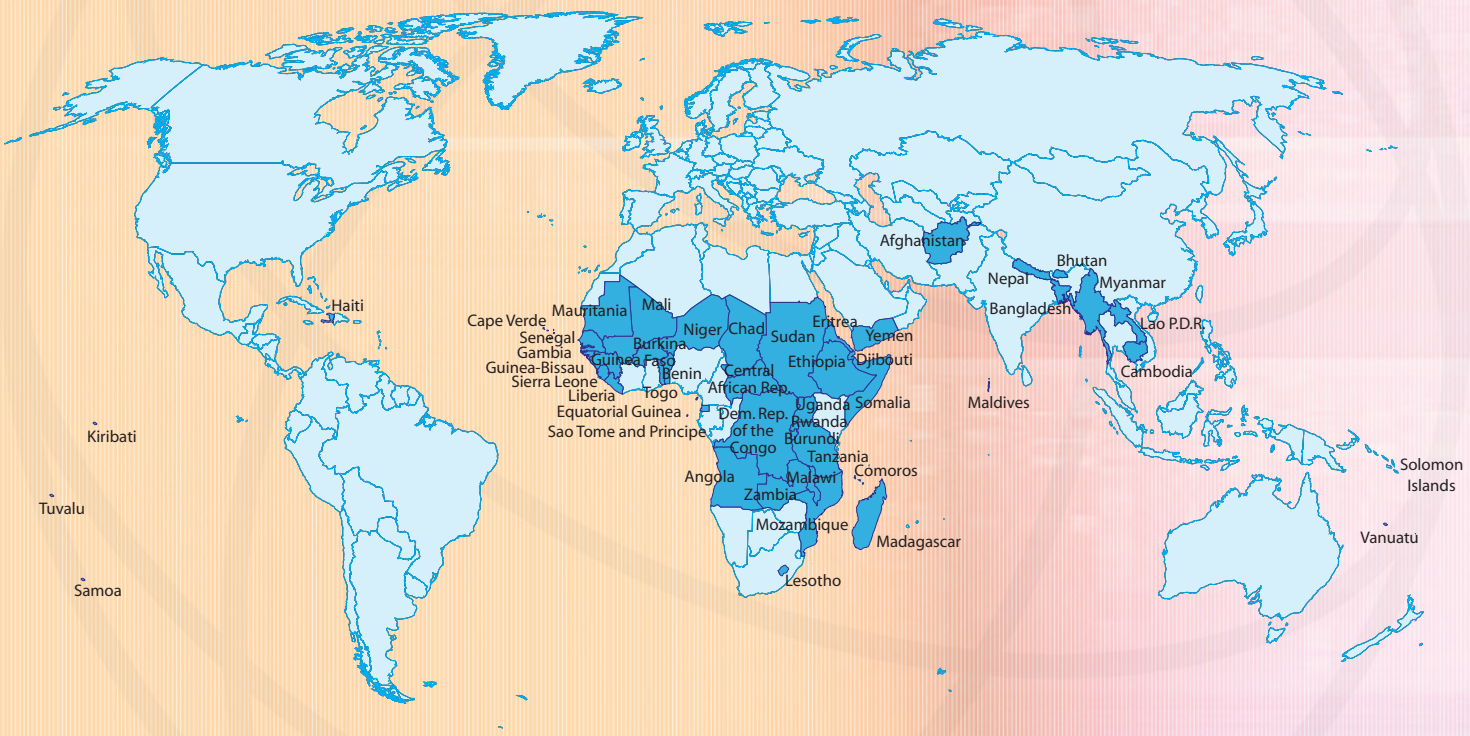
International Telecommunication Union

The Application of Information and Communication Technologies in the Least Developed Countries for Sustained Economic Growth



Edition 2004

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Foreword

We are delighted to present this publication of the International Telecommunication Union (ITU) on *The Application of Information and Communication Technologies in the Least Developed Countries for Sustained Economic Growth*.

The release of this edition is well timed to coincide with the inauguration of the first Global ICT Forum for the Least Development Countries (LDCs), taking place in Mauritius from 7 to 9 July 2004. The theme of the event is: *Forum for ICT Stakeholders – Special Focus on LDCs.*

The stakeholders are meeting at an interesting time when the global telecommunication sector is on the way to recovery following a number of difficult years for the industry. The future looks bright especially for the least developed countries that still possess large market opportunities for the willing investor. Low-cost technology has also become readily available thanks to exciting developments brought about by wireless technologies to include mobile cellular, wireless fidelity i.e. WI-FI and WI-FI MAX. It is technology such as this that will help this special group of countries to fulfill the aspirations of the world leaders as expressed in the Declaration of Principles and Plan of Action adopted by the first phase of the World Summit on the Information Society that was held in Geneva, Switzerland, from 10 to 12 December 2003.

Current sector growth in least developed countries is encouraging giving a lot of hope that the majority of these countries will reach the target set by the third United Nations Conference on the LDCs that was held in Brussels, Belgium, in 2001, i.e. to attain a telephone density of 5 per 100 inhabitants and Internet penetration of 10 per 100 inhabitants by 2010 when the fourth U.N. Conference for the LDCs will be held.

The publication makes a projection of ICT trends for this group of countries covering the period 2004-2014. The period is significant in that these countries, that constitute the world's poorest, have committed themselves to halve the number of their people living on less than a dollar a day by 2015.

This edition has been prepared by the ITU Telecommunication Development Bureau for circulation at the Global ICT Forum for the LDCs in Mauritius. Participants are invited to submit comments by 30th July 2004 for possible incorporation before the final version is released. All comments should be emailed to: cosmas.zavazava@itu.int. The views expressed in this document are those of the authors and do not necessarily reflect the opinions of ITU or its Members.

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14 June 2004

This publication is a joint effort of Cosmas L. Zavazava, and Fritz Ringling. Cecile Reifenberg assisted during the editing process and Melissa Arditto assisted during the cover designing stage.

We are inviting comments from all the stakeholders due to meet in Mauritius and any other readers of this publication. Contributions should be submitted to cosmas.zavazava@itu.int by 30 July 2004. Efforts will be made to incorporate suggestions and/or any other comments before sending this to publication to print.

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Introduction

The need for special attention to what were then called the "less developed" among the developing countries was first recognized in the early 1960s by the United Nations. This resulted in the establishment of the United Nations list of least developed countries. Three principal socio-economic criteria were used to establish this list: namely,

- per capita gross domestic product (GDP) of USD100[1] or less (in 1968 USD)
- share of manufacturing in total GDP of 10% or less;
- adult literacy rate of 20% or less.[2]

The United Nations General Assembly approved the list of the "least developed countries" in 1971. Since then the countries included in this group have made little economic headway, and in fact, for most countries the economic situation has worsened in the ensuing decades. It was not until the 1990's that a new push was made by the United Nations to reinvigorate the various assistance programmes for the "least developed countries" (LDCs).

Will the new programmes be any more successful than the initiatives of the past? There is hope that it will. For one thing, there is evidence of political will in these countries and there is a heightened level of awareness in the developed world that a high incidence of poverty creates socio-political instability. Then, multilateral agencies, donor countries and development experts have recognized that poverty can best be reduced through economic growth. Finally, these LDCs have never become this ready to take ownership of the aid and development programmes offered for their benefit.

But, why the poor economic performance and high incidence of poverty in the LDCs? The short answer is that the aid and development programmes did not work very well. The causes for the failure of these programmes and policy initiatives are manifold and complex: seven key factors can be singled out as being at the core of this contradiction; namely, the

- absence of sustained economic growth and a high level of income inequality;
- limitations placed by poverty on domestic resource availability for investments in public goods and governance;
- exclusion from the increasingly complex international economic relationships;
- reliance on primary commodity and low value manufactured products for exports;
- establishment of exclusionary trade blocks with high entry barriers;
- unsustainably high levels of hard currency, foreign debt and debt service payment;
- weakness of country infrastructures, especially information and telecommunications technologies (ICTs).[3]

What can be done to overcome these causes that have prevented the LDCs from improving their economic prospects? For one thing, the barriers for improved LDC economic performance have been institutionalised on the donor and agency levels by applying "one-size-fits all" solutions. Then, the LDCs have not been able to take full ownership of the donor agencies' programmes, and hence have done little to propose tailored solutions to their specific needs. This is so in part because, of institutional and systemic weaknesses. Finally, debate continues among donor agencies, and other experts on what will work best in stimulating long-term economic growth.

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1 All references to currency values in this report refer to United States Dollars (USD) unless otherwise noted.

2 ITU Website for LDCs – History and Definition. See: www.itu.int/itu-d/ldc.

3 This is a very important point. In a recent study in which Röller and Waverman (2001), analyse twenty-one OECD countries over 20 years, they found evidence of the existence of a significant positive causal link between telecommunications infrastructure and economic growth. (Röller, Lars-Hendrik/Waverman, Len (2001): Telecommunications Infrastructure and Economic Development : A simultaneous Approach. American Economic Review, Vol. 91 (4, September), pp. 909-923.

The requirement today revolves above all around policy solutions that are based on a profound understanding of the causes of poverty, which is at the heart of the lacklustre LDC economic performance. Fortunately there seems to be emerging a general agreement among donor agencies and experts: namely, the reduction in poverty in the LDCs is dependent upon sustained economic growth.

Since the potential for poverty reduction through economic growth is now recognized, the next question then becomes on how best to stimulate and sustain it. Under circumstances where poverty is pervasive, economic growth not only affects the incidence of poverty, but the incidence of poverty also affects economic growth. In other words, in societies where there is generalized poverty, poverty itself acts as a major constraint on economic growth for the simple reason that with limited domestic resources it is difficult to finance new investment from domestic resources. Clearly, the higher the incidence of poverty is, the greater this constraint of domestic resource availability.

With sustained economic growth being the key driver for poverty reduction in LDCs it is therefore of crucial importance to create the underlying conditions which will sustain an economic growth trajectory which outstrips the growth of population, which is high in all LDCs. The key input factors for establishing a platform for sustained economic growth in the LDCs are:

- international relationships and integration;
- improving the terms-of-trade;
- taking ownership of donor-driven policies;
- reducing external debt and debt service payments;
- improving governance;
- creating an expanded ICTs base.

Although this report will explore all six factors that are considered to be barriers to the LDCs' sustained economic growth trajectory, it will be the role and status of ICTs in these countries that will form the centrepiece of this report. Specifically, the report will examine the current status of ICTs in the LDCs, the progress that has been made to date, and the performance of the LDC telecommunication sector as a contributor to economic growth. Further, the report will estimate the sector potential in terms of ICTs element growth, revenue potential, as well as investment opportunities and return on investment (ROI) potential. It will also explore the concept of the "digital divide" and what supportive policies LDCs need to provide in-country to make ICTs the effective tool for economic growth that it can be, and hence contribute to the reduction of poverty.

In Chapter II "Least Developed Countries: Countries in Need" the report examines the establishment of the LDC group and the programmes designed to assist member countries to improve economic performance, and hence reduce poverty. On the other hand, in Chapter III "Least Developed Countries Poverty Reduction Strategies" we examine the connection between economic growth and poverty, and the programmes that have worked and those that have not worked. The Chapter also examines the principal input factors to economic growth and why they have not worked well in the past, and the options for improving the effectiveness of the input factors.

In Chapter IV "Information and Communications Technology as an Economic Growth Factor" we have examined the reason for ICTs being a prime input factor for sustained economic growth. Also explored has been the notion of the "digital divide" between rich and poor countries, how real it is, and if this should be of concern.

Chapter V "The Status of Information Technology in the Least Developed Countries" examines the current state of ICTs in the LDCs. On the other hand, Chapter VI "The Prospects of Information and Communication Technologies in the Least Developed Countries" develops projections for ICTs deployment for the period 2004 through 2014.

Chapter VII "Least Developed Countries Telecommunications Sector Financial Performance" prepares estimates for sector revenues and capital expenditures, both historical and forward-looking.

In Chapter VIII "Least Developed Countries Pro-Forma Financial Analysis of the Telecommunications Sector" we have developed financial scenarios for the LDC sector as a whole, including cash flow analysis and income statements.

Finally, Chapter IX "Conclusion and Recommendations" focuses on the LDC ICTs sector performance, both historical and forward-looking. We have also prepared recommendations for greater diffusion and absorption of ICTs by LDCs since we believe that these are the issues which require most of the short-term attention, rather than the headcount "digital divide" between rich and poor countries since it has been showing signs of narrowing.

1. Executive Summary

This report discusses the role of ICTs in economic growth, and looks at the current state of information and communication technology in LDCs then makes projections on ICTs growth in the next ten years. It also explores the body of evidence that links ICTs to economic growth and its indirect impact on poverty reduction. What makes ICTs a crucial input factor towards poverty reduction is its impact on economic growth, which in turn is the fundamental element in the reduction of the LDCs incidence of poverty.

It is not the report's purpose to pick the winners and the losers, although there is recognition that some countries will do better than others for a variety of reasons, that include both controllable and uncontrollable factors. Instead, the report strongly urge investors to have another look at the LDCs since in our opinion, smart ICTs investment opportunities abound. In fact, we believe that ICTs market opportunities in the LDCs will surpass those of the developed countries where markets are nearing saturation, and where margins are razor thin. In other words, the LDCs will be the place to be for investors! However, risks remain, i.e. volatility in terms of political instability, social unrest, financial crises, macroeconomic instability, or poor governance.

Having said that, things will certainly improve during the years ahead and this is already the case with a number of LDC countries that include Maldives, Cape Verde, Gambia, Mauritania, Kiribati, Lesotho, Senegal, Sao Tome and Principe, Samoa and Vanuatu. Further, we believe that the LDCs are on the verge of an exploding ICTs market, both in headcount and diffusion/absorption, thanks to growth in wireless. With ICTs price-performance and product cycle time reaching computer levels, ICTs will become affordable to many more people than the affluent segment in the LDCs as is currently the case. In fact, we estimate that the average investment per new subscriber plunged from about USD 4,000 in 1993 to USD 500 in 2002, and by 2014 we estimate that it will be at the USD 200 level. And even with cost of capital at the 20% level, annual subscriber revenues of USD 100 should be sufficient to cover it. Hence, not only will ICTs be affordable, they will also become indispensable tools for business, government and individuals.

In this report we have argued that the headcount "digital divide" between LDCs and the developed countries matters and is real, but at the same time it is closing fast as our evidence suggest. What in our opinion needs greater exposure is the level of ICTs absorption and the in-country "digital divide" in the LDCs. In these two areas the "digital divide" between the LDCs and the developed countries is growing. In the developed world ICTs skill sets are disseminated to nearly all social and ethnic groups. In LDCs decreasing prices for ICTs make the tools also affordable, but the diffusion of ICTs and their absorption in the LDCs is limited to the affluent segment because pass-through effect of ICTs cost reductions has not occurred as far as the LDCs are concerned. The lack of pass-through price reductions is the result of a number of factors of which include high import duties, government tax policies, supplier pricing strategies and operator profit targets are the most important.

For the ICTs headcount in the LDC to increase and for improved ICTs diffusion and absorption levels to take effect, what is needed above all is sustained economic growth. And economic growth is closely intertwined and dependent upon the governments' success in reforming institutions, jurisprudence, markets, education, health care, credit facilities, or the body politic, as well as the ability of donor countries and multilateral agencies to increase the effectiveness of their programmes.

The principal inhibitors to LDC economic growth were and remain: firstly, the institutionalisation of barriers to economic growth on the international level; secondly, the failure and sometimes unwillingness of the LDCs to take full ownership of international programmes; thirdly, donor countries, multilateral agencies and poverty experts differing on the causes and effects of the LDCs' economic malaise; and fourthly, the existence of generalized poverty in the LDCs acting as a major constraint on economic growth.

This report has made it its central theme that ICTs act as a key input factor to the economic growth formula upon which poverty reduction is dependent. Clearly, there exist other key factors that may be of greater or lesser importance than ICTs. They are more effectively dealt with in World Bank reports, IMF papers, NGO initiatives and other United Nations actions. This report has depended on these resources for inputs and ideas to explore and develop the importance of the ICTs input factor in the economic growth formula but have made no attempt to expand on them.

It should be noted once more that ICTs are pivotal in promoting economic growth, and further that it is at the centre of an economic and social transformation that is affecting all countries. This has been accepted by policy makers, enterprises and society. In fact, ICTs and globalisation have created a new economic and social landscape. In so doing ICTs have brought fundamental changes in the way enterprises and economies as a whole function. It is also true that unless a country participates effectively in the exchange of knowledge and information, the country is bound to be marginalized as it takes part in activities and interactions at the national and global levels. Hence, the more connected and active a country is in the global knowledge and information economy, the better the chances of that country to achieve accelerated socio-economic development. This accelerated development also normally results in improvement of the quality of life of its people, as well as an upsurge in the exchange of goods and services.

The impact of ICTs on firms' and industries' performance and competitiveness is achieved above all through increased information flows, which result in knowledge transfer as well as improved organization. In particular, ICTs have become important tools for improving productive capacity and increasing international competitiveness by reducing the transaction costs involved in the production and exchange of goods and services, increasing the efficiency of management functions, and enabling firms to exchange and access more information, and accessing it virtually in real time.

While ICTs improve productivity in existing productive activities, they also make possible the emergence of new activities such as online outsourcing of services and the production of different types of ICTs goods. These activities enable countries, including developing ones, to diversify their economies, enhance their export competitiveness and produce high-value-added services that boost the local economy.

Unfortunately, although the LDCs have increased their ICTs headcount, they have not been able to fully participate in the development of an ICTs driven economy because the absence of constructive policy frameworks, the slowness of the establishment of network infrastructures and the training of people to use it and to commercially exploit the information and knowledge that it makes available. Furthermore, regulatory frameworks need to be put in place to facilitate digital commerce and ensure secure transactions to those who use it. Financing is required for infrastructure development and, local content needs to be created.

As a result, the existing difference in the ICTs headcount is often the focus of particular concern among policy makers, academics and NGOs, as it should indeed be. The far wider availability of ICTs in rich countries goes the argument, will therefore enable the rich to get richer, while the poor are left behind. In short, not only is there a worrying "digital divide" between rich and poor, the divide is widening. The debate over the "digital divide" has sadly obscured the real issue: namely, how worrying is the "digital divide", especially since ICTs growth in the LDCs has significantly outpaced growth in the developed countries in recent years? Since the poor countries are catching up in the headcount of ICTs, it is clear that the debate should therefore revolve around the adoption and absorption of ICTs by LDCs, rather than the number of new ICTs installations.

What is worrying is the fact that ICTs have less impact on productivity in poor countries than in rich countries because of lower adoption levels. Another worry is that the adoption level may be hugely unequal, and limited to the relative affluent minority, so that the divide within countries may grow even as the divide between the poor countries and the rich countries narrows. After all, the importance of ICTs lies in its ability to educate people and improve economic performance. In other words, ICTs represents an active instrument for people to improve income and enhance economic empowerment, and not a passive tool for entertainment and comfort.

Hence, the crux of the "digital divide" as a measurement of ICTs relevance to accelerating economic growth may not only be between LDCs and developed countries, but also lies within the LDC countries themselves. Without the diffusion of ICTs to wider segments of society as is currently the case, LDC countries will continue to lack market information and market access, as well as the key ingredient for improvements in education and human skill-sets in order to move up the product value-chain.

The existence of the LDC in-country digital divide has important implications for policy makers. The tools for overcoming the intra-country "digital divide" are available, and are deployed already, but not yet in a systematic or coordinated fashion. And too much emphasis is still placed on providing narrowband voice telephony. It is our contention that LDCs should concentrate their ICTs deployment efforts on new technologies that break with the traditional fixed line circuit switched engineering model based on national exclusivity service provisioning. In fact the success of mobile communications and wireless Internet have demonstrated what can be accomplished in a span of a few short years at a relatively modest investment and in competitive markets.

From the perspective of improving ICTs headcount, it is clear that the LDCs have done well. Fixed lines surged between 1993 and 2002 from about 1.7 million to 4.8 million, representing a 190% increase, hence improving teledensity from 0.31 to 0.74. More dramatic still has been the growth in mobile telephony where the number of subscribers rose from 15,000 in 1993 to 7.0 million in 2002, hence raising penetration from 0.003% to 1.1%. On the other hand, the number of embedded personal computers (PCs) rose from 491,000 in 1997 to 2,565,000 in 2002, for a cumulative growth rate of 422%, hence increasing penetration from 0.07% to 0.36%. The Internet subscriber base rose from 135,000 in 1998 to 1,868,000 in 2002, thus raising the penetration rate from 0.02% to 0.27%.

ICTs growth will be even more dramatic in the years to come. Our projections for the period 2004 to 2014 for access lines suggest a rise from 6.2 million to 26.5 million, representing a 327% increase, resulting in a rise of teledensity from 0.86 to 2.7. The key ingredient in ICTs headcount improvement is mobile telephone where the increase is projected to go up to an estimated 15.0 million in 2004 to 191.8 million by 2014, hence raising the penetration level from 2.2% to 19.4%. The reasons for this more-than-tenfold increase are the result of the exponential increase in mobile technology price-performance, competitive market forces, and the prepaid business model.

The number of embedded PCs will rise from an estimated 4.2 million in 2004 to approximately 29.5 million by 2014, for a growth rate of 600%, hence increasing penetration from 0.5% to 3.0%. The number of Internet users will rise from about 3.5 million in 2004 to 20.5 million, thus raising the penetration rate for LDC countries from 0.52% to 2.1%.

The increase in the ICTs headcount naturally also accelerated telecommunications sector revenues and capital investments. According to our estimates LDC aggregate telecommunications revenues amounted to about 1.9 billion in 1993, representing about 1.3% of the LDCs' estimated GDP for that year. By 2002 revenues had increased to approximately USD 2.4 billion for a CAGR (Compound Annual Growth Rate) of 2.5%. Because the number of access line and mobile subscribers increased dramatically during the period from about 1.7 million to 11.7 million, revenues per subscriber declined from USD 1,222 to USD 207 as one would expect. Other factors contributing to the decrease were reductions in international tariffs, the use of VOIP, and the undoing of the accounting rate system.

