the shifting global markets and trade patterns.

Infrastructure

63. One of the characteristics of the LDCs is poor infrastructure, particularly telecommunication infrastructure, reflected by the low rates of teledensity. As the infrastructure is indisputable to ensure

[9] Modified from Roger Harris, "ICTs for poverty alleviation", e-primer from the UNDP Asia-Pacific Development Information Programme, 2004.

faster communication and enable the increasing number of more advanced ICT services, including the Internet,[10] Governments should take action, within the framework of national development policies, to support an enabling and competitive environment, the necessary investment in ICT infrastructure and the development of new services.

Universal access

64. Policies that promote universal access and telecommunication as priorities for the poorest and most vulnerable groups of the society are an important step towards the information society. The creation of an enabling environment which encourages the necessary investment and public-private partnerships to expand the much-needed rural infrastructure is another important challenge to overcome.

65. Communication satellites have proved their usefulness in a variety of applications, whether in broadcasting, mobile communications, Internet applications or broadband networking. While much of the current broadband connectivity is provided through terrestrial networks, interconnecting geographically distributed networks through satellites is yet another attractive proposition for areas not covered by slow and costly terrestrial broadband facilities. Rather than being a replacement, satellite communication is expected to fill the gaps in the terrestrial infrastructure and eliminate "last mile" problems.

66. Although access is becoming more affordable owing to the declining cost of networking infrastructure and access devices, Governments should provide delivery mechanisms including promotion of community e-centres to facilitate such access.

Capacity-building

67. The benefits of improved access depend, to a large degree, on the capabilities of the users in gaining access to appropriate technologies and training either through their own resources or through utilizing shared facilities.

68. Given the potential of ICTs, it is essential to develop new skills to develop, access and apply them to socio-economic development. Therefore, it is essential to educate young people as knowledge workers and increase awareness and technical skills among users and ICT professionals. In the knowledge economy, building capacity among key stakeholders in ICT applications will be a critical success factor in most sectors and institutions. If Governments can channel their scarce financial and political resources to developing social and human capital, building the basic infrastructure and creating a level playing field for the private sector, that will go some way towards creating the prerequisites for the ICT sector to flourish. Beginning modestly with such areas as data

[10] There is strong evidence from other developing countries that areas lacking telephone access see less entrepreneurial activity than those with access. A weak information infrastructure in rural areas - just like weak transport - will reduce the attractiveness of trade with particular areas and reduce the provision of basic services to the most vulnerable communities (OECD Development Centre Working Paper No. 229).

processing and telework, these countries can gradually move to more sophisticated tasks of software development and e-commerce.

69. Since ICT initiatives often work better and are more likely to be sustainable if there is a business model behind them, entrepreneurial, marketing and managerial capabilities also have to be developed in addition to ICT skills development.

Application/local content

70. Information supplied by government, enterprises, NGOs and development organizations has to be relevant for the intended target group in order to be used and to make a difference to development. Therefore, demand- and needs-driven approaches and involvement of local people should be encouraged in developing content and applications. So-called “killer” applications that address the specific problems of LDCs should be encouraged. For example, in the case of landlocked countries, ICT applications can be developed to ease and reduce the cost of trade and transport. This includes applications that are designed to target the Millennium Development Goals and enable competitive sectors such as tourism to work more efficiently.

71. English is the predominant language of the Web, but many Internet users cannot understand it. Accordingly, efforts should be made to develop locally relevant content in local languages.

Partnership

72. Enterprises play a major role in introducing innovative new initiatives and driving ICT development. A viable environment for business development requires access to financial capital that facilitates access to global markets. Appropriate tariff and intellectual property right regimes play an important role in enabling business development and demand for ICT.

73. The private sector plays a crucial role in the creation of appropriate technologies and applications to be used in LDCs and LLDCs. However, the private sector has yet to see the rural poor as a market. Rural areas can provide a huge market with potentially enormous returns on investment considering the number of people in need of better information services in Asia and the Pacific. The private sector is encouraged to invest more in improving access to and use of ICT in rural areas. In addition, the international community should make an effort to enhance awareness and build capacity in key ICT application areas through providing financial and technical support to key national institutions as well as through promoting public-private partnerships.

74. The LDCs and most of the LLDCs depend on external assistance and partnerships as they cannot meet their basic needs with their own resources even when they improve their own policies and progress with good governance. The international community, including the United Nations and donor organizations, are requested to support their ICT development, focusing on the development of basic communication infrastructure, relevant and targeted ICT applications and services, and human resources development.

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