For the period from 2004 through 2014 we anticipate that subscriber revenues will decrease further from our adjusted 2002 figure. Despite the decline in per subscriber revenues, telecommunications sector revenues will increase due to the projected large jump in ICTs users. Specifically, our estimates suggest that revenues will increase from about USD 11.1 billion in 2005 to USD 25.8 billion in 2014. The annual revenues per subscriber are expected decrease from an adjusted USD 333 in 2005 to USD 108 in 2014.

In 1993 CAPEX was according to our estimates USD 383 million, representing 20.7% of estimated telecommunications sector revenues. By 2002 CAPEX[4] (Capital Expenditure) had declined to

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4 Refers to cost of the network solution, infrastructure and terminals.

USD 475 million, amounting to 15.5% of telecommunications revenues. The decline in telecommunications investments in the post-1999 period should not come as a surprise since it was precipitated to a considerable degree by the bursting of the "dot.com" bubble in the developed countries in the 2000/2001 timeframe and a glut in international capacity due to the failure of anticipated demand to develop. Hence, funding for ICTs-related ventures became much more difficult to secure afterwards. We expect funds to become again more readily available after 2005. For the period 2005 through 2014 we estimate that LDC telecommunications sector-related CAPEX will rise from about USD 3.5 billion to USD 4.7 billion, corresponding to investments per new fixed, mobile and Internet subscriber of USD 414 and USD 117, respectively.

The forecast prepared by us for LDC telecommunications revenues and CAPEX for the period 2005 through 2014 suggest that revenues as a% of LDC GDP will remain flat at about 5.1%. Investments, on the other hand, will decline from 31.9% of telecommunications sector revenues in 2005 to 18.2% in 2014.

In order to ascertain the prospects for private investments in the LDC telecommunications sector we have prepared pro-forma income statements and cash flow analyses for the LDC group of countries as a whole as if the countries were one market and serviced by one telephone operator. The results of the aggregate will differ substantially from the return on investment prospects for individual countries, hence caution is advised when interpreting the prospects of the sector in the aggregate and then relating it to the individual country markets. Nonetheless, the aggregate analysis will serve as useful guide to the potential opportunities provided by LDCs to investors in telecommunications related ventures. For our analysis we have prepared three scenarios: namely, baseline, optimistic and pessimistic.

The results for the LDC baseline case with OPEX[5] (Operating expenditure) at 64% and the tax rate at 40% were very positive; both for profitability and cash flow. Specifically, our analysis indicate that the market would be profitable for the entire forecast period with profits rising from USD 1,643 million in 2003, to USD 3,522 million in 2014. Free cash flow, on the other hand, because of capital expenditure requirements, remained negative, from 2004 through 2008 for a cumulative total of USD 3,591 million. From 2009 forward free cash was positive, increasing from USD 47 in 2010 to USD 2,684 million in 2014. For the 12-year period the LDC pro-forma cumulative free cash flow amounted to USD 4,826 million, hence producing an IRR (Internal Rate of Return) of just under 20%.

For our optimistic scenario, with OPEX at 60% and the tax rate at 36% the result improved significantly. In fact, the IRR increased to about 35%. Specifically, net income increased from USD 1,956 million in 2003 to USD 5,788 million at the end of the forecast period in 2014. The cumulative free cash flow under this scenario amounted to USD 17,623 million.

For our pessimistic sector scenario, with OPEX at 70% and the tax rate at 30% the results declined substantially for both net income and free cash flow. In fact, the IRR decreased to about 10%. Although net income increased from USD 1,583 million in 2003 to USD 2,237 million in 2014, the cumulative free cash flow under this scenario amounted to a negative USD 2,082 million.

The pro-forma financial and cash flow analyses of the LDC telecommunications sector under one-company and one-market conditions indicate overally, that the sector performance is positive, providing IRRs ranging from about 10% to 35%. More positive still is the fact that with the exception of the earlier years, cash flow is sufficient to meet annual estimated capital expenditures on infrastructure and equipment in all three scenarios.

What is true for the LDC telecommunications sector as a whole may not be true, however, for individual countries within the LDC group of countries. Hence, for private investors and multilateral agencies it is important to choose both the individual country investment opportunities from a return-on-investment (ROI) perspective carefully, but also to analyse the political and economic risk factors, which also vary wildly amongst the countries.

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5 Cost of keeping the network up and running to include: site rentals, cost of leased lines, maintenance and network management, upgrades and feature updates, administration, etc.

The performance of the LDC telecommunications sector will build on the embedded growth of the 1990s, except at a much-accelerated rate. Several factors stand out that are of importance to policy makers and investors: namely, the

- headcount ICTs divide between the developed countries and LDCs will narrow from twenty-fold or more today to four-fold or less by 2014;
- investment costs per subscriber will decline from USD 500 to USD 200 between 2003 and 2014, but total CAPEX will amount cumulatively to USD 45.9 billion;
- revenues will amount to cumulative USD 179.8 billion from 2003 through 2014, while free cash flow will total USD 4.8 billion or our baseline scenario; and
- private investment should be the primary driver for ICTs expansion.

These are heady numbers indeed, but for the projections to materialize a number of important policy decisions have to be made by LDC governments. Our recommendations point to some crucial decisions, which will determine whether the LDC telecommunications sector can realize its potential. The performance of the sector in the 1990s indicates that the demand for ICTs exists in spite of high poverty incidence and lacklustre economic growth. And now is the time to set the stage for the continuation of the growth and diffusion/absorption of ICTs by building on the performance of the past ten years.

- **Technology Model:** Wireless, IP telephony, packet switched and router-based, off-the-shelf migrateable hardware and open source software, unified voice-data platform, and fibre optics in business districts.
- **Business Model:** Competitive markets for all services, business units, non-hierarchical decision-making, professional management, unbundled and cost-based rates, reliance on private capital funds, and corporatization of incumbent operator.
- **Regulatory Model:** Competitive markets, independence of regulators, cost based tariffs, only basic service regulated, price caps, USOs (Universal Service Obligations), unbundled interconnection rates, auctioning of licenses, and emphasis on diffusion of ICTs to all social/ethnic groups and regions.
- **Government Actions**: Telecommunications Act that is commensurate with a competitive market, licensing regime that allows free market entry, regulatory agency that is independent, improvement of credit market, improvements in the recognition of property rights, enhanced efficiency and transparency of the court system, ownership of aid/development programmes, institutional reform that can stimulate economic growth.
- **Donors and Agencies:** Facilitate access to foreign capital markets, create seed funds for ICTs investments, make available loans at preferential interest rates to private investors, create loan guarantees for domestic investors, continue to provide debt relief, improve access to international markets by reducing tariffs and ending subsidies, and increase aid and resources for development.
- **Private Investors:** Analyse opportunities which are substantial, assess risks, select countries carefully, expect solid returns but take a longer term view, look for support from agencies, and obtain government support.

In the final analysis, this exercise has proven three important points: namely, that the headcount ICTs divide is narrowing fast; secondly, that the LDC ICTs sector is growing and becoming profitable; and thirdly, that the market is capable of generating sufficient cash flow to provide the financial resources for the expansion. This is all positive news for the LDCs. By increasing ICTs headcount it will precipitate diffusion and absorption levels, hence stimulating economic growth, this reducing poverty. It is now up to governments, donor agencies, and the private sector to do their part.

2. Least developed countries: countries in need

2.1 History and Definition

The need for special attention to what were then called the "less developed among the developing countries was first recognized in the early 1960s by the United Nations. A resolution to recognize the special needs of these countries was introduced at the first session of UNCTAD in 1964.

The first resolution on the subject of the "least developed countries" was adopted at UNCTAD II in 1968. By drawing both upon UNCTAD's work on the identification and classification of such countries, as well as on the recommendations of the Committee on Development Policy (CDP), the United Nations established the list of least developed countries by using three principal socio-economic criteria: namely,

- per capita gross domestic product (GDP) of USD 100[6] or less (in 1968 USD)
- share of manufacturing in total GDP of 10% or less;
- adult literacy rate of 20% or less.[7]

The United Nations General Assembly approved the list of the "least developed countries" (LDCs) in 1971. As a result of the creation of a specific list of countries deserving of special attention, UNCTAD was now able to engage its resources in a more focused analytical work approach for the purpose of determining the causes for these countries predicament, and then to develop special measures favouring the LDCs.

The task became more urgent when during the 1970s evidence emerged indicating that the LDCs were not only lagging further and further behind other developing countries, but more importantly that they were in some cases actually regressing. In fact, as a group, the LDCs recorded negative per capita growth during this period in agricultural production, manufacturing output, gross domestic investment, export purchasing power, and import volume. In the wake of the LDCs' poor economic performance, UNCTAD initiated two expanded programmes for assistance: namely, the

- "Immediate Action Programme" for the period 1979-1981, and
- "Substantial New Programme for Action" (SNPA) for the 1980s.

The United Nations Conference on the LDCs adopted SNPA in 1981. Unfortunately, neither SNPA, nor the major policy reforms initiated by many LDCs, which carried out a structural transformation of their domestic economies, were able to reverse their economic decline. Further, the supportive measures taken by a number of donors in the areas of aid, debt and trade in the 1980s had little impact on the LDC economies as their economic situation as a whole continued to worsen.

Factors, which contributed to the worsening state of affairs, included domestic policy shortcomings, natural disasters, civil war and adverse external conditions. Furthermore, external debt and debt service emerged as major problems for most LDCs during the 1980s as they were caught in the vice of declining commodity prices and increasing interest rates.

In the wake of the LDCs' dismal economic performance the United Nations General Assembly, upon the recommendation of UNCTAD, convened the Second United Nations Conference on LDCs in 1990. The outcome of this Conference was the LDC Programme of Action for the 1990s. Specifically, this Programme sets out detailed policy provisions for mobilizing and developing human capacities in the LDCs, and the development of their economic bases. On the key issue of external financial support, the international community, particularly the developed countries, collectively committed itself to a significant increase in support of this Programme.

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6 All references to currency values in this report refer to United States Dollars (USD) unless otherwise noted.

7 ITU Website for LDCs – History and Definition.

The work of UNCTAD that had originally led to the creation of the first list of LDCs, now also resulted in increasing the awareness of the special needs of these countries. This heightened level of awareness served to change the policies of donor countries and multilateral agencies. Specifically,

- there has been both a shift in the share and an increase of official assistance going to this group of countries;
- the donor countries have not only provided an increasing share of their assistance, but also cancelled debt, or taken other debt relief measures in favour of these countries; and
- the awareness has also led to a few innovations in commercial policy measures on behalf of these countries: namely,
  - the creation of a special sub-committee for LDCs within GATT previously, and now WTO should be noted in this respect, as should the WTO Plan of Action for the LDCs; and
  - trade preferences for LDCs, including provisions in the Lomé Conventions and within the generalized system of preferences (GSP), can also be attributed to the recognition that these countries required special assistance.

In terms of focused assistance in the area of telecommunications, the International Telecommunication Union intervened with special targeted assistance in 1971 through the implementation of relevant ITU Plenipotentiary Conference Resolutions. Until 1992, ITU funds were utilized on an ad hoc basis to finance experts, equipment procurement, fellowships, network management etc. From 1992, the approach was refined with the introduction of a *programme approach* to assistance leading to implementation based on clearly defined priority areas. Although this innovation of programming funds for specific priority actions resulted in some improvement in the state of telecommunications in the LDCs, the small amount of funds available meant, however, that ITU assistance had to remain catalytic and was spread rather thinly for the increasing number of these countries. These meagre financial resources resulted in very few noteworthy successes. In most cases, the situation either remained stagnant or deteriorated.

Remedial action came in 1998, when a new strategy in providing assistance to LDCs was proposed under the Valletta Action Plan (VAP), a World Telecommunication Development Conference (WTDC-98) product. The strategy under this programme sought to concentrate the Union's efforts and resources on a number of selected LDCs each year, with the support of the recipient country itself and other development partners that the Union mobilized to help.

While the regular assistance to LDCs (workshops/seminars/fellowships) continued, these were limited to five priority areas which the WTDC-98 adopted namely:

- Introduction of new technologies;
- Sector restructuring;
- Rural telecommunication development;
- Human resources development/management;
- Financing and tariffs.

The efforts of the 1960s, 1970s and 1980s have been instrumental in leading to the identification of a category of the very poorest and structurally weakest countries with special needs, and to the acceptance by the international community that these least developed countries are deserving of special and specific attention. Today, forty-nine countries, with a total population of 670 million inhabitants, are designated by the United Nations as LDCs. The LDC list is reviewed every three years by the United Nations' Economic and Social Council (ECOSOC).

Both, the criteria for inclusion, or the countries included have changed very little since the establishment of the LDC group. Specifically, today the criteria underlying inclusion in the LDC list are:

- a low income – as measured by the GDP per capita;

- weak human assets – as measured by the composite index (Augmented Quality of Life Index) based on indicators of:
  - nutrition (per capita calorie intake as a percentage of relevant requirements);
  - health (child mortality rate);
  - education (combined primary and secondary school enrolment ratio); and
  - literacy (adult literacy rate); and
- a high level of economic vulnerability – as measured by a composite index (Economic Vulnerability Index) based on indicators of:
  - instability in agricultural production;
  - instability in exports of goods and services;
  - the economic importance of non-traditional activities (share of manufacturing and modern services in GDP);
  - export concentration (UNCTAD's merchandise export concentration index); and
  - economic smallness (population in logarithm).[8]

The LDC list[9] includes currently the following countries in Africa, Asia, Americas and Oceania:

- **Africa:** Angola, Benin, Burkina Faso, Burundi, Cape Verde, C.A.R., Chad, Comoros, D.R. Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, and Zambia.
- **Asia:** Afghanistan, Bangladesh, Bhutan, Cambodia, P.D.R. Laos, Maldives Myanmar, Nepal, and Yemen.
- **Americas:** Haiti.
- **Oceania:** Kiribati, Samoa, Solomon Islands, Tuvalu and Vanuatu.[10]

2.2 Why the Persistence of Poverty in the LDCs?

The LDC group of countries is generally associated with underdevelopment and poverty. And this association is not entirely wrong. In fact, in most LDCs absolute poverty is generalized in the sense that the majority of the population live at or below income levels which are sufficient to meet their basic needs, and the available resources, even when equally distributed, are barely sufficient to meet the basic needs of the population on a sustainable basis. Further, poverty is generally also persistent.

The first question that needs to be answered in this context is therefore: Why should this still be the case when these countries have for more than three decades been the beneficiary of special programmes promoted by the United Nations, multilateral agencies and donor countries? The short answer is that the programmes have not worked very well. But the causes for the failure of these programmes and policy initiatives are manifold and complex: seven key factors can however be singled out as being at the core of this contradiction; namely, the

- absence of sustained economic growth and a high level of income inequality;
- limitations placed by poverty on domestic resource availability for investment in public goods and governance;
- exclusion from the increasingly complex international economic relationships;

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8 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap. UNCTAD Secretariat, New York and Geneva. (Inside cover page).

9 See: www.itu.int/itu-d/ldc/listldcs.htm.

10 ITU Website for LDCs – History and Definition. Available at : www.itu.int/itu-d/ldc.

- reliance on primary commodity exports and the analogous rise of financially powerful market intermediaries supported by global supply chains;
- establishment of exclusionary trade blocks with high entry barriers;
- unsustainably high levels of hard currency foreign debt and debt service payment;
- weakness of country infrastructures, especially information and telecommunication technologies (ICTs).

Since the causes of the failure of the LDCs to move forward have been identified, the second question begging for an answer then becomes: What can be done to overcome the causes preventing the LDCs from improving their economic prospects? After all, the causes and their effects on the persistence of poverty have been known for some time. The barriers to improving the LDC economic performance have become institutionalised on the international level by donors and agencies by applying "one-size-fits all" solutions and a standard repertoire of structural reform recommendations. The LDCs, on the other hand, have not taken full ownership of the donor and agency programmes, and hence have done little to propose tailored solutions to their specific needs. Further, donor agencies, and experts differ on the causes and effects of the LDC economic malaise. What can however be said with a high degree of certainly is that:

- There exists a general inadequacy of the analytical foundations for effective poverty reduction in the LDCs.
- The current international poverty statistics in the LDCs are flawed and inadequate. Nonetheless, sweeping and simplistic solutions for poverty reduction are continued to be introduced, and implemented by policy makers with uncertain results.
- There exists disagreement among experts on the relationship between economic growth and poverty in developing countries.

In the wake of these known shortcomings, what is required above all, are actual policy solutions that are based on a profound understanding of the causes of poverty, which is pervasive in the LDCs and closely tied to their poor economic performance. Most importantly, how can those causes be effectively addressed, and how can economic growth be stimulated on a sustainable basis and how can it be used to reduce poverty?[11]

Yet, despite the inadequacy of statistical data and disagreement on policy solutions for the reduction of poverty, it is generally agreed that the reduction in poverty in the LDCs is dependent upon sustained economic growth. The question then is borders on how to stimulate economic growth and to sustain it because only increases in national income will reduce poverty sufficiently to make a difference. Hence, although the interrelationship between poverty and economic growth is recognized, the economic growth formula for poverty reduction is unfortunately not being realized in most LDCs because of:

- lack of growth-oriented macroeconomic policies;
- inability to advance domestic productive capacity;
- disagreement over policies and implementation;
- exclusion from strategic integration into the global economy; and
- inability to reduce the barriers to intra-country economic and social exclusion.[12]

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[11] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. I.

[12] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. I.

2.3 Input Factors for Sustained Economic Growth in LDCs

Since the potential for poverty reduction through economic growth is now recognized: How can it be stimulated and sustained? Would it be erroneous to expect the growth-poverty relationship for LDCs to differ from rich countries where only a minority part of the population live in poverty, or from middle-income countries which have already achieved a measure of prosperity, but where a significant population segment has received few benefits? The short answer is that the three cases are not analogous and hence require different policy applications.

The longer answer to this question has important policy implications for the partners in this tri-partite relationship: namely, donor countries, multilateral agencies and LDCs. Whatever decision is made in response to the question of economic growth cum poverty reduction, it will have great policy implications for the LDCs since they differ from the solutions applied by the rich and middle-income countries for the simple reason that poverty is persistent and pervasive.

In rich countries, where only a minority of the population lives in poverty, it is clear that economic growth is unlikely to be sufficient to reduce absolute poverty. After all, no matter how high an economy's per capita income may be, there will always be individuals or households that, because of their own special circumstances or because of sectorial shifts or cyclical fluctuations, fall below the poverty line. Poverty reduction for rich countries therefore necessarily involves income transfers, social welfare systems or targeted job creation programmes.

In the middle-income countries, on the other hand, redistributive measures are vital since economic growth is unable to deliver significant benefits to the poor because of the high level of inequality in income and access to public goods.

But for countries of generalized poverty as is the case in the LDCs, where the available resources in the economy, even when equally distributed, are barely sufficient to meet the basic needs of the population on a sustainable basis, poverty reduction can be achieved on a major scale only through sustained economic growth which will raise household living standards.[13] Although it is clear that sustained economic growth provides the opportunity for poverty reduction in the LDCs, it is at the same time very difficult to realize precisely because poverty is pervasive.

It has become clear that under circumstances where poverty is pervasive, economic growth not only affects the incidence of poverty, but the incidence of poverty also affects economic growth. In other words, in societies where there is generalized poverty, poverty itself acts as a major constraint on economic growth for the simple reason that the limited domestic resources make it difficult to finance new investment from domestic resources. Further, economic vulnerability is high as domestic resources are insufficient to cope with climatic and external shocks, while public goods and services are underfunded, including public administration, law enforcement and the general system of governance. Finally, in countries suffering from generalized poverty, providing the necessary physical capital stock, education, health and other social and physical infrastructure to keep pace with population growth are a constant problem. Clearly, the higher the incidence of poverty is, the greater this constraint of domestic resource availability.[14]

With sustained economic growth being the key driver for poverty reduction in LDCs it is therefore of crucial importance to create the underlying conditions which will sustain an economic growth trajectory which outstrips the growth of population. This requires external and internal input factors that can best be achieved through a tri-partite partnership between donors, agencies and LDCs. We have identified six specific input factors.

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[13] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. V.

[14] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. VI.

- **Establishment of international relationships:** International relationships will provide access to foreign investments, enhance export opportunities and increase access to modern technologies. But to reap the benefits of international relationships the LDCs need to change the terms of such relationships since the current form of integration, which includes falling and volatile real primary commodity prices, unsustainable debt and a donor-driven aid/debt service system, is not supporting sustained economic growth and poverty reduction. Indeed, for many LDCs, external trade and finance relationships have become an integral part of perpetuating the "poverty trap". [15]
- **Ability by LDCs to increase their contribution to the product value chain:** This will be difficult since various asymmetries in the international trade system, such as trade barriers, bilateral preferences, global commodity supply chain intermediaries, or vertical integrated companies, are making it difficult for LDCs to move up from commodity supplier to value-added product manufacturers.[16]
- **LDCs taking ownership of donor-driven policies for development and poverty reduction:** This means that policies designed to assist LDCs should be formulated by these countries, and only then be implemented, rather than driven by donors or imposed by multilateral institutions, such as the IMF, or the World Bank. A large number of LDCs undertook structural adjustment programmes in the 1990s, producing some positive macroeconomic effects, notably in reducing inflation and adjusting exchange rates without measurable impact on the incidence of poverty. Further, domestic savings rates and investments did not increase significantly, nor have private capital inflows increased substantially. And neither have the export dynamics undergone any marked transformation. Clearly, an inherent capacity shortage by the LDCs, "one-size-fit-all" solutions, and the potential of the withdrawal of consessional assistance and debt relief by multilateral agencies and donor countries hamper the transition to policy autonomy for structural change. [17]
- **Unsustainable external debt:** The reduction of the debt level should become a key ingredient for LDCs' policies for sustained economic growth. For one thing, a high level of external debt precipitates high debt service, which in turn reduces resources available for public investment in physical and human capital. Further, the debt overhang acts as a deterrent to private investment, because it breeds uncertainty in the international debt markets, thus increasing domestic interest rates. Finally, debt service payments tighten the foreign exchange constraint. Together, these seriously damage growth prospects in poor countries, since it is difficult to establish the kind of investment-export nexus that is at the heart of sustained economic growth. On the contrary, there is the "treadmill effect" of an export-debt payment nexus where the return to external viability remains a perpetual aspiration since the preconditions for its realization, namely increased productive capacity and efficiency, are never fulfilled.[18] In fact, a World Bank study based on 93 developing countries, which examined their external debt levels over the period 1969 to 1998, found that the average impact of external debt on per capita GDP growth was negative for net present value of debt levels above 160 to 170% of exports and 35 to 40% of GDP. Further, a doubling of debt levels slows down annual per capita growth by about one-half to one full percentage point.[19]

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15 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. VII.

16 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, pp. VIII to XI.

17 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. X.

18 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 152.

19 External Debt, Public Investment, and Growth in Low Income Countries – Benedict Clements, Rina Bhattacharya and Toan Quoc Nguyen – IMF Working Paper.

- **Adoption of strategies that are anchored in long-term development strategies:** Private enterprise should play a leading role in the achievement of the goals in development strategies. The success of development strategy depends on good governance, a competitive market, secure property rights, an effective judiciary, availability of credit, and an entrepreneurial class willing to commit its resources to domestic investment rather than luxury consumption or holding private wealth abroad.[20]

- **Impact of ICTs on economic performance**: It is now widely accepted by policy makers, enterprises and society at large that ICTs are at the centre of an economic and social transformation that is affecting countries worldwide. Furthermore, ICTs and globalisation have combined to create a new economic and social landscape, which have brought fundamental changes in the way enterprises and economies as a whole function and are intertwined.[21] Despite the wide range of benefits, however, the LDCs have so far been slow to adopt ICTs as a key policy tool for promoting sustained economic growth. Reasons for this have been amply documented. They include the lack of awareness of what ICTs could offer, an insufficient telecommunications infrastructure and Internet connectivity, expensive Internet access, absence of adequate legal and regulatory frameworks, shortage of requisite human capacity, failure to use local language and content, and lack of entrepreneurship and a business culture open to change, transparency and democracy.[22]

In the final analysis, it is for the individual governments to make their respective strategic choices. But ideally, these policy choices should include the promotion of ingredients that produce sustained economic growth, the establishment of a dynamic investment-export nexus, the deployment of resources to productive investments, the pursuit of good governance practices and the elimination of exclusionary socio-economic platforms.[23]

Although this report will explore all six factors that are barriers to long-term sustained economic growth in the LDCs, it will be the status of ICTs that will form the core of this report. Specifically, the report will examine the current status of ICTs in the LDCs, the progress that has been made to date, and the performance of the LDC telecommunication sector as a contributor to economic growth. Further, the report will estimate the sector potential in terms of ICTs element growth, revenue potential, and investment opportunities and return on investment (ROI) potential. It will also explore the concept of the "digital divide" and what supportive policies LDCs need to provide to make ICTs the effective tool for economic growth and hence contribute to the reduction of poverty.

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20 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. XI.

21 E-Commerce and Development Report 2003: United Nations Conference on Trade and Development, NYC and Geneva, 2003, Overview, p. xvi.

22 E-Commerce and Development Report 2003: United Nations Conference on Trade and Development, NYC and Geneva, 2003, Overview, p. xvi.

23 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. XI.

3. LDC poverty reduction strategies

3.1 Overall Growth Trends

The real GDP of the LDCs as a group grew by an annual average of 4.5% over the three years from 1997 to 2000. This represents an improvement over the period 1990 to 1996, when the LDCs grew at an annual average of 2.8%, and it compares favourably with the average of 3.3% for other developing countries. This improved growth performance for the LDCs as a whole is encouraging. However, these recent growth rates are less adequate when viewed in real per capita terms, as population growth rates are very high in most LDCs. Real per capita GDP in the LDCs grew at 2.1% per annum during 1997 to 2000 period, while for the years 1990 to 1996 it grew by a mere 0.3%.

The economic performance of the individual LDCs shows a significant divergence from the average performance of the LDCs as a group. Specifically, the Asian LDCs fared best with real GPD growth of 5.0% from 1997 to 2000 and 4.5% from the period 1990 to 1996, while the Island LDCs had respective growth rates of 3.6% and 3.9%, the African LDCs managed only growth rates of 4.1% and 1.5%, respectively.

Similarly, the respective real per capita GDP growth rates for Asian, Island and African LDCs also diverged significantly both from the average and each other. Real per capita GDP growth rates for the period 1997 to 2000 were 3.0% for the Asian LDCs, 0.8% for the Island LDCs and 1.5% for the African LDCs. The period 1990 to 1996 saw growth rates of 2.6%, 1.9% and –0.7% for the Asian, Island and African LDCs, respectively.[24]

Table 1. LDCs Real GDP Growth Rates[25]

	Real GDP Growth		Real Per Capita GDP Growth	
	1990-1996	1997-2000	1990-1996	1997-2000
LDC Average	2.8 %	4.5 %	0.3 %	2.1 %
African LDCs	1.5 %	4.1%	–0.7 %	1.5 %
Asian LDCs	4.5 %	5.0 %	2.6 %	3.0 %
Island LDCs	3.9 %	3.6 %	1.9 %	0.8 %

Although the LDCs as a group have shown a respectable average per capita GDP growth rate of 2.1% for the period 1997 to 2000, this average growth rate is however misleading because of high in-country income inequality. Specifically, for the LDCs as a group during this period the actual increase favoured the countries' top earners because of the asymmetric income distribution. According to our calculation, after preparing a composite population weighted average LDC income distribution index based on the World Bank GINI Index and United Nations/ITU indices for 2002, the distribution of the per capita increases largely bypassed the bottom 20% of the population. In fact, only 3.7% of the actual increase went to the bottom 10% earners of the population whose average portion of the LDC composite income amounted to 2.6%. On the other hand, the LDC top 10% earners, accounting for 32.8% of income, received 46.7% of the per capita GDP increase, hence widening the gap between the poor and rich within the LDCs.

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[24] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 3.

[25] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 3.

Table 2. LDCs Per Capita Growth Distribution 1997 to 2000[26]

Average Income Distribution		Average Increase Current Dollars	
Bottom 10 %	0.026	Bottom 10 %	0.037
Bottom 20 %	0.064	Bottom 20 %	0.046
Middle 60 %	0.454	Middle 60 %	0.108
Top 20 %	0.482	Top 20 %	0.343
Top 10 %	0.328	Top 10 %	0.467

3.2 Poverty Reduction Factors

3.2.1 The International Relationship Factor

International flows of goods increased from 20% of gross world product, USD 5.9 trillion in 1994 to 29%, or USD 9.6 trillion in 2001.[27] Hence, external factors remain an important determinant of economic progress in LDCs. The problem for the LDCs, however, is in many respects not limited to the level of integration with the world economy, but is to a great extend the form of the integration. And the current form of LDC country integration is not supporting sustained economic growth and poverty reduction. Indeed, as pointed out previously, for many LDCs external trade and finance relationships are an integral part of the "poverty trap" because the existing terms-of-trade is weighted heavily against the LDCs.

Already today, international trade plays a large role in the economic relationships of the LDCs with the developed countries. As a matter of fact, a review of the patterns of trade integration within the LDCs suggests that trade is as important in the economic life of the LDCs as it is in the economic life of other developing countries, but that in the case of the LDCs export capacities remain underdeveloped, thus contributing to lack of progress in the reduction of poverty. This problem is of particular importance in those LDCs that predominantly export primary commodities. Although generalized poverty is characteristic of almost all LDCs, the countries where the incidence of extreme poverty, defined by the 1 USD-a-day poverty line, is highest are those LDCs whose export structures are dominated by primary commodities.

The lack of trade integration is not the principal roadblock to economic growth since the LDC commodity exporting countries as a whole tend to be well integrated into the global economy in terms of their trade/GDP ratios. They have also to have undertaken more trade liberalization than LDCs that export manufactured products and/or other services. Research indicates however that the commodity exporting LDCs have at the same time both slower rates of export growth and suffer also from increased trade flow marginalization, while the incidence of poverty tends to be rising rather than falling. The conventional wisdom that persistent poverty is due to the low level of trade integration of LDCs with the global economy, and insufficient trade liberalization, must therefore at a minimum be reassessed.[28]

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26 NDAI, Inc. estimates, based on United Nations and ITU statistics.

27 Has the Internet Increased Trade? Evidence from Industrial and Developing Countries – George R. G. Clark and Scott J. Wallsten – World Bank Policy Research Paper, February 2004.

28 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 130.

It is clear that international trade is of immense importance for economic growth, and thus poverty reduction in the LDCs. But there exists a paradox within the trade integration and trade liberalization connection: namely, that poverty has increased both in economies that have adopted the most open trade regime, and in those that have continued with the most closed trade regime. But for countries between these extremes trade has increased, and hence there is a tendency for poverty to decline. This may suggest that a tempered liberalized trade regime is best suited for the LDC economies and that the IMF and World Bank policy prescriptions of opening the national economy fully to imports may not be the best solution for the promotion of economic growth.

But regardless of what trade liberalization scheme is adopted by the LDCs, for poverty to decrease they must grow both GDP per capita and export orientation.[29] In order to decrease poverty, the LDCs must integrate into the world economy and pursue trade liberalization. But at the same time they must manage their integration in such a way that it supports economic growth and poverty reduction. The critical policy issue for most LDCs is therefore not their low level of integration into the global economy, understood in terms of their trade/GDP ratio, but rather on how to build competitive and dynamic export capacities and how to ensure that growth is an integral element of a sustained development process. What is clear is the fact that the improvement in production and supply capacity is a necessary condition for deriving benefits from globalisation of markets.[30]

3.2.2 The Product Value Chain Factor

Although studies have found that there is no inevitable relationship between primary commodity dependence and poverty, nonetheless the probability that the incidence of poverty persistence and pervasiveness in non-oil commodity exporting LDCs is higher than for other LDCs is greater. A fundamental cause for this condition is the fact that commodity exporting LDCs have a low productivity, low value-added, and weak competitive commodity sector that is generally concentrated on a narrow range of products serving declining or sluggish international markets.

The weakness of the primary commodity sector is rooted in the wider problem of low investment and low productivity, which should not come as a surprise since that is characteristic of situations of generalized poverty. This pattern of export specialization is in turn associated with slow export growth, relatively large terms-of-trade shocks, the build-up of unsustainable external debts, high levels of aid dependence and enmeshment within the aid/debt service system.[31]

Furthermore, the deterioration of the terms-of-trade for LDC commodity exports has for some years been accelerated by the formation of powerful intermediaries, which have become inserted between the producing and consuming countries. Another effect of recent trends now inherent to the structure of the global commodity economy is increasing price instability, which is associated with increasingly close links between financial and commodity markets. While the deployment of ever-larger amounts of speculative capital funds can contribute to market liquidity, it can also considerably increase instability of commodity prices.[32]

Since commodity-exporting countries can no longer depend on their primary exports to fuel economic growth, these LDCs need to find the means to improve their terms-of-trade. This can best be accomplished by moving up the production value chain from commodity exporter *sui generis* to producer of semi-finished products using the country's commodities as inputs. A precondition for the

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[29] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 115.

[30] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 130.

[31] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 161.

[32] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 161.

attainment of this goal is the existence of a solid basis of accumulated financial capital and human skill sets since only their general availability will then improve labour productivity sufficiently to make in-country producers competitive in the international market.

But the establishment of such capital and skill bases require the creation of profitable investment opportunities, as well as the reduction of the risks and uncertainties surrounding country investment activity. Further, it requires the availability of financial instruments for entrepreneurs in order to secure funding for investing in expanding production.[33] The basis for inducing private capital to respond to investment opportunities is a good investment climate, which has the ability to improve returns, and reduce risks of private investment. The key ingredients for the establishment of a positive investment climate include political stability, a good legal system, effective contract enforcement, a stable macroeconomic environment, and the size of the national budgets and current account deficits.[34]

Progress towards the establishment of a good LDC investment climate has been made during the 1990s as the increasing flow of foreign direct investment (FDI) would suggest. In fact, between 1987/9 and 2000/1, net financing to developing countries rose from a negative 0.5% to a positive 2% of the recipient economies' GDP. This increase reflected a parallel rise in FDI flows by a similar magnitude. Over the same period, net FDI flows went from 0.5% to 2.5% of GDP. Net portfolio equity flows also rose, although by a very modest amount, from virtually zero in the late 1980's to some 0.1% of GDP in 2000/1.[35]

3.2.3 The Ownership of Donor-Driven Policies Factor

In situations of generalized poverty where the majority of the population fall below the poverty line, growth and poverty reduction are necessarily linked. Redistribution transfers can play a direct role in alleviating the worst aspects of poverty. However, generalized poverty is a situation where the available resources in the economy, even when more equally distributed, are barely sufficient to cater to the basic needs of the population on a sustainable basis. In these circumstances, poverty reduction as was pointed out previously can be achieved on a major scale only through economic growth and not wealth redistribution.[36]

World Bank studies have identified three key features of the relationship between economic growth and poverty.

- In societies where there is generalized poverty, economic growth has particularly strong positive effects in reducing poverty.
- The relationship between growth and poverty is a two-way street: economic growth affects the incidence and depth of poverty; at the same time the incidence and depth of poverty affect economic growth.

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[33] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 181.

[34] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 182.

[35] Greenfield Foreign Direct Investment and M &A: Feedback and Macroeconomic Effects – Cesar Calderon, Norman Loayza, Luis Serve – World bank Policy Research Paper 2004.

[36] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 75.

- Poverty acts as a major constrain on economic growth.[37] [38]

The studies have also found that if the level of in-country income inequality is high which is the case in most LDCs, then the supportive evidence indicates that such inequality is bad for growth, thus suggesting that countries with higher initial inequality experience lower rates of growth. A high priority for assuring more pro-poor growth rests therefore on government action that can help poor people to acquire the skills and maintain good health in order to participate in the growth process. Doing less damage is also a good idea. There are often biases against the poor in taxation and spending policies, such as the allocation of spending on infrastructure, health care and educational facilities.[39]

With income and income inequality varying greatly amongst the LDCs, it is not surprising that there also exists a wide variation in the impact of a given rate of growth on poverty. As World Bank studies have shown, at the 95% confidence interval, a 2% growth rate in average household income will bring anything from a modest drop in the poverty rate of 1% to a more dramatic 7% annual decline. Hence, for a country with a headcount index of 40%, a World Bank study found at the 95% confidence level, that the index will fall by somewhere between 0.04% and 2.8% in the first year. According to the study, the elasticity tends to be higher (in absolute value) for higher order poverty measures that reflect distribution below the poverty line. Thus the gains to the poor from growth are clearly not confined to people near the poverty line, but much deeper.[40]

Defining growth tends to be distribution neutral on average, which does not, of course, mean that distribution is unchanging. Indeed, income distribution changes have according to World Bank studies been an important factor empirically in explaining differing rates of poverty reduction at country level. Amongst growing economies, the median rate of decline in the "USD 1/day" headcount index is 10% per year amongst countries that combine growth with falling inequality, while it is only 1 per cent per year for those countries for which growth came with rising inequality. Either way, poverty tends to fall, but at very different rates. Clearly, the opposite is true for countries with contracting economies – poverty rises on average, but much more rapidly when inequality is rising than falling.[41] [42]

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37 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 97.

38 Martin Ravallion et al (1997) provide estimates for the income growth elasticity of the incidence of poverty ranging from –0.53 to –3.12 for various poverty lines and samples, based on consumption averages for household surveys. This means that with every 1% increase in the average private consumption, the proportion of the population living in poverty will fall by between ½ and 3%. With similar methodologies, UNECA (1999) provides measures of income growth elasticity of headcount poverty in Africa of –0.92 and –0.85. Already in 1991 Martin Ravallion had calculated an elasticity of poverty reduction of –2.2 for developing countries and –1.5 for Sub-Saharan Africa, based on per capita consumption growth. [United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap; Box 7: The elasticity of poverty reduction with respect to economic growth. p. 74].

39 Pro-Poor Growth: A Primer – Martin Ravallion [Development Research Group, World Bank, Policy Research Working Paper 3242, March 2004].

40 Pro-Poor Growth: A Primer – Martin Ravallion [Development Research Group, World Bank, Policy Research Working Paper 3242, March 2004].

41 Pro-Poor Growth: A Primer – Martin Ravallion [Development Research Group, World Bank, Policy Research Working Paper 3242, March 2004].

42 It should be noted in this respect, as pointed out by Martin Ravallion, high inequality will help protect the poor from the adverse impact of aggregate economic contraction. Low inequality can thus be a mixed blessing for poor people living in an unstable macroeconomic environment; it helps them share in the benefits of growth, but also exposes them to the costs of contraction. [Pro-Poor Growth: A Primer – Martin Ravallion Development Research Group, World Bank, Policy Research Working Paper 3242, March 2004].

Making growth more pro-poor requires a combination of more growth, a more pro-poor pattern of growth and success in reducing the antecedent inequalities that limit the prospects for poor people to share the opportunities unleashed in a growing economy.

While poverty is more often seen as a consequence of low average income, there are reasons for thinking that there is a feedback effect whereby high initial inequality also impedes future growth.[43]

In many developing countries, a plausible way the feedback effect can happen stems from the existence of credit market failures, which means that some poor people are unable to exploit growth-promoting opportunities from investment in (physical and human) capital. And it will tend to be the poor for whom these constraints are most likely to be binding. With declining marginal products of capital, the output loss from the market failure will be greater for the poor. So the higher the proportion of poor people there are in the economy the lower the rate of growth. Then, poverty is self-perpetuating. Further, high inequality can foster macroeconomic instability and impede efficiency-promoting reforms that require cooperation and trust.[44]

3.2.4 The Unsustainable External Debt Level Factor

Debt, especially external debt, affects economic growth through its impact on the efficiency of resource use, rather than the level of private investment. Once a country has an unsustainable external debt, it has a number of negative features that further hinder economic growth.

- Firstly, as a very large portion of the debt is owed by Governments rather than by the private sector, debt service reduces resources available for public investment in physical and human capital.
- Secondly, the debt overhang acts as a deterrent to private investment, particularly because of uncertainty. Domestic interest rates may be very high.
- Thirdly, debt service payments tighten the foreign exchange constraint.

Together, these factors seriously damage growth prospects in poor countries. In fact, it is very difficult to establish the kind of investment-export nexus that is at the heart of sustained economic growth. Rather, excessive external debt acts as a re-enforcer of the treadmill effect of an export-debt payment nexus where the return to external viability remains a perpetual unfulfillable aspiration.[45]

Given the evidence that high levels of external debt can depress economic growth in low-income countries, and further also having indirect effects on growth through its effects on public investment, the United Nations has examined the debt levels of the LDCs and has classified countries into those with sustainable and unsustainable levels of external debt according to their principal export earnings sources.

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[43] Pro-Poor Growth: A Primer – Martin Ravallion [Development Research Group, World Bank, Policy Research Working Paper 3242, March 2004].

[44] Pro-Poor Growth: A Primer – Martin Ravallion [Development Research Group, World Bank, Policy Research Working Paper 3242, March 2004].

[45] United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 152.

Table 3: Country External Debt Classification[46]

Sustainable Debt – Non-Oil Commodity Exporters	Bhutan, Eritrea, Solomon Islands and Uganda
Unsustainable Debt – Non-Oil Commodity Exporters	Benin, Burkina Faso, Burundi, CAR, Chad, DR Congo, Ethiopia, Guinea, Guinea-Bissau, Malawi, Mali, Mauritania, Niger, Rwanda, Sao Tome and Principe, Sierra Leone, Sudan, Tanzania and Zambia
Sustainable Debt – Oil Exporters	Equatorial Guinea and Yemen
Unsustainable Debt – Oil Exporters	Angola
Sustainable Debt – Manufacturers & Service Exporters	Bangladesh, Cape Verde, Djibouti, Haiti, Lesotho, Maldives, Nepal, Samoa and Vanuatu
Unsustainable Debt – Manufacturers & Service Exporters	Cambodia, Comoros, Gambia, Laos, Madagascar, Mozambique, Myanmar and Senegal

Furthermore, a World Bank study, based on 93 developing countries covering the period 1969 through 1998, found that the average impact of external debt on per capita GDP growth was negative for net present value of debt levels above 160 to 170% of exports and 35 to 40% of GDP. Further, a doubling of debt levels slows down annual per capita growth by about half to a full percentage point. In effect, on average, doubling debt reduces by almost 1% both growth in per capita physical capital and growth in total factor productivity.[47]

But debt itself as a World bank study pointed out is not the only component impacting economic growth negatively. Other things being equal, higher debt service can raise interest payments and the budget deficit, reducing public savings; this in turn, may either raise interest rates or crowd out credit available for the private investment, hence dampening economic growth. Higher debt service payments can also have adverse effects on the composition of public spending by squeezing the amount of resources available for infrastructure and human capital, with negative effects on growth.[48]

The study found that each 1% point of GDP increase in public investment would raise annual per capita growth by 0.2%. However, higher public investment that leads to higher budget deficits the study found had no salutary effect on growth, given the adverse effects of deficits on economic activity. On the other hand, changes in the terms of trade, population growth and openness showed no statistically significant effect on growth.[49]

With respect to debt stock, the results of the study were once again consistent with the debt overhang hypothesis, and indicated the marginal impact of debt on growth, which became negative beyond a certain threshold level. This threshold level was estimated at around 50% of GDP for the face value of external debt, and around 20 to 25% of GDP of estimated net present value. A decline in the external debt level from 60 to 30% for the Highly Indebted Poor Countries (HIPCs) would add directly 0.8-1.1% to their annual per capita GDP growth rates. More importantly, however, debt affects growth through its impact on the efficiency of resource use, rather than the level of private investment.[50]

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46 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 151.

47 External Debt, Public Investment, and Growth in Low Income Countries – Benedict Clements, Rina Bhattacharya and Toan Quoc Nguyen – IMF Working Paper.

48 External Debt, Public Investment, and Growth in Low Income Countries – Benedict Clements, Rina Bhattacharya and Toan Quoc Nguyen – IMF Working Paper.

49 External Debt, Public Investment, and Growth in Low Income Countries – Benedict Clements, Rina Bhattacharya and Toan Quoc Nguyen – IMF Working Paper.

50 External Debt, Public Investment, and Growth in Low Income Countries – Benedict Clements, Rina Bhattacharya and Toan Quoc Nguyen – IMF Working Paper.

It is therefore clear, according to the World Bank study, that high levels of debt can depress economic growth in low-income countries. Further, that external debt also has indirect effects on growth through its effects on public investment. While the stock of public debt does not appear to depress public investment, debt service does. The relationship is non-linear, with the crowding-out effect intensifying as the ratio of debt service to GDP rises. On average, every 1% increase in debt service as a share of GDP reduces public investment by about 0.2%.[51]

3.2.5 The Good Governance Factor

Development is above all about fundamental change in economic structures. It is about the movement of resources out of agriculture to services and industry, about migration to cities and international movement of labour, and about transformation in trade and technology. About social inclusion and change – change in health and life expectancy. It is about improvements in education and literacy, about population size and structure, and in gender relations. These factors are at the heart of the story. The policy challenge is to release and guide these forces of change and inclusion.[52]

Most development economists believe that underlying economic institutions and policies are main determinants of long-term growth.[53] This suggests that a policy package focusing on known determinants of growth in average incomes, such as the protection of property rights, stable macroeconomic policies, good governance, investments into public goods and openness to international trade should be at the heart of pro-poor growth strategies.[54]

The United Nations has identified five key interrelationships on the domestic level that hinder sustained economic growth.

- First, domestic resources available to finance physical and human capital investment and productivity growth are low owing to generalized poverty.
- Second, state capacities are weak as all activities, including administration and law and order, are underfunded.
- Third, corporate capacities, in business, finance and support services, are weak, even though there may be a thriving informal sector.
- Fourth, generalized poverty engenders rapid population growth and environmental degradation.
- Fifth, in a situation of generalized poverty, the probability of political instability and conflict is greater.

The factors of low productivity, rapid population growth, environmental degradation, political instability and conflict, weak state capacities and corporate capacities all serve to reinforce generalized poverty directly and indirectly, and will then combine to limit economic growth. In fact, persistent and generalized poverty will in turn result in low savings and investment, and hence low productivity.[55]

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51 External Debt, Public Investment, and Growth in Low Income Countries – Benedict Clements, Rina Bhattacharya and Toan Quoc Nguyen – IMF Working Paper.

52 Evaluating the Poverty and Distribution Impact of Economic Policies: A Compendium of existing Techniques – Francois Bourguignon and Luiz A. Pereira – World Bank.

53 Aid, Policies, and Growth: Revisiting the Evidence – Craig Burnside and David Dollar, World Bank Policy Paper.

54 When is Growth Pro-Poor? Cross-Country Evidence – Aart Kraay, World Bank Policy Paper.

55 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 148.

An important step towards sustained economic growth is undoubtedly the creation of a good investment climate, which will become the basis for inducing private investments. And a good investment climate improves the returns and reduces the risks for private investment. A good investment climate includes political stability, a good legal structure and effective contract enforcement, a stable macroeconomic environment with target rates for inflation and the size of the budgets and current account deficits.[56]

It will however not be easy to create a good investment climate, when after all much of the lack of progress in economic development is the result of poor governance. As The Economist remarked in its survey of Sub-Saharan Africa, "Sub-Saharan Africa is poor because of bad government [which] makes it hard for Africans to better their lot in spite of working hard".[57] Moreover, despite substantial inflows of donor country aid, the explosion of technology and trade that has boosted income in other regions, Sub-Saharan Africa remains the world's poorest continent: half of its 700 million people subsist on 65 US cents or less a day. Even worse, it is the only continent to have grown poorer in the past 25 years. It is estimated, as The Economist points out, that "40% of the continent's private wealth is stashed offshore".[58]

But fortunately, Africa is becoming democratised by the efforts of Africans through better education and urbanization and pressure from donor countries since the end of the "cold war". Africans are now freer, but greater freedom and economic reform unfortunately has not yet translated into greater prosperity. This may stem, as the Economist suggested, from the fact that economic reform is often undertaken under duress on the insistence of the IMF or World Bank in return for loans. Hence, the results have mostly been dismal. Africa is poorer now than when the reform began.[59] The remarks of The Economist on Sub-Saharan Africa, although to a lesser degree, can also be applied to some LDC countries in other regions.

The lack of secure property rights – very few people can proof that they own their land and/or houses because they do not have title deeds – is not only a problem for Africans but also for people in many of non-African LDCs. This matters, because without a reliable system for ascertaining who owns what, assets cannot be used as collateral. Asset-backed lending is a crucial element in the dynamism of advancing capitalism as the Economist points out.

Further, most of the LDCs' population lives outside the formal systems of rules and paper. And poor countries with insecure property rights not only fail to catch up to rich countries, but they fall further behind – they diverge. In fact, the correlation between the Political Risk Service Rule measure and the size of government – where the size of government is an indicator of the extent to which government taxes citizen's assets – is significantly negative.[60]

A World Bank study of political market imperfections strongly suggests that the lack of credibility of pre-electoral promises and incomplete voter information are especially robust in explaining development outcomes. The most powerful explanation of contrasting development outcomes links political checks and balances to the credibility of government commitments. As political economy

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56 United Nations Conference on Trade and Development: The Least Developed Countries Report 2002 – Escaping the Poverty Trap, p. 182.

57 The Economist: How to make Africa smile – A survey of Sub-Saharan Africa [January 17, 2004].

58 The Economist: How to make Africa smile – A survey of Sub-Saharan Africa [January 17, 2004].

59 The Economist: How to make Africa smile – A survey of Sub-Saharan Africa [January 17, 2004].

60 What does Political Economy tell us about economic development – and vice versa? by Philip Keefer, The World Bank, March 2004.

analysis in poor countries, according to this study, demonstrates that often-catastrophic policy choices and living conditions do not result primarily from a shortage of resources or an oppressive international economic order, but rather to local political and social conditions and the distorted incentives with which these conditions endow government decision makers. Further, theory and evidence point to one type of institutional arrangement – elections cum political check and balances – as important for growth and development.[61]

The respect for the rule of law is an important factor in economic growth policy. When the rule of law is not always respected and the court system makes it difficult to enforce contracts. When it is difficult to register/incorporate companies, expensive in terms of money and time. Then there is evidence that capital available for investment will not be put to productive domestic use.

A World Bank study revealed that by the criteria referred to above, on a six-point scale, controlling for per capita income, the lowest 25% of countries scored more than one point below the best performing quartile. Similar, the most corrupt quartile of countries was more than 1.5 points more corrupt that the least corrupt quartile, again on six point scale. Taking policy and credibility failures together, it is not surprising that from 1975 to 2000, income per capita in the fastest growing quartile of countries grew more than 2% per year faster than in the slowest growing quartile – a difference that, by the year 2000, meant that incomes per capita in the slower growing quartile were more than 60% less than they would have otherwise been.[62] Hence, evidence makes it clear that good governance does matters.

The quality of the legal system also matters since it affects the size of the firm, and hence employment, as a recent study by the World Bank indicated. Specifically, the authors of the study discovered that employment in developing countries is disproportionally concentrated in very small firms. The paper examined the extent to which the distribution of firm size was related to the quality of the legal system by using data from Mexico. The results showed that Mexican states with more efficient legal systems had larger firms, than those with ineffective systems. A one-standard deviation improvement in the quality of the legal system, the study found, increased the average firm size by about 10 to 15%.

The impact of the legal system was found to be greatest in sectors, where proprietorships dominated. This pattern is consistent with better legal systems where the increasing of investments reduces the idiosyncratic risk investors face.[63] Since firms finance investment through a combination of internal and external funds, inducing investment from either source depends on the degree of legal protection offered to investors by the legal system. Clearly, the willingness of firms to reinvest internally generated funds depends on protection of basic property rights; the willingness of banks to lend depends on the ability to capture collateral pledged in support of loans; and the willingness of outside equity investors to take a minority ownership position depends on protection against tunnelling by insiders.[64]

The connection between the laws and the legal system on the one hand, and financial market development on the other hand is well established. It has been shown that outsider shareholder rights are better protected in legal systems with roots in the English common law system than in the various civil law systems, implying variation in the ability of firms to access outside equity. Regardless

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61 What does Political Economy tell us about economic development – and vice versa? by Philip Keefer, The World Bank, March 2004.

62 What does Political Economy tell us about economic development – and vice versa? by Philip Keefer, The World Bank, March 2004.

63 The Quality of the Legal System, Firm Ownership, and Firm Size – Luc Laeven and Christopher Woodruff – World bank Policy Research Paper, March 2004.

64 The Quality of the Legal System, Firm Ownership, and Firm Size – Luc Laeven and Christopher Woodruff – World bank Policy Research Paper, March 2004.

however whether common law or coded law applies, what matters most is both creditor-friendly laws and higher quality legal systems. And these are associated with better-developed banking systems, implying variation in the ability of firms to access outside debt.[65]

Since an efficient legal system reduces idiosyncratic risk, it helps to lower the cost of internal investment funds, and limits the ability of insider to steal from outside investors, and thus lowering the cost of external investment funds. More efficient legal systems also increase the demand for investment capital by increasing the profitability of investment by a firm. Hence, improvements in the administration of the legal system are important in reducing idiosyncratic risk, and hence in drawing increased investment from owner-managed firms. This finding has particularly strong implications for developing countries, because employment in these countries is concentrated in very small firms.[66]

Reforms on the national level must also include fiscal and monetary policy. Shifts in particular expenditures, such as education or health, trade liberalization, or regulatory changes, will require the determination of what the likely aggregate effect of these changes will have on various social groups. This has not happened in any systematic fashion to date. Recurrent economic policy issues in LDCs continue to be linked to public finance, structural reforms and macroeconomic policies.[67] Table 4 below outlines such recurrent economic policy issues.

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65 The Quality of the Legal System, Firm Ownership, and Firm Size – Luc Laeven and Christopher Woodruff – World bank Policy Research Paper, March 2004.

66 The Quality of the Legal System, Firm Ownership, and Firm Size – Luc Laeven and Christopher Woodruff – World bank Policy Research Paper, March 2004.

67 Evaluating the Poverty and Distribution Impact of Economic Policies: A Compendium of existing Techniques – Francois Bourguignon and Luiz A. Pereira – World Bank.

Table 4: Recurrent Economic Policy Issues in Developing Countries[68]

Public Finance	• Public expenditures, such as shifting allocation of public spending to specific public programmes that affect particular sectors or target groups through loans and/or in-kind transfer policies. Loan guarantees, microfinance, or the provision of various types of infrastructure. • Tax policy – including changing tax bases, bands, or rates of direct and indirect taxes and subsidies • Management of pension and public insurance systems – including health and unemployment insurance • Pricing and publicly provided goods and services
Structural Reforms	• Liberalization and/or regulation of specific markets, including labour and basic commodity markets • Trade liberalization through the elimination of tariff and nontariff barriers and other preferential agreements; and adherence to WTO rules • Financial sector reforms, including regulation of the banking sector, openness of the capital account, availability of microcredit, and adherence to international financial codes and standards • Public sector management, including the delivery of services, quality and targeting of services • Private and public governance reforms, including adherence to international standards • Restructuring, privatisation and regulation of public utilities, infrastructure and other firms • Decentralization and reforms in intergovernmental institutional relations • Civil service reforms, including the size and composition of public sector employment • Land reform, such as negotiated voluntary land transfers • Environmental regulation, including pollution control and enforcement
Macro Policies	• Fiscal policy, including appropriate deficit levels • Monetary policy, including Central bank independence, inflation targeting, and interest rate policies • Exchange rate regimes and effects of a real devaluation • Public debt management, including the size and composition of public sector liabilities

68 Evaluating the Poverty and Distribution Impact of Economic Policies: A Compendium of existing Techniques – Francois Bourguignon and Luiz A. Pereira – World Bank, p. 3.

3.2.6 The ICTs Factor

It is now widely accepted by policy makers, enterprises and society at large that ICTs have come to be the centre of an economic and social transformation that is affecting all countries. In fact, ICTs and globalisation have combined to create a new economic and social landscape. In so doing ICTs have brought fundamental changes in the way enterprises and economies as a whole function.[69]

Clearly, the role of telecommunications as a cross-sectoral facilitator of socio-economic development as well as critical utility such as water and energy is not in dispute. Furthermore, neither is the fact disputed that telecommunications with their associated new breed of ICTs have become the "bed-rock" or foundation of the 21st century with its knowledge based economy. It is also true that unless one participates effectively in the exchange of knowledge and information, he is bound to be marginalized as he takes part in activities and interactions and the national and global levels. This is true also on the wider scale for countries. The more connected and active a country is in the global knowledge and information economy, the better the chances of that country to achieve accelerated socio-economic development. This accelerated development also normally results in improvement of the quality of life of its people, as well as an upsurge in the exchange of goods and services.[70] In fact, ICTs can be catalytic in helping countries achieve the eight Millennium Development Goals (MDGs) adopted by the United Nations Millennium Summit of 2000.

Table 5 provides a detailed analysis of how ICTs can help countries to achieve MDGs by 2015.

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69 E-Commerce and Development Report 2003: United Nations Conference on Trade and Development, NYC and Geneva, 2003, p. xvi.

70 Telecommunications and ICT in the LDCs 1989 – 1999 ITU Geneva 1999, p. 6.

Table 5: How ICTs can help achieve the Millennium Declaration Goals

Goal/Target	Role of ICTs
1. Eradicate extreme poverty and hunger Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day Halve, between 1990 and 2015, the proportion of people who suffer from hunger.	Increase access to market information and reduce transaction costs for poor farmers and traders. Increase efficiency, competitiveness and market access of developing country firms. Enhance ability of developing countries to participate in global economy and to exploit comparative advantage in factor costs (particularly skilled labour).
2. Achieve universal primary education Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	Increase supply of trained teachers through ICT-enhanced and distance training of teachers and networks that link teachers to their colleagues. Improve the efficiency and effectiveness of education ministries and related bodies through strategic application of technologies and ICT-enabled skill development. Broaden availability of quality educational materials/resources through ICTs.
3. Promote gender equality and empower women	Deliver educational and literacy programmes specifically targeted to poor girls and women using appropriate technologies. Influence public opinion on gender equality through information or communication programmes using a range of ICTs.
4. Reduce child mortality 5. Improve maternal health 6. Combat HIV/AIDS, malaria, and other diseases Reduce infant and child mortality rates by two-thirds between 1990 and 2015 Reduce maternal mortality rates by three-quarters between 1990 and 2015 Provide access to all who need reproductive health services by 2015	Enhance delivery of basic and in-service training for health workers. Increase monitoring and information-sharing on disease and famine. Increase access of rural caregivers to specialist support and remote diagnosis. Increase access to reproductive health information, including information on AIDS prevention, through locally appropriate content in local languages.
7. Ensure environmental sustainability Implement national strategies for sustainable development by 2005 so as to reverse the loss of environmental resources by 2015 Halve, by 2015, the proportion of people without sustainable access to safe drinking water. Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.	Remote sensing technologies and communications networks permit more effective monitoring, resource management, mitigation of environmental risks. Increase access to/awareness of sustainable development strategies, in areas such as agriculture, sanitation and water management, mining, etc. Greater transparency and monitoring of environmental abuses/enforcement of environmental regulations. Facilitate knowledge exchange and networking among policy-makers, practitioners and advocacy groups.

Source: ITU adapted from Department for International Development (United Kingdom).

The impact of ICTs on firms' and industries' performance and competitiveness is achieved above all through increased information flows, which result in knowledge transfer as well as improved organization. In particular, ICTs have become important tools for improving productive capacity and increasing international competitiveness by reducing the transaction costs involved in the production and exchange of goods and services, increasing the efficiency of management functions, and enabling firms to exchange and access more information, and accessing it virtually in real time.[71]

The specific contribution that ICTs have made to economic growth amounted in Japan to 35%, in Germany to 20%, in the USA to 19%, in Italy to 19%, in Australia to 14%, in the UK to 14%, in France to 13%, in Canada to 12% and in Finland to 11%.[72]

While ICTs improve productivity in existing productive activities, they also make possible the emergence of new activities such as online outsourcing of services and the production of different types of ICT goods. These activities enable countries, including developing ones, to diversify their economies, enhance their export competitiveness and produce high-value-added services that boost the local economy.[73]

Despite the wide range of benefits that can be brought about by ICTs, the development and adoption of ICTs by developing countries have so far been limited. Reasons for this have been amply documented. They include the lack of awareness of what ICTs could offer, insufficient telecommunications infrastructure and Internet connectivity, expensive Internet access, absence of adequate legal and regulatory frameworks, shortage of requisite human capacity, failure to use local language and content, and lack of entrepreneurship and a business culture open to change, transparency and democracy.[74]

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71 E-Commerce and Development Report 2003: United Nations Conference on Trade and Development, NYC and Geneva, 2003, p. xvi.

72 World Telecommunications Development Report 2003: Access Indicators for the Information Society (ITU – World Summit on the Information Society: Geneva and Tunis 2003), p.42.

73 E-Commerce and Development Report 2003: United Nations Conference on Trade and Development, NYC and Geneva, 2003, p. xvi.

74 E-Commerce and Development Report 2003: United Nations Conference on Trade and Development, NYC and Geneva, 2003, p. xvi.

4. ICTs as an economic growth factor

As a premise, the positive role of ICTs in the development process is recognized. Taking into account the constraints that LDCs face in adopting e-commerce and ICTs, it is important to formulate appropriate strategies that can be realistically adopted to overcome these constraints, and how then the implementation of a sustainable ICTs infrastructure can proceed, be managed and be fostered.

Clearly, an important first step of ICTs strategies and programmes in LDC countries revolves around the need for a comprehensive approach that integrates ICTs into the country's broader development strategies and policies.[75] For ICTs to accomplish the desired goal of improving economic growth, integration into the world economy and improve the terms-of-trade, LDCs must simultaneously undertake national reforms in governance, financial markets, education and health care, property rights and macroeconomic policy. Important is also a broad based diffusion of ICTs within the country.

Linking ICT policies with other development policies – education, trade or investment – yields benefits from synergies between different elements and ensures a more broad-based diffusion of ICTs. A second step is the development of public policy supportive of the extension of the information society, including measures to foster competition in the telecommunications sector; support for investment in infrastructure; initiatives by governments, such as promoting ICT awareness, skill-building and enhancing the regulatory environment are among the factors that will promote ICT penetration. [76]

On the other hand, high population density, which reduces the cost of infrastructure construction, tends to handicap LDCs. The majority of the developing countries face limitations on the development of their e-economy that are difficult to overcome directly through measures designed to promote e-business adoption. These handicaps include:

- low income levels, which limit the potential for growth for any online business as much as for any offline one, and reduce incentives for investments;
- low literacy levels that make it difficult for many people to benefit from many IT tools;
- the absence of well-developed payment systems that can support online transactions; and
- cultural resistance to online trade.

It is clear that these and other obstacles need to be addressed in the wider context of national development strategies. At the same time, the development of the information society in general, and of a vibrant digital economy in particular, can make a tangible contribution to reaching general development goals. Considerations relevant to the development of e-business should therefore be part and parcel of national development strategies.[77]

Devising the right policy framework for the development of ICTs is a challenging task. And establishing the network infrastructure is not nearly enough. People must be trained to use it and to commercially exploit the information and knowledge that it makes available. Regulatory frameworks need to be put in place to provide companies and consumers with the confidence and security they require using the Internet. Financing needs to be available for infrastructure development (including FDI) and SME development. Finally, local content needs to be created.[78]

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[75] E-Commerce and Development Report 2003: United Nations Conference on Trade and Development, NYC and Geneva, 2003, p. xxi.

[76] E-Commerce and Development Report 2003: United Nations Conference on Trade and Development, NYC and Geneva, 2003, p. 16.

[77] E-Commerce and Development Report 2003: United Nations Conference on Trade and Development, NYC and Geneva, 2003, p. 16.

[78] E-Commerce and Development Report 2003: United Nations Conference on Trade and Development, NYC and Geneva, 2003, p. 89.

Already in 1984, the Maitland Report highlighted the growing inequalities in telecommunications resources between developed and developing countries. It found that there was a direct correlation between the availability of, and access to, telecommunications infrastructure and a country's economic growth.[79] And the disparities in the use of ICTs and the availability of ICT tools as measured in telephones, computers and Internet connections, as well as network infrastructures between the developed world and the LDCs are real and enormous. But new ICT technologies which drive down the cost of building infrastructures and acquiring the ICT tools with exponentially increasing price/performance parameters will allow LDCs to leapfrog the historically linear ICTs development cycles, and hence close the ICTs gap quickly. The closing if the ICTs gap will result in accelerated economic growth, and hence poverty reduction.

The difference in the availability of ICTs is often the focus of particular concern among policy makers, academics and NGOs, as it should indeed. Such technology, it is generally agreed, boosts productivity, though how quickly and by how much is the subject of much debate. The far wider availability of ICTs in rich countries goes the argument, will therefore enable the rich to get richer, while the poor are left behind. In short, not only is there a worrying "digital divide" between rich and poor, the divide is widening – with ominous consequences.[80] The acrimony of the debate over the "digital divide" has obscured the real issue: namely, how worrying is "digital divide" since ICTs growth in the LDCs has significantly outpaced growth in the developed countries in recent years. Should the debate revolve therefore around the adoption and absorption of ICTs applications and functions by LDCs rather than the number of new ICTs installations?

The digital divide is almost always described in terms of the difference in the number of telephones, Internet users or computers per head in rich and poor countries. While the gap as defined by these per-head measures looks enormous, the growth rates tell a different story. Over the past 25 years, the telephone penetration has been increasing faster in the low and middle-income countries than in the high-income countries, which has not been surprising given the market saturation in rich countries. But the same is also true of Internet usage, which grew by around 50% per year in the high-income countries in the late 1990's, compared with 100% per year in low and middle-income countries. The rich are ahead, but the poor are catching up fast. The most striking feature of the per-head divide in access to ICTs is not how large it is, but how rapidly it is closing.[81]

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79 Trends in Telecommunications Reform 2003: Promoting Universal Access to ICT: Practical Tools for Regulators. ITU Geneva 2003.

80 The Economist: The Digital Divide – Canyon or mirage? [January 24 2004] Page 69.

81 The Economist: The Digital Divide – Canyon or mirage? [January 24 2004] Page 69.

Table 6: How Big is the Digital Divide?[82]
Distribution of ICTs

Developed Countries				
Population 1992	Access Lines 1992	Mobile 1992	PCs 1992	Internet 1992
21 %	79 %	88 %	90 %	97 %
Population 2002	Access Lines 2002	Mobile 2002	PCs 2002	Internet 2002
19 %	55 %	54 %	73 %	66 %

Developing Countries				
Population 1992	Access Lines 1992	Mobile 1992	PCs 1992	Internet 1992
79 %	21 %	12 %	10 %	3 %
Population 2002	Access Lines 2002	Mobile 2002	PCs 2002	Internet 2002
81 %	45 %	46 %	27 %	34 %

But the closing ICTs gap also shows the worrying lack of absorption and diffusion of ICTs elements by small and medium size businesses as the table below suggests.

Table 7: ICTs in SMEs in East Africa[83]

	No ICTs	Telephone	Fax	Computer
Tanzania	20 %	80 %	4 %	30 %
Kenya	25 %	75 %	18 %	30 %

As pointed out above, such per head-measures may not even be the right way to measure the divide. It should be expected that poor countries have fewer telephones and computers per head, simply because they are poorer. But in the LDCs telephones and computers are routinely shared between many users, hence this measure does not tell the whole story. One alternative measure is per-income availability of ICTs. The number of phones and Internet users per dollar of GDP provides a measure of the relative importance attached to ICTs. On this measure, the digital divide becomes a digital leapfrog, as low and middle-income countries jump ahead of rich countries.[84]

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82 World Telecommunications Development Report 2003: Access Indicators for the Information Society (ITU – World Summit on the Information Society: Geneva and Tunis 2003), p.77.

83 World Telecommunications Development Report 2003: Access Indicators for the Information Society (ITU – World Summit on the Information Society: Geneva and Tunis 2003), p.46.

84 The Economist: The Digital Divide – Canyon or mirage? [January 24 2004] Page 69.

Does that mean there is nothing to worry about? Not necessarily. One worry is that ICTs might have less impact on productivity in poor countries than in rich countries because of lower adoption levels. Another worry is that the adoption level may be hugely unequal, and limited to the relative affluent minority, so that the divide within countries may grow even as the divide between countries shrinks. Moreover, rich countries may be more likely to do business online with other rich countries, at the expense of poorer countries.[85]

All this has important implications for policy makers. There is no doubt that ICTs are playing a big role in development. But it is a mistake to place too much emphasis on bridging the digital divide by trying to narrow the per-head divide in access. In many developing countries, people face much more important challenges than the lack of internet access, namely, the lack of access to water, food, medical treatment and education. For them, as the Economist points out, the digital divide is a symptom, rather than the cause, of wider inequality.[86]

If the Internet has made it easier for firms to enter new markets by reducing communications and search costs, then it may also be made easier to export goods and services. The results show that higher Internet penetration in developing countries is correlated with greater exports to developed countries, but not with trade between developing countries, or with exports from developed countries.

To test whether Internet use affects export behaviour the authors of a World Bank paper endogenize Internet use by using countries' regulation of data services and Internet which have proven to be instrumental variables. The results were sufficiently robust to endogenize Internet penetration, suggesting that access to the Internet does affect export performance of firms in developing countries; as a result Internet access appears to stimulate exports from poor countries to rich countries. Furthermore, the analysis suggests that regulatory policies affecting telecommunications and Internet development affect trade, further emphasizing the importance of deregulating potentially competitive services in the ICT sector.[87]

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85 The Economist: The Digital Divide – Canyon or mirage? [January 24 2004] Page 69.

86 The Economist: The Digital Divide – Canyon or mirage? [January 24 2004] Page 69.

87 Has the Internet Increased Trade? Evidence from Industrial and Developing Countries – George R. G. Clark and Scott J. Wallsten – World Bank Policy Research Paper, February 2004.

Table 8: Telecommunications and ICTs in the LDCs[88]

Constraints	• Sparsely distributed population over large areas • Low disposable incomes due to extreme poverty • Non-business-oriented management of telecommunications entities • Lack of clearly defined rules and responsibilities in the sector, especially where the policy and/or regulatory functions are run together with the telecommunications operations by the same entity • Opaque and non-effective regulatory frameworks • Low attraction of investment capital, managerial resources and technological innovation • Poor business marketing of services accompanied by poor customer satisfaction • Poor financial management and low billing discipline • Narrow financial mobilization base • Dilapidated networks and old technologies • Low level of maintenance discipline • Political instability leading to conflicts and wars • Weak institutional arrangements
Opportunities	• Global and regional trend towards liberalization • Trend towards less government direct participation in commercial and service provisioning activities • More private sector participation • Restructuring of telecommunications sector leading to separation of policy, regulatory and operational activities • Availability of new proven technologies and services facilitating cheaper and faster infrastructural development • Telecommunication sector profitability track record • Involvement of other sectors in the development of telecommunications • Stability and liberalization in the LDCs • Recognition of importance of ICTs in development • Ease of movement globally and regionally of private investment
Priorities	• Undertaking restructuring and reforms • Financing, tariff setting and partnership • Introduction of new technologies and services • Achievement of universal service/access • Human resource development, management and capacity building

88 Telecommunications and ICT in the LDCs 1989 – 1999 ITU Geneva 1999, pp 5-6.

International flows of goods increased from 20% of gross world product – or the average of the previous 15 years – of USD 5.9 trillion in 1994, to 29%, or USD 9.6 trillion in 2001. Internet hosts increased from 17 per 10,000 people to 231 during the same period, while Internet traffic's daily volume will increase from about 180 petabytes in 2003 to an estimated 5,175 petabytes in 2007. Although export and Internet growth appear to have occurred contemporaneously, the two changes are not necessarily linked. However cross-country evidence according to this paper suggests a relationship between the Internet and globalisation: countries that export more tend to have higher Internet penetration than countries that export less.[89]

The study finds furthermore that Internet penetration is positively correlated with exports from developing countries to developed countries but not to other developing countries. On the other hand, Internet penetration does not appear to be correlated with exports from developed countries to other developed countries or to developing countries. Internet use affects exports from developing countries. Further, regulatory policies in developing countries that affect telecommunications and Internet development also indirectly affect those countries' exports.[90]

What is clear from all evidence is that trade stimulates Internet use. And Internet use stimulates trade. The extent to which a country is integrated into the global economy can play a role in its access to IT. Countries with greater contact, either via trade, tourism, or geographical location, with the outside world, are more likely to be advanced in digital technology than other countries.[91] This is where the LDC countries are handicapped.

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[89] Has the Internet Increased Trade? Evidence from Industrial and Developing Countries – George R. G. Clark and Scott J. Wallsten – World Bank Policy Research Paper, February 2004.

[90] Has the Internet Increased Trade? Evidence from Industrial and Developing Countries – George R. G. Clark and Scott J. Wallsten – World Bank Policy Research Paper, February 2004.

[91] Has the Internet Increased Trade? Evidence from Industrial and Developing Countries – George R. G. Clark and Scott J. Wallsten – World Bank Policy Research Paper, February 2004.

5. The status of ICTs in the least developed countries

5.1 Overview: Historical Perspective and Future Prospects

That there are more telephones, computers and Internet connections in rich countries than there are in poor countries is obvious. There are also more cars, televisions and air-conditioners in rich countries than in poor countries. But the difference in the availability of ICTs is the focus of particular concern among policy makers, academics and NGOs, and not the availability of cars, or televisions, or air conditioners. The importance of ICTs lies in its ability to educate people and improve economic performance. In other words, ICTs represent an active instrument for people to improve income and enhance economic empowerment, and not a passive tool for entertainment and comfort.

ICTs technologies, it is generally agreed, boosts productivity, though how quickly and by how much remains the subject of much debate. What is also recognized is the fact that ICTs improve countries' terms-of-trade. And since ICTs are more widely available in rich countries it has created a "digital divide" between rich and poor, and the divide is widening according to arguments advanced by proponents of the headcount thesis.[92] This is the argument since the digital divide is almost always described in terms of the difference in the number of telephones, Internet users or computers per head in rich and poor countries.

While the gap as defined by these per-head measures looks indeed enormous, the growth rates however tell a different story. Over the past 25 years, the telephone penetration has been increasing faster in the low and middle-income countries than in the high-income countries, which should not be surprising given the market saturation in rich countries. Further, new technologies and their increasing price-performance ratios are fundamentally changing the parameters of this argument. Internet usage, for example, which grew by around 50% per year in the high-income countries in the late 1990's, grew by 100% per year in low and middle-income countries. The rich are ahead, but the poor are catching up fast. Hence, the most striking feature of the per-head divide in access to ICT is not how large it is today, but how rapidly it is closing.[93]

More importantly, however, such per head-measures may not even be the right way to measure the divide. It should be expected for poor countries to have fewer telephones and computers per head, simply because they are poorer. One alternative measure is per-income availability of ICTs. The number of phones and Internet users per dollar of GDP provides a measure of the relative importance attached to ICTs. On this measure, the digital divide is closing fast. Hence, the emphasis on measuring ICTs in LDCs should not be on head-measures but rather on the ICTs adoption level.

Clearly, the ICTs adoption levels in the LDCs are still lagging behind the developed countries, and furthermore, the adoption level may be hugely unequal within the LDCs, being limited to the relative affluent minority, so that the divide within countries may grow even as the divide between countries shrinks. In fact, in a large number of LDC countries the ICTs' availability is dominated by penetration in the principal city of the country, while on the sector level ICTs have the largest usage factor in the government sector, including foreign representatives and parastatal companies, as well as the financial and the export sectors.

If this measure is used then the gap is not closing because the in-country diffusion has not taken place, and as a result the impact of ICTs on productivity in LDCs is small. And as World Bank studies have shown, the LDCs are already electronically integrated into the world economy; the problem is the lack of widespread use of ICTs within LDC countries. Furthermore, much of the in-country ICTs are

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92 The Economist: The Digital Divide – Canyon or mirage? [January 24 2004] Page 69.

93 The Economist: The Digital Divide – Canyon or mirage? [January 24 2004] Page 69.

owned by supply chain intermediaries whose sole purpose it is to act as feeders of raw materials or semi-finished products to manufacturers and distributors in the developed countries. It does not matter whether these intermediaries are locally owned or are foreign subsidiaries since supply contracts make them mere procurement agents of multinational companies for raw materials, or contract manufacturers of semi-finished and low-value-added products serving a supply chain over which they exercise little control. The prices are dictated by financial markets and labour costs.

Hence, the crux of the "digital divide" as a measurement of ICT relevance to accelerating economic growth may not be between LDCs and developed countries, but rather within the LDC countries themselves. Without the diffusion of ICTs to wider segments of society as is currently the case, LDC countries will continue to lack market information and market access, as well as the key ingredient for improvements in education and human skill-sets in order to move up the product value-chain. [94] And as a result the majority of the LDC population will remain employed in the informal sector of the economy.

But a broad-based diffusion of ICTs with countries of the LDC group requires an improvement in per capita GDP, which can be achieved only through sustained economic growth. This will require governments to reduce the level of social and regional in-country exclusion. It also means decreasing income inequality since its negative impact on economic growth accelerates with higher levels of inequality as several World Bank studies have demonstrated as already referenced above.

Further, the spread of ICTs and their adoption/absorption level will be assisted by the ability and willingness of the LDCs to enhance their level of international integration since it will increase their ability to gain access to foreign investments and improve the terms-of-trade. ICTs will permit the LDCs to increase their contribution to the product value chain because the large diffusion of ICTs will improve human capital through better education and health care. Yet for this to occur the LDCs need to take ownership of the agency and donor aid/assistance programmes and improve their own governance.

The existence of the LDC in-country digital divide has important implications for policy makers from multilateral agencies, donor countries and LDC governments. The tools for overcoming the intra-country "digital divide" are available, and are deployed already, but not yet in a systematic or coordinated fashion. And too much emphasis is still placed on providing narrowband voice telephony, which is very profitable to the equipment suppliers from the developed, world, but inefficient and expensive for the LDCs. It is our contention that LDCs should concentrate their ICTs deployment efforts on new technologies that break with the traditional fixed line circuit switched telephony engineering model and monopoly business model. In fact the success of mobile communications and wireless Internet have demonstrated what can be accomplished in a span of a few short years at a relatively modest investment and competitive markets. As a matter of fact, it has taken mobile telephony a mere eight years to sign up 7.0 million subscribers by 2002, while fixed telephony after almost a century of existence has only managed to provide access to 4.7 million customers.

Some pundits have suggested a new ICTs connectivity model based on off-the-shelf technology with "plug-and-play" capabilities, containing either build-in or off-the-shelf generic Linux/UNIX based software, robust and scalable in architecture, simple to use and with few off-site training needs, and without expensive maintenance contracts. Hence, to spur accelerated diffusion of ICTs in country the LDC governments and national and international policy makers should look for alternative business models for their respective ICT sectors that above all, promote the usage of ICTs.

- **Engineering Model:**
  - Packet switched technology should replace circuit switched technology;
  - IP telephony should become the rule rather than the exception;

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[94] The Economist: The Digital Divide – Canyon or mirage? [January 24 2004] Page 69.

  - Routers should replace central offices and remote switching units wherever possible;
  - Fixed wireless and mobile communications should become the norm for all new subscriber connections, especially in rural areas;
  - Multi-functional transmission systems should replace single functional voice and data systems; and
  - Fibre should become the norm for business connections in central business districts.
- **Business Model:**
  - Competitive model should replace the monopoly model;
  - Incumbent telephone operator should be reorganized on the business unit model and privatised;
  - Rural telecommunications should be given priority;
  - Prepaid services should become the rule;
  - Partnerships with ISPs, community service centre operators, and wireless/wireline resellers should be encouraged;
  - Services should be cost-based and cross-subsidization should be eliminated, but tariffs should be set at levels where ICTs adoption/penetration is encouraged.
- **Regulatory Model:**
  - Regulator should be independent and self-funding;
  - Rules should be clear and regulation predictable;
  - Auctioning method for licenses should be adopted;
  - Tariffs need to be cost-based and cross-subsidies need to be eliminated;
  - Interconnection cost should be based on LARIC (Long-Run Average Incremental Cost);
  - USO (Universal Service Obligation) should be established and priced;
  - Price caps for basic services should be established;
  - Regulatory touch should be light, but firm; and
  - Penalties should be known and enforced.

5.2 The Status of ICTs in Least Developed Countries: 1993-2002

5.2.1 Population Trends

The forty-nine-country group comprising the LDCs had in 1993 a population of about 552 million. Growing at an average annual rate of about 2.5% the population had grown to 685 million by 2002. The countries in the group ranged in population size from Bangladesh with 133 million in 2002 to Tuvalu, Kiribati and Sao Tome & Principe with 10,000, 88.000 and 151,000, respectively. Hence, while the former accounted for 19% of the LDC population, the latter group had only a combined 0.04%. Yet regardless of country size population growth exceeds 2% in all countries of the LDC group. The average rural to urban distribution for the LDCs in 2002 was approximately 75% to 25%, respectively.[95] Table 9 "LDC Population Trends: 1993-2002" below provides the population statistics for each LDC country.

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[95] ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Population Statistics] in the Annex for details.

5.2.2 Per Capita GDP Trends

The population weighted average per capita GDP for the LDC group of countries increased only marginally from USD 261 in 1993 to USD 266 in 2002. After declining to a low of USD 239 in 1993, per capita GDP growth remerged in 1997, and has grown marginally since that date.[96] In the final analysis, the per capita GDP for the LDC countries as a whole has remained static since some of the marginal growth may be the result of exchange rate fluctuations and/or fixed exchange rates, which do not necessarily reflect the market value of the national currencies vis a vis the United States currency. As a matter of fact, of the forty-nine countries in the LDC group only 19 registered growth in per capita GDP, while 30 showed a decline during this period.

The variance of per capita GDP between the LDC group of countries is large. The per capita GDP in 1993 ranged from a high of USD 1,224 for Vanuatu to a low of USD 103 for Ethiopia. By 2002 at the high end of the per capita GDP of the non-oil producing countries – Equatorial Guinea's per capita GDP was USD 4,290 – while the Maldives, Samoa, Cape Verde and Vanuatu had USD 2,260, 1,450, 1,330 and 1,150, respectively. At the low end of the per capita GDP scale was Burundi with USD 89, Ethiopia with USD 97, D.R. Congo with USD 110 and Somalia with USD 100.[97]

Some countries have however made progress in improving the income of their people. The most notable growth of per capita GDP has occurred in Cape Verde, Tanzania, Uganda, Bangladesh, Bhutan, Maldives and Samoa. Table 10 "Per Capita GDP LDCs (USD)" below provides the per capita GDP statistics for each LDC country, while Table 11 "LDC Per Capita GDP Growth Countries (USD)" gives details of the success stories.

5.2.3 Access Line Trends

Fixed lines surged between 1993 and 2002 from about 1.7 million to 4.8 million, representing a 190% increase for a cumulative annual growth rate of 13%, against 2 to 3% in the developed nations. As a result fixed line teledensity rose from 0.31 in 1993 to 0.74 in 2002, but individual country distribution varied widely from a high of 10.4% in the Maldives to a low of 0.03% in the D.R. Congo. New fixed line connections during this period were highest in Ethiopia, Senegal, Sudan, Bangladesh, Laos, Nepal and Yemen. Table 12 "High Access Line Growth Countries (000)" gives details of the success stories, while Table 13 "Access Line Trends: 1993-2002" below provides the population statistics for each LDC country.

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96 LDC Average Telecom Revenues, NDAI, Inc. 2004.

97 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Population Statistics] in the Annex for details.

Table 9: LDC Population Trends: 1993-2002[98]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Angola	10276	10674	10772	11185	11570	11,901	12480	13,130	13530	13940
Benin	5078	5245	5418	5597	5782	5,963	6170	6,373	6584	6801
Burkina Faso	9583	9820	10063	10313	10570	10,784	11106	11,383	11668	11960
Burundi	5,816	5,946	6,079	6,203	6,458	6,639	6,589	6,723	6,860	6,990
Cape Verde	370	381	386	396	406	415	428	435	437	440
C.A.R.	3,156	3,235	3,325	3,344	3,416	3,482	3,550	3,620	3,780	3,960
Chad	6,194	6,361	6,533	6,709	6,890	7,075	7,267	7,463	7,665	7,870
Djibouti	557	566	579	588	598	609	620	632	644	660
Eritrea	3,393	3,437	3,574	3,681	3,760	3,577	3,620	3,659	3,810	3,980
Ethiopia	51,859	53,425	57,143	58,506	60,148	59,646	61,090	63,490	64,460	67,350
Gambia	1,038	1,067	1,095	1,127	1,158	1,191	1,223	1,257	1,292	1,326
Guinea	6,522	6,729	6,943	7,165	7,246	7,328	7,411	7,495	7,598	7,665
Guinea-Bissau	1,028	1,050	1,069	1,091	1,112	1,148	1,175	1,202	1,227	1,253
Liberia	2,640	2,700	2,760	2,810	2,880	2,660	2,930	3,154	3,108	3,238
Lesotho	1,930	1,980	2,030	2,078	2,120	2,062	2,110	2,150	2,160	2,170
Madagascar	12,239	12,569	12,909	13,257	13,615	14,222	14,650	15,085	15,492	15,910
Malawi	8,996	9,176	9,360	9,547	9,738	9,934	10,130	10,340	10,386	10,440
Mali	8,770	8,963	9,160	9,361	9,567	9,790	10,006	10,226	10,400	10,630
Mauritania	2,124	2,180	2,237	2,296	2,357	2,419	2,483	2,548	2,614	2,680
Mozambique	14,647	14,681	15,078	15,298	15,521	16,023	16,554	17,096	17,656	18,230
Niger	8,550	8,846	9,028	9,465	9,787	10,076	10,400	10,730	11,230	11,750
Senegal	7,902	8,102	8,347	8,572	8,762	9,003	9,280	9,520	9,803	10,077
Sierra Leone	4,300	4,381	4,457	4,534	4,611	4,689	4,769	4,850	4,870	4,950
Sudan	24,941	25,649	26,378	27,127	27,898	28,343	28,880	31,100	31,810	32,540
Tanzania	26,733	27,508	28,305	29,125	29,969	30,562	31,731	32,650	33,596	34,444
Togo	3,885	4,010	4,138	4,201	4,315	4,397	4,510	4,630	4,750	4,873
Uganda	17,907	18,558	19,233	19,933	20,658	21,207	22,189	22,996	23,833	24,700
Zambia	8,444	8,685	8,933	9,188	9,451	9,721	9,999	10,286	10,580	10,883
D.R. Congo	42,280	43,930	45,450	46,812	48,040	49,527	50,340	51,630	52,520	52,650
Equatorial Guinea	379	389	401	410	420	429	440	450	470	505
Comoros	570	590	610	632	652	658	680	690	730	760
Rwanda	5,680	5,300	5,180	5,400	5,883	6,604	7,230	7,730	7,950	8,170
S. Tome & Principe	122	124	127	135	138	141	144	149	150	151
Somalia	8,954	9,077	9,822	9,722	9,722	9,722	9,672	9,940	10,050	10,162
Bangladesh	116519	118258	120022	121813	123631	125,683	127348	129247	131175	133130
Bhutan	548	565	582	600	619	635	657	658	674	691
Cambodia	9683	9968	10246	10273	10515	11,438	12270	13,100	13440	13790
Laos	4,500	4,580	4,612	4,734	4,859	4,847	5,120	5,256	5,393	5,534
Maldives	232	238	245	250	254	260	265	270	275	280
Myanmar	43,120	43,920	44,064	44,208	44,352	44,497	45,060	47,750	48,360	48,980
Nepal	19,390	19,860	20,340	20,830	21,330	21,370	21,820	22,280	22,737	23,200
Yemen	13,336	14,588	15,370	15,919	16,480	16,887	17,490	18,350	18,883	19,485
Afghanistan	17,320	18,470	19,660	20,880	22,100	21,354	22,000	22,720	22,500	23,294
Haiti	6,893	7,035	7,180	7,336	7,490	7,788	8,087	8,140	8,270	8,300
Samoa	165	166	168	170	171	173	175	177	179	180
Solomon Islands	346	356	366	376	387	398	409	420	432	444
Kiribati	76	77	79	80	81	82	83	85	86	88
Tuvalu	9	9	9	9	9	9	9	9	10	10
Vanuatu	159	163	168	172	177	181	187	182	197	202
Population (M)	**549,159**	**563,587**	**580,033**	**593,458**	**607,673**	**617,549**	**632,836**	**653,456**	**666,324**	**681,716**

[98] ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Population Statistics] in the Annex for details.

Table 10: Per Capita GDP LDCs (USD)[99]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Angola	1174	1132	1684	583	661	620	901	800	664	290
Benin	416	287	370	394	370	412	358	363	360	413
Burkina Faso	307	182	228	233	223	233	226	194	200	220
Burundi	167	180	230	141	154	138	120	105	97	89
Cape Verde	841	930	1,268	1,262	1,246	1,293	1,356	1,286	1,241	1,330
C.A.R.	405	265	332	301	276	302	302	274	265	280
Chad	235	186	220	237	221	240	207	184	212	200
Djibouti	845	860	858	839	839	845	863	873	892	900
Eritrea	149	180	161	170	183	187	196	196	170	146
Ethiopia	103	97	96	102	103	106	100	100	96	97
Gambia	353	340	348	348	354	350	353	345	340	340
Guinea	486	520	652	711	522	491	463	402	381	370
Guinea-Bissau	229	216	232	243	251	180	191	179	162	171
Liberia	0	0	50	53	40	1	1	1	1	1
Lesotho	412	450	459	454	483	432	432	418	377	327
Madagascar	275	236	245	302	260	263	254	257	292	277
Malawi	227	128	153	249	264	186	176	158	158	170
Mali	287	197	260	275	282	298	293	259	289	318
Mauritania	446	460	472	472	448	407	381	359	360	365
Mozambique	141	150	149	186	222	238	239	223	204	215
Niger	260	160	185	188	167	208	194	170	155	165
Senegal	681	415	534	564	518	541	512	458	470	506
Sierra Leone	172	208	198	208	184	144	142	131	152	150
Sudan	211	227	315	301	363	364	366	360	381	310
Tanzania	160	164	186	223	256	272	272	277	272	270
Togo	320	245	268	349	347	322	316	261	260	301
Uganda	174	264	294	286	294	279	246	254	246	243
Zambia	387	386	388	358	415	333	315	312	300	300
D.R. Congo	0	0	0	124	124	126	256	295	143	110
Equatorial Guinea	427	303	408	677	1,316	1,043	1,719	2,765	3,789	4,290
Comoros	491	340	382	350	325	327	329	293	303	310
Rwanda	344	109	248	257	317	304	263	226	208	230
S. Tome & Principe	390	399	358	0	0	0	236	311	290	331
Somalia	0	0	0	0	0	0	0	0	0	100
Bangladesh	209	220	246	259	262	262	276	281	346	370
Bhutan	438	490	540	562	597	643	676	734	734	590
Cambodia	252	268	322	329	316	265	269	257	254	260
Laos	294	337	382	393	359	258	284	329	324	322
Maldives	1,062	1,442	1,635	1,841	1,972	1,992	2,111	2,060	2,260	2,260
Myanmar	939	1,375	1,892	2,311	90	104	147	148	148	150
Nepal	181	205	207	210	227	213	231	240	241	237
Yemen	1,423	1,670	775	469	401	348	384	464	492	512
Afghanistan	124	17	12	5	4	5	0	–	9	270
Haiti	226	292	325	405	433	482	506	450	423	380
Samoa	719	1,136	1,152	1,337	1,419	1,291	1,335	1,329	1,424	1,450
Solomon Islands	684	766	848	913	966	755	695	580	611	620
Kiribati	443	502	552	683	670	588	578	510	464	500
Tuvalu	0	0	0	0	0	0	0	0	0	330
Vanuatu	1,226	1,320	1,415	1,387	1,344	1,260	1,213	1,176	1,114	1,150
Average PC GDP	**261**	**258**	**268**	**239**	**243**	**241**	**271**	**271**	**262**	**266**

[99] ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Population Statistics] in the Annex for details.

Table 11: LDC Per Capita GDP Growth Countries (USD)

Country	1993	2002	CAGR
Cape Verde	841	1,330	6 %
Tanzania	160	270	7 %
Uganda	174	243	4 %
Bangladesh	209	370	7 %
Bhutan	438	590	3 %
Maldives	1,062	2,260	9 %
Samoa	719	1,450	8 %

Table 12: LDC High Access Line Growth Countries (000)

Country	1993	2002	CAGR
Ethiopia	133	354	8 %
Senegal	64	225	15 %
Bangladesh	246	606	11 %
Laos	9	62	23 %
Nepal	73	328	18 %
Yemen	161	542	18 %
Sudan	64	672	30 %

5.2.4 Mobile Subscriber Trends

More dramatic still than the access line increase has been the growth in mobile telephony where the number of subscribers rose from 15,000 in 1993 to 7.0 million in 2002, hence raising penetration from 0.003% to 1.1%. As a matter of fact, the number of mobile subscribers exceeded those of fixed line subscribers in the LDC countries by over 2.0 million in 2002. [100]

The countries with the highest mobile subscriber penetration among the LDC countries are Maldives, Cape Verde, Gambia, Senegal, Cambodia, Tanzania and Yemen. Table 14 “LDC High Mobile Subscriber Growth Countries (000)” below provides the mobile subscriber statistics for each LDC country, while Table 15 “LDC Wireless Subscriber Trends (‘000’)” identifies the highest mobile penetration level among the LDC countries.

100 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Access lines and Mobile Subscribers] in the Annex for details.

Table 13: Access Line Trends: 1993-2002[101]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Angola	53	53	53	53	63	65	67	70	80	85
Benin	20	24	28	33	37	40	44	52	59	63
Burkina Faso	22	26	30	34	36	42	47	53	58	64
Burundi	16	16	17	15	16	17	19	20	20	22
Cape Verde	15	18	22	25	33	43	47	55	62	70
C.A.R.	7	7	8	10	10	10	10	9	9	9
Chad	5	5	5	6	8	9	10	10	11	12
Djibouti	7	8	8	8	8	8	9	10	10	10
Eritrea	13	15	17	19	22	24	27	31	32	36
Ethiopia	133	138	143	149	157	167	195	232	284	354
Gambia	16	18	19	21	25	26	29	33	35	38
Guinea	12	9	11	16	20	21	21	24	26	26
Guinea-Bissau	7	7	7	8	8	7	6	11	10	11
Liberia	5	5	5	5	6	6	7	7	7	7
Lesotho	15	16	18	16	20	21	22	22	22	28
Madagascar	35	34	37	39	43	47	50	55	58	60
Malawi	33	33	34	35	37	40	42	46	55	73
Mali	14	15	17	22	24	27	34	39	51	57
Mauritania	8	8	9	10	13	15	17	19	24	32
Mozambique	57	58	60	61	66	75	78	86	89	84
Niger	11	12	14	15	16	18	19	20	22	23
Senegal	64	72	82	95	116	140	166	206	237	225
Sierra Leone	15	16	17	17	17	17	18	19	23	24
Sudan	64	64	75	99	113	162	251	387	453	672
Tanzania	85	88	90	93	105	122	150	174	149	162
Togo	17	21	22	24	25	31	38	43	48	51
Uganda	21	30	39	49	54	55	57	62	56	55
Zambia	78	80	77	78	77	80	83	83	86	89
D.R. Congo	36	36	36	9	9	10	10	10	10	11
Equatorial Guinea	1	3	3	4	5	5	6	6	7	9
Comoros	4	4	4	5	6	6	7	7	9	10
Rwanda	11	10	7	10	12	11	12	18	22	23
S. Tome & Principe	2	3	3	3	3	4	4	5	5	6
Somalia	15	15	15	15	15	20	35	35	35	100
Bangladesh	246	262	287	316	332	380	412	433	491	606
Bhutan	4	5	5	6	6	10	12	14	18	20
Cambodia	4	5	7	15	19	23	27	31	34	35
Laos	9	18	17	19	25	30	35	41	53	62
Maldives	10	12	14	15	18	20	22	24	27	29
Myanmar	117	137	157	179	214	229	249	271	295	342
Nepal	73	76	84	113	140	208	253	267	298	328
Yemen	161	173	187	205	221	249	284	347	423	542
Afghanistan	29	29	29	29	29	29	30	29	29	33
Haiti	45	50	60	60	60	65	70	73	80	130
Samoa	7	7	8	8	9	9	9	9	10	12
Solomon Islands	6	6	7	7	8	8	8	8	7	6
Kiribati	2	2	2	2	3	3	3	3	4	5
Tuvalu	1	1	1	1	1	1	1	1	1	1
Vanuatu	4	4	4	4	5	6	6	7	7	7
Total (K)	**1635**	**1754**	**1901**	**2080**	**2315**	**2661**	**3058**	**3517**	**3941**	**4759**

101 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Population Statistics] in the Annex for details.

Table 14: LDC High Mobile Subscriber Growth Countries (000)

Country	1993	2002	Penetration
Cap Verde	0	43	9.8 %
Gambia	1	100	7.5 %
Senegal	0	553	5.5 %
Cambodia	4	380	2.8 %
Tanzania	0	760	2.2 %
Yemen	5	412	2.1 %

5.2.5 Personal Computer Trends

The number of embedded personal computers (PCs) rose from 491,000 in 1997 to 2,565,000 in 2002, for a cumulative growth rate of 422%, or a CAGR of 38%, hence increasing penetration from 0.07% to 0.36%. This is impressive indeed, and compares favourably with the growth rates in the developed world.

The greatest number of PCs are in Bangladesh, Senegal and Sudan with an estimated 450,000, 200,000 and 200,000, respectively. Table 16 below provides the LDC PC trends on a country-by-country basis.

5.2.6 Internet Subscriber Trends

The Internet subscriber base rose from 135,000 in 1998 to 1,868,000 in 2002, for a CAGR of over 90%, thus raising the penetration rate from 0.02% to 0.27%. Further, it increased the portion of Internet subscribers as a percent of PC owners from 17% to 73% between 1998 and 2002.[102] This is impressive indeed, and compares favourably with the growth rates in the developed world.

The greatest number of PCs are in Bangladesh, Senegal, Togo, Uganda and Yemen with an estimated 204,000, 105,000, 200,000, 100,000 and 100,000, respectively. Table 17 below provides the LDC Internet subscriber trends on a country-by-country basis.

102 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [PC Statistics] in the Annex for details.

Table 15: LDC Wireless Subscriber Trends ('000') [103]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Angola	1	2	2	3	7	10	24	26	87	130
Benin	0	0	1	3	4	6	7	56	125	218
Burkina Faso	0	0	0	1	2	3	5	25	45	90
Burundi	1	1	1	1	1	1	1	16	30	52
Cape Verde	0	0	0	0	1	1	8	19	32	43
C.A.R.	0	0	0	1	1	2	4	5	11	13
Chad	0	0	0	0	0	0	1	6	22	34
Djibouti	0	0	0	0	1	1	1	1	3	15
Eritrea	0	0	0	0	0	0	0	0	0	0
Ethiopia	0	0	0	0	3	4	7	18	28	50
Gambia	1	1	2	3	5	5	6	43	55	100
Guinea	0	1	1	1	3	21	25	42	56	91
Guinea-Bissau	0	0	0	0	0	0	0	0	0	0
Liberia	0	0	0	0	0	0	1	2	2	10
Lesotho	0	0	0	1	4	10	12	22	57	97
Madagascar	0	1	1	2	4	13	36	63	148	163
Malawi	0	0	1	4	7	11	23	49	56	86
Mali	0	0	0	1	3	4	6	10	45	53
Mauritania	0	0	0	4	6	7	8	15	110	247
Mozambique	0	0	0	0	3	7	12	51	153	255
Niger	0	0	0	0	1	1	2	2	2	17
Senegal	0	0	1	1	7	27	88	250	302	553
Sierra Leone	0	0	0	0	0	0	0	12	27	67
Sudan	0	0	0	2	4	9	13	23	104	191
Tanzania	0	1	4	9	20	38	51	180	427	760
Togo	0	0	0	0	3	8	17	50	95	170
Uganda	0	0	2	4	5	30	56	127	284	393
Zambia	0	0	2	3	5	8	28	99	121	139
D.R. Congo	0	0	9	7	9	10	12	15	150	560
Equatorial Guinea	0	0	0	0	1	1	1	5	15	32
Comoros	0	0	0	0	0	0	0	0	0	0
Rwanda	0	0	0	0	2	5	11	39	65	111
S. Tome & Principe	0	0	0	0	0	0	0	0	0	2
Somalia	0	0	0	1	3	4	5	7	15	35
Bangladesh	1	1	3	4	26	75	149	279	520	1075
Bhutan	0	0	0	0	0	0	0	–	0	0
Cambodia	4	10	14	23	34	46	89	131	224	380
Laos	1	1	2	4	5	7	12	13	30	55
Maldives	0	0	0	0	1	2	3	8	19	42
Myanmar	1	2	3	7	9	9	11	13	23	48
Nepal	0	0	0	0	1	2	6	10	17	22
Yemen	5	8	8	9	12	16	28	32	152	412
Afghanistan	0	0	0	0	0	1	2	3	5	25
Haiti	0	0	0	0	0	10	25	55	92	140
Samoa	0	0	0	0	1	2	3	3	3	3
Solomon Islands	0	1	1	1	1	1	1	1	1	1
Kiribati	0	0	0	0	0	0	1	1	1	1
Tuvalu	0	0	0	0	0	0	0	0	0	1
Vanuatu	0	0	0	1	1	1	1	1	1	5
Total (K)	**15**	**30**	**58**	**101**	**206**	**418**	**802**	**1,828**	**3,760**	**6,987**

103 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Access lines and Mobile Subscribers] in the Annex for details.

Table 16: LDC Personal Computer Trends (000): 1997-2002[104]

	1997	1998	1999	2000	2001	2002
Angola	8	10	12	15	17	27
Benin	5	7	9	10	11	15
Burkina Faso	8	10	12	15	17	19
Burundi	0	0	3	4	4	5
Cape Verde	2	5	20	25	30	35
C.A.R.	0	4	5	6	7	8
Chad	0	8	10	11	12	13
Djibouti	5	6	6	7	7	10
Eritrea	0	1	6	6	7	10
Ethiopia	5	35	45	60	75	100
Gambia	3	4	10	15	17	19
Guinea	15	20	25	27	32	42
Guinea-Bissau	0	0	3	3	4	5
Liberia	0	0	0	0	0	0
Lesotho	0	0	3	4	5	6
Madagascar	20	25	30	35	40	70
Malawi	1	8	10	12	13	14
Mali	7	9	11	13	14	15
Mauritania	14	15	20	25	27	29
Mozambique	30	40	50	60	70	82
Niger	2	3	4	5	6	7
Senegal	100	120	140	160	180	200
Sierra Leone	0	0	2	5	7	10
Sudan	32	55	85	100	115	200
Tanzania	50	55	80	100	120	144
Togo	25	30	50	70	120	150
Uganda	30	40	55	60	70	82
Zambia	0	60	65	70	75	80
D.R. Congo	0	0	2	3	6	8
Equatorial Guinea	0	1	1	2	3	4
Comoros	1	2	2	3	4	4
Rwanda	0	0	5	6	20	22
S. Tome & Principe	0	0	1	6	9	10
Somalia	0	0	1	2	2	35
Bangladesh	30	120	130	200	250	450
Bhutan	0	3	3	5	7	10
Cambodia	9	11	13	15	20	27
Laos	8	10	12	14	16	18
Maldives	5	6	8	10	15	20
Myanmar	0	0	50	100	150	250
Nepal	45	50	60	70	80	85
Yemen	20	25	30	35	37	145
Afghanistan			1	2	4	10
Haiti			21	22	23	30
Samoa	1	1	1	1	1	2
Solomon Islands	9	10	14	16	17	18
Kiribati	0	1	1	1	1	1
Tuvalu	0	0	1	1	1	1
Vanuatu	1	2	2	2	2	3
Total (K)	**491**	**812**	**1,130**	**1,439**	**1,770**	**2,550**

104 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics.

Table 17: LDC Internet Subscriber Trends (000): 1998-2002[105]

	1998	1999	2000	2001	2002
Angola	3	10	15	29	41
Benin	3	10	15	25	50
Burkina Faso	5	7	9	19	25
Burundi	1	3	5	6	9
Cape Verde	2	5	8	12	16
C.A.R.	1	2	2	3	5
Chad	0	1	3	4	4
Djibouti	1	1	2	3	5
Eritrea	1	1	5	6	9
Ethiopia	6	8	10	25	50
Gambia	3	9	12	18	25
Guinea	1	5	8	15	35
Guinea-Bissau	1	2	3	4	5
Liberia	0	0	0	0	0
Lesotho	1	1	4	5	21
Madagascar	9	25	30	35	55
Malawi	2	10	15	20	27
Mali	2	6	15	20	25
Mauritania	1	3	5	7	10
Mozambique	4	10	20	30	50
Niger	1	3	4	12	15
Senegal	8	30	40	100	105
Sierra Leone	1	2	5	7	8
Sudan	2	5	30	56	84
Tanzania	3	25	40	60	80
Togo	15	30	100	150	200
Uganda	15	25	40	60	100
Zambia	3	15	20	25	52
D.R. Congo	1	1	3	6	50
Equatorial Guinea	1	1	1	1	2
Comoros	1	1	2	3	3
Rwanda	1	5	5	20	25
S. Tome & Principe	1	1	7	9	11
Somalia	0	1	1	1	89
Bangladesh	5	50	100	186	204
Bhutan	0	1	2	5	10
Cambodia	2	4	6	10	30
Laos	1	2	6	10	15
Maldives	2	3	6	10	15
Myanmar	0	1	7	10	25
Nepal	15	35	50	60	80
Yemen	4	10	15	17	100
Afghanistan	0	0	0	0	1
Haiti	2	6	20	30	80
Samoa	0	1	1	3	4
Solomon Islands	2	2	2	2	2
Kiribati	1	1	2	2	2
Tuvalu	0	1	1	1	1
Vanuatu	1	1	4	6	7
Total (K)	**135**	**382**	**706**	**1,148**	**1,867**

105 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [PC Statistics] in the Annex for details.

5.2.7 ICTs Trends

The table below shows in summary the progress the LDCs have made between 1993 and 2002 in embedding ICTs into their respective country infrastructures, especially in the diffusion of mobile telephony, which grew from zero to over seven million in less than one decade. And no less impressive are the adoption of the Internet and the proliferation of PCs in the LDCs during the same period.

Table 18: LDC ICTs Progress – 1993 to 2002[106]

	1993	1997	2000	2002
Fixed Lines	1,655,000	2,338,000	3,540,000	4,782,000
Fixed Line Penetration	0.30	0.40	0.50	0.70
Mobile Subs	15,000	208,000	1,899,000	7,210,000
Mobile Penetration	0.003	0.03	0.30	1.05
PCs	0	491,000	1,415,000	2,565,000
PC Penetration	0	0.08	0.20	0.40
Internet Subs	0	0	707,000	1,868,000
Internet Penetration	0	0	0.10	0.30
Fixed + Mobile	1,670,000	2,546,000	5,439,000	11,992,000
Fixed + Mobile Penetration	0.3	0.40	0.80	1.80

5.2.8 Per GDP Availability of ICTs Trends

A measure frequently used as an indicator by which to gauge a country's level of embedded ICTs in the economy is to determine country per GDP availability of ICTs. By that measure the LDC group of countries is fast approaching the level of the developed countries. Between 1993 and 2002 the LDCs GDP per access line declined from USD 108,501 to USD 59,026, or effectively dropped by almost one-half. Again, great disparities between the countries themselves exist. In fact, 33 LDC countries had already in 2002 a lower per GDP per access line availability of ICTs in 2002 than the North Americans of about USD 50,000. Table 19 "Per GDP Access Line Availability Trends (USD): 1993-2002" below provides a country by country survey of the per GDP availability, while Table 22 "Canada & USA Statistics" shows the equivalent figures for Canada and the United States.

For mobile telephony the LDC average GDP per subscriber declined from over USD 10 million in 1993 when there were very few mobile telephones in use to under USD 50,000 in 2002 when the countries had a combined 7.0 million subscribers. In fact, mobile subscriber growth has been so rapid that by 2002 only 11 LDC countries had a higher per GDP availability of ICTs than North America's approximates of 60,000. Table 20 "LDC per GDP Mobile Connectivity Availability Trend (USD)" below provides a country by country survey of the per GDP availability, while Table 22 "Canada & USA Statistics" shows the equivalent figures for Canada and the United States.

106 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Internet Subscribers] in the Annex for details.

Table 19: Per GDP Access Line Availability Trends (USD): 1993-2002[107]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Angola	227,623	227,981	342,265	123,035	121,393	119,010	167,828	150,057	112,299	47,560
Benin	105,622	62,721	71,595	66,825	57,820	59,921	50,201	44,488	40,174	44,584
Burkina Faso	133,726	68,740	76,479	70,674	65,475	62,817	53,403	41,666	40,234	41,113
Burundi	60,705	66,893	82,245	58,308	62,158	53,893	41,615	35,296	33,271	28,278
Cape Verde	20,745	19,685	22,248	19,990	15,330	13,759	12,348	10,171	8,747	8,360
C.A.R.	182,597	122,468	137,988	100,654	94,282	95,597	107,210	110,209	111,300	123,200
Chad	291,118	236,629	287,452	265,006	190,336	188,667	150,427	137,319	147,725	131,167
Djibouti	67,238	60,845	62,098	61,667	62,715	64,326	59,451	55,174	57,445	59,400
Eritrea	38,889	41,244	33,848	32,935	31,276	27,871	26,279	23,134	20,241	16,141
Ethiopia	40,161	37,552	38,362	40,051	39,460	39,028	31,328	27,366	21,789	18,455
Gambia	22,901	20,154	20,056	18,676	16,397	16,033	14,887	13,141	12,551	11,864
Guinea	264,141	388,787	411,531	318,395	189,121	163,548	163,395	125,541	111,340	109,079
Guinea-Bissau	33,630	32,400	35,430	33,139	34,889	25,830	37,404	19,560	19,877	19,478
Liberia	–	–	27,600	29,786	19,200					
Lesotho	53,011	55,688	51,765	58,963	51,198	42,418	41,433	40,850	37,015	25,343
Madagascar	96,164	87,244	85,479	102,657	82,323	79,583	74,422	70,488	77,994	73,451
Malawi	61,882	35,592	42,120	67,920	69,482	48,624	42,450	35,516	29,836	24,312
Mali	179,785	117,714	140,094	117,013	112,412	108,053	86,228	67,911	58,933	59,304
Mauritania	118,413	125,350	117,318	108,371	81,226	65,636	55,648	48,144	39,210	30,569
Mozambique	36,232	37,968	37,444	46,646	52,207	50,846	50,723	44,330	40,470	46,660
Niger	202,091	117,947	119,299	118,628	102,152	116,434	106,189	91,205	79,120	84,293
Senegal	84,082	46,699	54,357	50,891	39,127	34,790	28,623	21,166	19,441	22,662
Sierra Leone	49,307	56,953	51,911	55,475	49,907	37,512	37,622	33,439	32,184	30,938
Sudan	82,227	90,974	110,788	82,477	89,619	63,684	42,112	28,930	26,754	15,011
Tanzania	50,321	51,265	58,497	69,837	73,067	68,138	57,539	51,977	61,330	57,407
Togo	73,129	46,783	50,408	61,090	59,892	45,672	37,504	28,103	25,729	28,760
Uganda	148,372	163,310	144,987	116,344	112,471	100,284	95,763	94,209	104,695	109,129
Zambia	41,895	41,905	45,013	42,171	50,937	40,976	37,948	38,665	36,907	36,684
D.R. Congo	–	–	–	644,965	661,884	624,040	1,288,704	1,523,085	751,036	526,500
Equatorial Guinea	161,833	39,289	54,536	69,393	110,544	74,575	126,060	207,375	254,404	240,717
Comoros	69,968	50,150	58,255	44,240	35,317	30,738	31,960	28,881	24,577	23,560
Rwanda	177,629	57,770	183,520	138,780	155,409	182,511	158,458	97,054	75,164	81,700
S. Tome & Principe	23,790	16,492	15,155	–	–	–	8,496	9,268	8,700	8,330
Somalia	–	–	–	–	–	–	–	–	–	10,162
Bangladesh	98,994	99,301	102,876	99,840	97,564	95,170	85,311	83,876	92,437	81,284
Bhutan	60,006	55,370	62,856	56,200	61,591	58,329	37,011	34,498	27,484	20,385
Cambodia	610,029	534,285	471,316	225,321	174,881	126,295	122,246	108,603	100,405	102,440
Laos	147,000	85,748	103,634	97,919	69,775	44,011	41,545	42,176	32,969	28,741
Maldives	24,638	28,600	28,613	30,683	27,827	25,896	25,428	23,175	23,019	21,821
Myanmar	346,066	440,803	531,013	570,752	18,653	20,208	26,602	26,077	24,262	21,482
Nepal	48,077	53,570	50,124	38,711	34,585	21,884	19,923	20,027	18,388	16,763
Yemen	117,870	140,821	63,699	36,420	29,903	23,601	23,648	24,537	21,963	18,406
Afghanistan	74,058						–	–		190,587
Haiti	34,618	41,084	38,892	49,518	54,053	57,751	58,457	50,178	43,728	24,262
Samoa	16,948	26,939	24,192	28,411	26,961	24,816	25,958	26,137	25,490	21,750
Solomon Islands	39,444	45,449	44,338	49,041	46,730	37,561	35,532	30,450	37,707	45,880
Kiribati	16,834	19,327	21,804	27,320	18,090	16,072	15,991	14,450	9,976	8,800
Tuvalu	–	–	–	–	–	–	–	–	–	3,300
Vanuatu	48,734	53,790	59,430	59,641	47,578	45,612	37,805	30,576	31,351	33,186
Average	**108,501**	**96,597**	**103,843**	**102,328**	**82,160**	**75,955**	**86,203**	**85,966**	**66,882**	**59,026**

107 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Internet Subscribers] in the Annex for details.

Table 20: LDC per GDP Mobile Connectivity Availability Trend (USD)[108]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Angola	12,064,024	6,041,484	9,070,024	2,173,618	1,092,539	752,920	468,520	404,000	103,263	31,097
Benin			2,004,660	735,073	534,835	446,683	315,551	41,311	18,962	12,884
Burkina Faso				2,402,929	1,178,555	837,557	501,991	88,332	51,858	29,236
Burundi	971,272	1,070,280	1,398,170	874,623	994,532	916,182	790,680	44,120	22,181	11,964
Cape Verde					505,876	536,595	72,546	29,443	16,947	13,609
C.A.R.				1,006,544	942,816	525,782	268,025	198,376	91,064	85,292
Chad							1,504,269	228,865	73,863	46,294
Djibouti					501,722	514,605	535,060	551,736	191,483	39,600
Eritrea										
Ethiopia					2,065,081	1,580,619	872,714	352,722	221,006	130,659
Gambia	366,414	362,780	190,530	130,732	81,986	83,370	71,953	10,085	7,987	4,508
Guinea		3,499,080	4,526,836	5,094,315	1,260,804	171,336	137,252	71,738	51,694	31,165
Guinea-Bissau										
Liberia										
Lesotho				943,412	255,990	89,078	75,960	40,850	14,286	7,315
Madagascar		2,966,284	3,162,705	2,001,807	884,975	287,722	103,364	61,537	30,565	27,037
Malawi			1,432,080	594,301	367,262	175,974	77,517	33,341	29,303	20,637
Mali				2,574,275	899,298	729,355	488,626	264,853	66,791	63,780
Mauritania				270,928	175,989	140,648	118,253	60,982	8,555	3,960
Mozambique					1,148,554	544,782	329,701	74,753	23,541	15,370
Niger					1,634,429	2,095,808	1,008,800	912,050	870,325	114,044
Senegal			4,457,298	4,834,608	648,388	180,393	53,993	17,441	15,256	9,221
Sierra Leone								52,946	27,416	11,082
Sudan				4,082,614	2,531,744	1,146,317	813,083	486,783	116,535	52,814
Tanzania		4,511,312	1,316,183	721,653	383,603	218,760	169,232	50,245	21,401	12,237
Togo					499,102	176,979	83,833	24,169	13,000	8,628
Uganda			2,827,251	1,425,210	1,214,690	197,225	97,473	45,992	20,644	15,273
Zambia			1,733,002	1,096,435	784,433	404,637	112,489	32,416	26,231	23,488
D.R. Congo			–	829,241	661,884	624,040	1,073,920	1,015,390	50,069	10,342
Equatorial Guinea					552,720	447,447	756,360	248,850	118,722	67,702
Comoros										
Rwanda					932,456	401,523	172,863	44,794	25,440	16,929
S. Tome & Principe										24,991
Somalia				–	–	–	–	–	–	29,034
Bangladesh	24,352,471	26,016,760	9,841,804	7,887,392	1,245,820	439,053	235,893	130,174	87,282	45,821
Bhutan										
Cambodia	610,029	267,142	235,658	146,949	97,728	65,893	37,086	25,700	15,240	9,435
Laos	1,323,000	1,543,460	880,892	465,116	348,876	212,721	121,173	133,017	58,244	32,399
Maldives					500,888	258,960	186,472	69,525	32,711	15,067
Myanmar	40,489,680	30,195,000	27,789,696	14,594,955	443,520	514,188	602,165	543,615	311,186	153,063
Nepal					4,841,910	2,275,905	840,070	534,720	322,330	249,927
Yemen	3,795,426	3,045,245	1,488,969	829,557	550,707	367,292	239,863	266,075	61,121	24,214
Afghanistan							–	–		251,575
Haiti						375,382	163,681	66,600	38,024	22,529
Samoa					242,649	111,672	77,875	78,411	84,965	87,000
Solomon Islands		272,696	310,368	343,288	373,842	300,490	284,255	243,600	263,952	275,280
Kiribati							47,974	43,350	39,904	44,000
Tuvalu										3,300
Vanuatu				238,564	237,888	228,060	226,831	214,032	219,458	46,460
Average	**10,496,539**	**6,137,809**	**4,274,478**	**2,251,925**	**878,280**	**523,674**	**362,497**	**195,923**	**96,570**	**49,561**

108 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Internet Subscribers] in the Annex for details.

When access lines and mobile telephone availability are combined then the LDC country per GDP availabilities averages are lower than those of North America. Specifically, for the LDC the combined per GDP availability declined from USD 101,040 in 1993 to USD 18,668 in 2002. This indicates that for the LDC level of GDP the ICTs availability is quite high; in fact it is greater than one would expect at this stage of the ICTs markets under prevailing GDP value.

Table 21 "LDC per GDP Availability Access Line and Mobile Connectivity (USD)" below provides a country by country survey of the per GDP availability, while Table 22 "Canada & USA Statistics" shows the equivalent figures for Canada and the United States.

For comparison we have included the per GDP availability for access line and mobile telephones for Canada and the United States, which have been combined on a population based weighted average. The combined per GDP availability of ICTs declined from USD 39,006 to USD 28,951 during the same period. If the North American GDP availability ratio would be applied to the LDCs, then instead of having an access line and mobile subscriber base of 11.7 million the combined subscriber base would only be 7.5 million, or one-third less.

Table 21: LDC per GDP Availability Access Line and Mobile Connectivity (USD)[109]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Angola	223,408	219,690	329,819	116,444	109,254	102,481	123,566	109,417	53,796	18,803
Benin	105,622	62,721	69,126	61,256	52,179	52,271	43,311	21,420	12,882	9,996
Burkina Faso	133,726	68,740	76,479	68,655	62,029	58,434	48,268	28,312	22,656	17,086
Burundi	57,134	62,958	77,676	54,664	58,502	50,899	39,534	19,609	13,308	8,407
Cape Verde	20,745	19,685	22,248	19,990	14,879	13,415	10,552	7,560	5,769	5,179
C.A.R.	182,597	122,468	137,988	91,504	85,711	80,936	76,579	70,849	50,085	50,400
Chad	291,118	236,629	287,452	265,006	190,336	188,667	136,752	85,825	49,242	34,217
Djibouti	67,238	60,845	62,098	61,667	55,747	57,178	53,506	50,158	44,188	23,760
Eritrea	38,889	41,244	33,848	32,935	31,276	27,871	26,279	23,134	20,241	16,141
Ethiopia	40,161	37,552	38,362	40,051	38,720	38,087	30,243	25,396	19,834	16,171
Gambia	21,554	19,094	18,146	16,342	13,664	13,447	12,335	5,706	4,881	3,267
Guinea	264,141	349,908	377,236	299,666	164,453	83,676	74,593	45,651	35,303	24,240
Guinea-Bissau	33,630	32,400	35,430	33,139	34,889	25,830	37,404	19,560	19,877	19,478
Liberia	–	–	27,600	29,786	19,200	443	366	350	345	190
Lesotho	53,011	55,688	51,765	55,495	42,665	28,735	26,809	20,425	10,308	5,677
Madagascar	96,164	84,751	83,229	97,649	75,317	62,340	43,269	32,855	21,960	19,763
Malawi	61,882	35,592	40,917	60,954	58,428	37,709	27,429	17,197	14,784	11,162
Mali	179,785	117,714	140,094	111,925	99,922	94,110	73,294	54,052	31,308	30,730
Mauritania	118,413	125,350	117,318	77,408	55,576	44,752	37,841	26,904	7,023	3,506
Mozambique	36,232	37,968	37,444	46,646	49,937	46,506	43,960	27,828	14,884	11,562
Niger	202,091	117,947	119,299	118,628	96,143	110,306	96,076	82,914	72,527	48,469
Senegal	84,082	46,699	53,702	50,361	36,900	29,165	18,706	9,562	8,548	6,554
Sierra Leone	49,307	56,953	51,911	55,475	49,907	37,512	37,622	20,495	14,805	8,159
Sudan	82,227	90,974	110,788	80,844	86,555	60,332	40,038	27,307	21,759	11,689
Tanzania	50,321	50,689	56,008	63,675	61,377	51,955	42,939	25,548	15,865	10,087
Togo	73,129	46,783	50,408	61,090	53,475	36,303	25,912	12,994	8,636	6,637
Uganda	148,372	163,310	137,915	107,563	102,940	66,480	48,305	30,905	17,244	13,398
Zambia	41,895	41,905	43,873	40,609	47,831	37,208	28,376	17,633	15,333	14,320
D.R. Congo	–	–	–	362,793	330,942	312,020	585,775	609,234	46,940	10,143
Equatorial Guinea	161,833	39,289	54,536	69,393	92,120	63,921	108,051	113,114	80,947	52,840
Comoros	69,968	50,150	58,255	44,240	35,317	30,738	31,960	28,881	24,577	23,560
Rwanda	177,629	57,770	183,520	138,780	133,208	125,476	82,673	30,649	19,007	14,023
S. Tome & Principe	23,790	16,492	15,155	–	–	–	8,496	9,268	8,700	6,248
Somalia	–	–	–	–	–	–	–	–	–	7,527
Bangladesh	98,593	98,923	101,812	98,592	90,479	78,216	62,652	51,009	44,893	29,303
Bhutan	60,006	55,370	62,856	56,200	61,591	58,329	37,011	34,498	27,484	20,385
Cambodia	305,015	178,095	157,105	88,943	62,693	43,301	28,454	20,782	13,232	8,640
Laos	132,300	81,235	92,725	80,890	58,146	36,466	30,938	32,023	21,052	15,230
Maldives	24,638	28,600	28,613	30,683	26,363	23,542	22,377	17,381	13,511	8,913
Myanmar	343,133	434,460	521,057	549,273	17,900	19,444	25,476	24,884	22,507	18,838
Nepal	48,077	53,570	50,124	38,711	34,340	21,675	19,461	19,304	17,396	15,710
Yemen	114,320	134,596	61,086	34,888	28,363	22,176	21,526	22,465	16,157	10,457
Afghanistan	74,058	10,827	8,135	3,600	3,048	3,682	–	–	5,956	108,438
Haiti	34,618	41,084	38,892	49,518	54,053	50,051	43,074	28,617	20,338	11,681
Samoa	16,948	26,939	24,192	28,411	24,265	20,304	19,469	19,603	19,607	17,400
Solomon Islands	39,444	38,957	38,796	42,911	41,538	33,388	31,584	27,067	32,994	39,326
Kiribati	16,834	19,327	21,804	27,320	18,090	16,072	11,994	10,838	7,981	7,333
Tuvalu	–	–	–	–	–	–	–	–	–	1,650
Vanuatu	48,734	53,790	59,430	47,713	39,648	38,010	32,404	26,754	27,432	19,358
Average	**101,040**	**86,948**	**94,806**	**89,162**	**66,665**	**57,588**	**55,716**	**45,465**	**24,402**	**18,668**

109 ITU Statistical Yearbook, Annex, also Refer to LDC Access Line Statistics [Internet Subscribers] in the Annex for details.

Table 22: Canada & USA Statistics[110]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Per Capita GDP										
Canada	19,090	18,643	19,422	20,127	20,484	20,098	21,465	23,048	23,484	21,130
USA	25,390	26,615	27,619	28,765	30,172	32,414	34,102	36,211	35,843	34,100
Weighted Average Canada	1,925	1,882	1,966	2,042	2,081	2,035	2,159	2,317	2,298	2,075
Weighted Average USA	22,829	23,929	24,824	25,847	27,107	29,133	30,672	32,571	32,335	30,751
Average Per Capita GDP	24,755	25,810	26,789	27,889	29,188	31,167	32,831	34,888	34,633	32,826
Population										
Canada	28,947	29,256	29,617	29,969	30,287	30,300	30,490	30,750	31,020	31,410
USA	258,089	260,602	263,039	265,453	267,901	269,000	272,690	275,130	285,930	288,370
Total	287,036	289,858	292,656	295,422	298,188	299,300	303,180	305,880	316,950	319,780
Access Lines										
Canada	16,717	17,250	17,567	18,051	18,460	19,250	20,052	20,803	20,319	19,962
USA	148,106	153,448	159,735	165,047	172,452	178,000	183,521	192,519	190,000	190,000
Total	164,823	170,698	177,302	183,098	190,912	197,250	203,573	213,322	210,319	209,962
Wireless Subscribers										
Canada	1,333	1,866	2,560	3,420	4,207	5,350	6,911	8,751	9,924	11,849
USA	16,009	24,134	33,786	44,043	55,312	70,000	86,047	109,478	127,000	140,767
Total	17,342	26,000	36,346	47,463	59,519	75,350	92,958	118,229	136,924	152,616
GDP/Access Lines	**43,110**	**43,828**	**44,219**	**44,997**	**45,589**	**47,292**	**48,895**	**50,025**	**52,192**	**49,995**
GDP/Mobile Subs	**409,727**	**287,744**	**215,707**	**173,587**	**146,231**	**123,800**	**107,078**	**90,261**	**80,169**	**68,781**
GDP/Access + Mobile	**39,006**	**38,035**	**36,696**	**35,734**	**34,754**	**34,220**	**33,567**	**32,186**	**31,612**	**28,951**

110 Canada and United States GDP to ICT Ratios, NDAI, Inc. 2004.

6. The prospects of ICTs in the LDCs: 2004-2014

In order to determine the prospects of ICTs in the LDCs for the period beyond 2002 we have made projections for a number of country indicators and telecommunications sector statistics, as well as revenues and capital expenditures for the period 2003 to 2014. These estimates will permit us to prepare sector-wide financial and cash flow factors in order to ascertain whether the sector will be able to support the projected growth in LDC ICTs subscribers.

Clearly, positive financial results, will allow LDCs to tap into private domestic resources and foreign capital markets for funding. Further, the positive outcome of our financial and cash flow analyses will support the contention that the LDC telecommunications sector in the aggregate is a viable market for ICTs related investments with potentially high ROIs. Although in the overall the LDC ICTs sector's outlook is positive, the performance will vary from country to country.

Most importantly, the positive outlook for the ICTs sector should also buttress the argument that the "digital divide" for both "headcount" and adoption measurements between LDCs and the developed countries is closing. Although financials are an important driver towards closing the "digital divide", the exponentially improvements in telecommunications technology price/performance are an equally important factor.

The projections presented in this chapter are based on the data presented in earlier chapters of this report. Adjustments have been made to the data to account for its incompleteness and inconsistency. All estimates have been prepared for the LDCs as a whole, and no projections have been made for individual countries, or groups of countries.

6.1 Population Estimates

The LDC population, assuming that CAGR will continue at the same rate as during the earlier 1993 to 2002 period, is expected to increase between 2004 and 2014 from an estimated 720 million to approximately 990 million. The average rural to urban distribution for the LDCs in 2014 is expected to be significantly lower than it was in 2002.[111]

Table 23: LDC Population Estimates: 2003-2014[112]

	2003	2004	2005	2006	2007	2008
Population ('000')	700,197	719,410	740,378	762,548	785,563	809,723
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
Population ('000')	835,360	862,459	891,578	922,461	954,809	989,507

111 LDC Average Telecom Revenues [Forecast Fixed Mobile Internet].

112 LDC Population Forecasts, NDAI, Inc. 2004.

6.2 Per Capita GDP Estimates

The population weighted average per capita GDP, which had reached according to our estimates USD 266 in 2002, and it will reach USD 284 by the end of 2004. It should be noted, however, that some of the increase must be attributed to the rapid growth of the oil-producing countries: namely, Chad, Equatorial Guinea, Angola and Yemen, as well as Sudan. By the end of the forecast period we expect the population weighted average per capita GDP to reach about USD 518. But large differences between countries within the LDC group will remain. The oil producing and manufacturing countries will do best.[113]

In order to determine the LDCs' GDP we multiplied the per capita GDP estimates by the population estimates.

Table 24: LDC Per Capita GDP and Country GDP Estimates[114]

	2003	2004	2005	2006	2007	2008
Per Capita GDP (USD)	274	284	294	305	319	335
Total GDP (USD 'M')	192,067	204,053	217,725	232,939	250,681	271,032
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
Per Capita GDP (USD)	356	380	408	438	475	518
Total GDP (USD 'M')	297,184	327,662	364,114	404,481	453,209	512,536

6.3 Access Line Estimates

The number of fixed lines is expected to grow during the same period from about 6.2 million to 26.5 million, representing a 327% cumulative increase for a CAGR of 16%. As a result of this increase fixed line teledensity will rise from 0.86 in 2004 to 2.7 in 2014, or threefold between 2005 and 2014.

Table 25: LDC Access Line Estimates[115]

	2003	2004	2005	2006	2007	2008
Access Lines ('000')	5,432	6,190	7,087	8,134	9,358	10,799
Teledensity (%)	0.0078	0.0086	0.0096	0.0107	0.0119	0.0133
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
Access Lines ('000')	12,482	14,457	16,783	19,502	22,688	26,458
Teledensity (%)	0.0149	0.0168	0.0188	0.0211	0.0238	0.0267

113 LDC Population Forecasts, NDAI, Inc. 2004.

114 LDC Per Capita GDP Forecasts, NDAI, Inc. 2004.

115 LDC Access Line Forecasts, NDAI, Inc. 2004.

6.4 Mobile Subscriber Estimates

Mobile telephone subscriptions will continue to increase at a very dramatic pace, rising from an estimated 15.0 million in 2004 to 191.8 million by 2014, hence raising the penetration level from 2.2% to 19.4%. The reasons for this more-than-tenfold increase are the result of the exponential increase in mobile technology price-performance, competitive market forces, the prepaid business model, sustained economic growth and hence rising incomes, high ROIs, as well as increasing ICTs adoption levels within the LDCs.

Table 26: LDC Mobile Subscriber Estimates[116]

	2003	2004	2005	2006	2007	2008
Mobile Subs ('000')	10,445	15,009	20,974	28,639	38,349	50,460
Mobile Density (%)	0.0149	0.0209	0.0283	0.0376	0.0488	0.0623
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
Mobile Subs ('000')	65,361	83,185	104,335	128,935	157,967	191,824
Mobile Density (%)	0.0782	0.0965	0.1170	0.1398	0.1654	0.1939

6.5 Personal Computer Estimates

The number of embedded PCs will rise from an estimated 4.2 million in 2004 to approximately 29.5 million by 2014, for a cumulative growth rate of 600%, or a CAGR of 21%, hence increasing penetration from 0.5% to 3.0%.

Table 27: LDC Personal Computer Estimates[117]

	2003	2004	2005	2006	2007	2008
PCs ('000')	3,298	4,171	5,220	6,500	8,064	9,858
PC Density (%)	0.0047	0.0058	0.0071	0.0085	0.0103	0.0122
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
PCs ('000')	11,969	14,454	17,382	20,812	24,799	29,484
PC Density (%)	0.0143	0.0168	0.0195	0.0226	0.0260	0.0298

6.6 Internet Subscriber Estimates

The number of Internet users will rise from about 3.5 million in 2004 to 20.5 million during the forecast period, for a CAGR of almost 25%, thus raising the penetration rate for LDC countries collectively from 0.52% to 2.1%.

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116 LDC Mobile Subscriber Forecasts, NDAI, Inc. 2004.

117 LDC PC Forecasts, NDAI, Inc. 2004.

Table 28: LDC Internet Subscriber Estimates[118]

	2003	2004	2005	2006	2007	2008
Internet Subs ('000')	2,621	3,511	5,198	5,764	7,101	8,833
Internet Density (%)	0.0037	0.0049	0.0070	0.0076	0.0090	0.0109
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
Internet Subs ('000')	10,263	12,000	13,919	15,977	18,171	20,498
Internet Density (%)	0.0123	0.0139	0.0156	0.0173	0.0190	0.0207

6.7 ICTs Estimates Summary

Table 29 below outlines in summary the progress the LDCs are expected to make in embedding ICTs into their country technology infrastructures over the period 2005 through 2014 according to our estimates. Especially noteworthy is the spread of wireless telephony during the forecast period, which we anticipate to increase from about 5% to over 19%. Further, the combined penetration level of access lines and mobile subscribers will increase from almost 6% to over 22% between 2004 and 2014. Clearly, this is further proof that the headcount "digital divide" is closing between LDCs and developed countries.

Table 29: LDC ICTs Forecast – 2003 to 2014[119]

	2004	2007	2010	2014
Fixed Lines	6,190,000	9,358,000	14,457,000	26,458,000
Fixed Line Penetration	0.86	1.19	1.68	2.67
Mobile Subs	15,009,000	38,349,000	83,185,000	191,824,000
Mobile Penetration	2.09	4.88	9.65	19.38
PCs	4,178,000	8,064,000	14,454,000	29,464,000
PC Penetration	0.58	1.03	1.68	2.98
Internet Subs	3,511,000	7,191,000	12,000,000	20,489,000
Internet Penetration	0.49	0.92	1.39	2.07
Fixed + Mobile	21,199,000	47,707,000	97,642,000	218,282,000
Fixed + Mobile Penetration	2.95	6.07	11.32	22.06

118 LDC Internet Subscriber Forecasts, NDAI, Inc. 2004.

119 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

6.8 Projections for Per GDP Availability of ICTs

The combined ratio of LDC GDP to fixed line and mobile subscribers is expected to decline further and will reach USD 7,759 in 2005, and then further decline to USD 2,348 in 2014. The analogous North American per GDP availability of ICTs is estimated to remain essentially flat at the USD 27,000 level, but then the United States and Canada ICTs sector has already in 2004 a penetration level of over 60%. Important however is the progress the LDCs will make in reducing the "headcount digital divide" for about 20 to 1 in favour of North America in 2003 to approximately 4 to 1 by 2014. This is progress indeed.

Table 30: LDC Per GDP Availability of Access Lines and Mobile Subscriber Estimates: 2003-2014[120]

	2003	2004	2005	2006	2007	2008
GDP (USD 'M')	192,067	204,053	217,725	232,939	250,681	271,032
Access Lines	5,432	6,190	7,087	8,134	9,358	10,799
Access Lines of GDP	35,358	32,965	30,722	28,638	26,788	25,098
Mobile Subs of GDP	10,445	15,009	20,974	28,639	38,349	50,460
Mobile Subs of GDP	18,388	13,595	10,381	8,134	6,537	5,371
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
GDP (USD 'M')	297,184	327,662	364,114	404,481	453,209	512,536
Access Lines	12,482	14,457	16,783	19,502	22,688	26,458
Access Lines of GDP	23,809	22,665	21,695	20,740	19,976	19,372
Mobile Subs of GDP	65,361	83,185	104,335	128,935	157,967	191,824
Mobile Subs of GDP	4,547	3,939	3,490	3,137	2,869	2,672

	2003	2004	2005	2006	2007	2008
GDP (USD 'M')	192,067	204,053	217,725	232,939	250,681	271,032
Access Lines and Mobile Subs	15,877	21,199	28,061	36,773	47,707	61,259
Access and Mobile of GDP	12,097	9,626	7,759	6,335	5,255	4,424
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
GDP (USD 'M')	297,184	327,662	364,114	404,481	453,209	512,536
Access Lines and Mobile Subs	77,843	97,642	121,118	148,437	180,655	218,282
Access and Mobile of GDP	3,818	3,356	3,006	2,725	2,509	2,348

The analogous per GDP availability of ICTs numbers for North America is shown in Table 31 below.

120 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

Table 31: North America Per GDP Availability of Access Lines and Mobile Subscriber Estimates: 2003 -2014[121]

	2003	2004	2005	2006	2007	2008
GDP/Access Lines	50,799	51,659	52,474	53,302	54,126	54,925
GDP/Mobile Subs	63,322	58,949	55,382	52,540	50,341	48,743
GDP/Access + Mobile	28,187	27,532	26,944	26,459	26,083	25,825
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
GDP/Access Lines	55,860	56,840	57,737	58,614	59,468	60,225
GDP/Mobile Subs	23,809	47,202	46,991	47,186	47,822	48,934
GDP/Access + Mobile	25,748	25,787	25,906	26,141	26,506	26,988

121 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

7. Least developed countries telecommunication sector financial performance

7.1 Telecommunications Sector Revenues

7.1.1 Historical Perspective: 1993-2002

The ITU in its report on ICTs provides information on country telecommunications revenues for all member countries where available; hence data is also shown for the LDCs. The LDC data that has been made available is surprisingly comprehensive, with the exceptions being countries that are either undergoing or have undergone internal political turmoil and/or civil war, as one would expect, such as Guinea-Bissau, Liberia, Sierra Leone, D. R. Congo, Somalia, Haiti and Afghanistan. In order to make adjustments for the missing data we have prorated the aggregate revenues on a population basis in order to derive at an estimated total LDC revenue figures for the period under consideration.

According to our estimates LDC aggregate telecommunications revenues amounted to about USD 1.9 billion in 1993, representing about 1.3% of the LDCs' estimated GDP for that year. By 2002 revenues had increased to approximately USD 2.4 billion for a CAGR of 2.5%. The analogous ratio of telecommunications revenues to GDP remained essentially flat at 1.3%, increasing only marginally by 0.05% during the period.

Because the number of access lines and mobile subscribers increased dramatically during the period from about 1.7 million to 11.7 million, revenues per subscriber declined from USD 1,222 to USD 207 as one would expect. Additional key factors in the decrease in per subscriber revenues are the substantial reductions in international tariffs, the use of Voice over Internet Protocol (VOIP) to bypass the national operator, and hence undermining the accounting rate system, and the mandated reduction in accounting rates for United States based carriers by the Federal Communications Commission (FCC). The latter factor has served to accelerate the reduction of international rates. The increased price-performance of telecommunications technology and technology advance has been a substantial contributor to making these tariff reductions possible.

Table 32: Telecommunications Revenues% of GDP[122] (USD)

	1993	1996	1999	2002
Population (000)	549,000	594,000	633,000	682,000
GDP (M)	143,300	150,000	171,500	181,400
Telecom Revenue (M)	1,851	2,363	2,445	2,432
Revenue/GDP (%)	1.29	1.58	1.43	1.34
Fixed/Mobile Subs (000)	1,650	2,181	3,860	11,744
Revenue per Sub[123]	1,222	1,083	633	207

122 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

123 Unadjusted for country specific subscriber revenues.

Table 33: LDC Telecommunications Revenues (USD '000')[124]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Angola	75,000	99,500	95,300	110,500	115,800	128,400	160,100	114,800	–	–
Benin	33,800	23,700	33,000	36,100	40,500	45,300	46,100	54,400	61,900	–
Burkina Faso	47,800	26,900	37,100	41,800	42,300	52,000	53,800	51,500	102,500	63,300
Burundi	13,200	16,200	21,500	16,400	15,700	11,300	9,100	13,300	14,700	0
Cape Verde	17,800	20,400	24,100	24,300	26,400	32,700	34,300	38,400	41,700	48,300
C.A.R.	15,900	12,100	14,600	14,400	12,400	12,200	11,600	10,200	10,200	10,700
Chad	12,900	8,600	9,900	7,600	8,900	17,900	22,300	0	0	0
Djibouti	21,300	21,000	20,900	20,600	20,200	20,700	19,900	20,400	22,500	0
Eritrea	11,400	13,100	13,400	17,500	21,400	22,600	19,200	15,600	16,700	16,400
Ethiopia	50,800	53,500	72,400	78,300	82,300	78,600	76,300	87,700	107,800	104,400
Gambia	20,000	18,600	23,200	26,800	19,500	26,300	23,500	26,900	26,600	29,800
Guinea	0	12,300	18,500	25,200	32,000	21,300	32,300	27,700	28,200	0
Guinea-Bissau	9,400	10,000	11,600	11,500	14,500	0	0	0	0	0
Liberia	0	0	8,000	9,800	7,700	0	0	0	0	0
Lesotho	12,500	12,700	13,200	14,900	14,500	11,800	11,300	11,500	16,500	13,900
Madagascar	32,900	20,900	30,300	39,900	52,500	52,800	54,500	79,700	106,800	96,000
Malawi	26,100	18,600	13,300	31,900	36,400	32,800	0	30,300	33,800	32,200
Mali	42,900	30,700	42,700	56,300	54,800	58,700	67,300	59,600	59,200	0
Mauritania	20,600	24,000	24,900	23,800	29,700	28,400	28,500	25,200	0	0
Mozambique	65,000	64,200	61,500	57,200	64,400	73,000	94,300	109,500	118,400	127,900
Niger	23,300	16,300	19,300	17,500	23,700	22,500	14,700	16,300	18,400	0
Senegal	134,600	103,600	107,500	127,200	137,000	153,700	168,000	177,100	202,000	233,800
Sierra Leone	13,300	13,100	17,800	15,400	0	0	0	0	0	0
Sudan	2,100	17,700	0	38,500	63,200	99,200	101,300	130,600	164,900	0
Tanzania	74,400	67,700	70,300	69,300	109,500	126,000	143,500	173,800	218,600	221,300
Togo	26,800	25,300	32,100	39,300	39,100	39,200	39,100	38,900	38,800	42,100
Uganda	27,400	41,600	68,600	43,400	57,000	60,000	87,100	86,200	97,800	112,100
Zambia	103,900	92,200	100,600	108,200	100,400	88,100	82,500	64,300	69,200	0
D.R. Congo	0	0	0	0	0	0	0	0	0	0
Equatorial Guinea	0	0	0	5,600	8,500	11,700	11,700	14,900	18,800	0
Comoros	4,400	3,100	4,500	7,300	8,200	7,700	5,600	6,400	8,600	9,900
Rwanda	12,200	6,300	7,600	7,800	17,000	18,600	18,000	17,600	21,100	0
S. Tome & Principe	4,300	3,900	4,600	4,500	4,600	4,600	5,200	5,600	5,000	6,900
Somalia	0	0	0	0	0	0	0	0	0	0
Bangladesh	162,100	193,100	222,800	199,400	233,500	292,700	305,500	357,900	364,600	522,900
Bhutan	1,900	1,900	3,000	3,400	3,600	4,200	5,000	–	10,700	–
Cambodia	15,500	20,300	20,400	21,900	26,300	22,200	21,200	21,400	–	–
Laos	9,600	10,200	16,400	19,300	22,800	21,700	26,000	25,800	25,700	27,000
Maldives	13,000	14,800	18,700	26,800	33,900	39,100	44,900	53,000	58,800	65,200
Myanmar	166,600	191,000	251,700	320,100	8,600	9,400	12,900	15,500	18,000	11,100
Nepal	37,400	38,600	41,400	47,000	57,200	65,500	68,100	69,800	73,100	84,000
Yemen	168,500	191,100	111,100	79,800	66,600	79,500	79,400	93,500	114,000	143,900
Afghanistan	0	0	0	0	0	0	0	–	0	0
Haiti	0	0	78,100	86,600	0	0	0	0	0	0
Samoa	5,900	6,700	8,100	9,200	9,900	9,800	10,000	9,700	10,100	11,600
Solomon Islands	9,400	11,600	13,800	14,600	17,900	14,000	14,100	12,000	12,100	0
Kiribati	2,400	3,100	3,200	0	3,000	3,500	4,900	4,300	4,200	0
Tuvalu	200	500	500	600	600	800	1,200	1,100	1,200	0
Vanuatu	0	0	0	0	0	0	11,800	11,800	12,300	0
Total Revenues ('M')	**1,851**	**1,889**	**2,165**	**2,363**	**2,108**	**2,295**	**2,445**	**2,610**	**2,791**	**2,432**

124 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

7.1.2 Sector Revenue Estimates: 2003-2014

For the period from 2004 through 2014 we anticipate that subscriber revenues will decrease further from our adjusted 2002 figure. The adjustments we have made are designed to create consistency in historical revenues for the LDC sector. The adjustments were not made on a country-by-country basis.

Despite the decline in per subscriber revenues, telecommunications sector revenues will nonetheless increase due to the projected large increases in the subscriber base of ICTs users, be they Internet, fixed line or mobile subscribers, and in spite of decreases in equipment costs and competition affecting CPE sales. Specifically, our estimates suggest that revenues will increase from about USD 11.1 billion in 2005, to USD 15.4 billion in 2008, USD 19.3 billion in 2010 and USD 25.8 billion in 2014. The annual revenues per subscriber are expected to decrease from an adjusted USD 333 in 2005 to USD 219, USD 176 and USD 108 in 2008, 2010 and 2014, respectively.

Table 34: LDC Telecommunications Sector Revenue Estimates[125]

	2003	2004	2005	2006	2007	2008
Revenues per Sub (USD)	430	383	333	288	252	219
Total Revenues (USD 'M')	7,946	9,470	11,091	12,257	13,823	15,381
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
Revenues per Sub (USD)	194	176	161	142	124	108
Total Revenues (USD 'M')	17,097	19,303	21,777	23,266	24,623	25,809

7.2 Telecommunications Sector Investments

7.2.1 Sector Record: 1993-2002

The ITU telecommunications survey not only provided data on country sector revenues, but also showed data on country capital expenditures (CAPEX). Although not complete, the survey of telecommunications sector CAPEX in the LDCs nonetheless provides sufficient data to allow us to estimate total CAPEX by using population-based aggregation. It must be noted that by converting national currency CAPEX data into USD the role of exchange rate fluctuations must be taking into account when comparing individual countries within the LDC group.

In 1993 CAPEX, adjusted for missing country data, was according to our estimates USD 383 million, representing 20.7% of estimated telecommunications sector revenues. Investments in telecommunications for the LDCs peaked in 1998 at USD 808 million according to our estimates, and then declined through 2002 when it stood at USD 475 million, amounting to 15.5% of telecommunications revenues.

The decline in telecommunications investments in the post-1999 period should not come as a surprise since it was precipitated to a considerable degree by the bursting of the dot.com bubble in the developed countries in the 2000/2001 timeframe. Funding for ICTsrelated ventures became much more difficult to secure afterwards. This was true not only for Internet-related ventures and telecommunications start-ups, but especially for ventures in countries perceived to be “high risk”, such as the LDCs.

125 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

Moreover, over-investments into telecommunications infrastructures worldwide, due to the failure of the previously anticipated traffic to materialize, contributed to the general investment malaise, which is only now abating. This resulted in a precipitous drop in telecommunications related CAPEX. In essence, venture capital and debt funding for new ventures practically ceased after 2000, and is only now resuming. The decline in LDC CAPEX tracks very much the decrease in telecommunications investments in the developed world. An additional factor contributing to the decline is the increasing price-performance of telecommunications equipment, which greatly reduces the investment requirement per individual subscriber.

Table 35: Telecommunications CAPEX[126] (USD)

	1993	1996	1999	2002
CAPEX (000)	383,200	736,800	802,280	475,000
CAPEX/Revenue (%)	20.69	31.19	32.80	19.53
Telecom Revenue (M)	1,851	2,363	2,445	2,432
Fixed/Mobile Subs(000)	1,650	2,181	3,860	11,744
CAPEX/Sub	232	338	208	41

In Table 36 below LDC country-related CAPEX is provided whenever available, including the estimated annual total investments for all LDCs. The total estimated CAPEX has been adjusted to make allowance for those countries that had not provided the ITU with such information.

126 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

Table 36: LDC CAPEX (USD '000') [127]

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Angola										
Benin	23,100	14,600	17,300	11,300	–	23,700	31,900	29,400	26,400	–
Burkina Faso	22,700	11,800	11,900	21,100	25,400	18,100	15,700	19,600	19,400	24,000
Burundi	7,300	2,300	3,400	600	3,000	13,400	23,800	30,100	0	0
Cape Verde	7,100	5,600	4,700	13,800	15,200	11,000	14,000	12,800	11,600	14,900
C.A.R.	11,700	1,300	1,200	100	2,900	100	100	100	100	100
Chad	9,700	4,300	8,500	13,700	1,900	0	0	0	0	0
Djibouti	0	0	0	0	0	0	0	0	0	0
Eritrea	1,600	2,600	2,900	12,800	13,500	16,600	8,900	22,800	1,400	900
Ethiopia	11,000	8,600	7,600	0	23,700	18,800	29,800	37,300	46,300	29,100
Gambia	14,600	3,400	9,500	2,800	4,200	12,400	14,900	6,300	6,600	3,700
Guinea	0	0	34,600	39,900	37,900	26,100	8,800	4,900	800	0
Guinea-Bissau	9,400	10,000	11,600	11,500	14,500	0	0	0	0	0
Liberia	0	0	2,000	1,500	3,300	0	0	0	0	0
Lesotho	2,100	1,700	5,800	0	0	900	1,300	1,200	21,600	7,100
Madagascar	0	0	12,800	38,900	27,900	60,000	2,880	11,200	0	0
Malawi	0	0	0	800	0	0	0	0	0	0
Mali	5,800	11,400	17,900	29,500	42,900	23,000	16,200	16,800	17,700	0
Mauritania	3,300	9,400	12,400	17,500	12,700	5,600	4,200	0	0	0
Mozambique	20,700	10,300	21,700	24,700	41,300	19,300	34,300	54,300	47,400	58,900
Niger	8,000	2,900	2,500	0	0	0	0	0	0	0
Senegal	78,600	35,000	34,000	54,600	36,600	68,400	89,200	78,700	66,300	108,600
Sierra Leone	1,200	2,100	5,900	8,700	0	0	0	0	0	0
Sudan	0	7,800	0	22,400	61,100	56,700	67,300	93,000	108,200	0
Tanzania	6,600	6,900	5,000	200,900	192,700	254,600	188,400	21,800	9,400	0
Togo	5,500	3,800	5,800	14,300	18,000	17,700	12,100	17,600	22,600	30,000
Uganda	9,900	9,400	23,100	29,100	24,600	18,000	55,200	0	0	0
Zambia	22,600	18,700	10,500	11,300	12,800	8,300	4,600	7,900	4,800	0
D.R. Congo	0	0	0	0	0	0	0	0	0	0
Equatorial Guinea	0	0	0	0	0	0	0	0	0	0
Comoros	900	0	1,600	0	0	0	0	0	6,000	4,200
Rwanda	0	0	0	0	0	0	16,800	0	0	0
S. Tome & Principe	300	400	0	400	1,900	900	1,200	900	700	4,100
Somalia	0	0	0	0	0	0	0	0	0	0
Bangladesh	11,200	120,900	111,400	67,300	46,300	34,400	54,000	89,900	69,700	79,900
Bhutan	0	0	0	0	0	0	0	1,400	2,800	2,700
Cambodia	0	0	0	0	0	0	0	0	0	0
Laos	0	10,500	6,100	19,500	9,500	0	5,900	8,100	0	10,900
Maldives	0	7,800	9,200	14,700	14,400	10,900	8,300	11,300	7,300	7,800
Myanmar	18,000	54,300	12,400	15,200	12,300	7,400	8,000	3,900	5,900	2,400
Nepal	2,000	11,000	16,900	29,800	20,100	22,300	20,400	18,700	20,800	0
Yemen	65,000	61,300	40,400	0	0	51,700	39,200	47,700	48,700	73,600
Afghanistan	0	0	0	0	0	0	0	0	0	0
Haiti	0	0	0	4,100	0	0	0	0	0	0
Samoa	0	0	1,100	1,100	1,000	1,000	1,300	0	0	0
Solomon Islands	1,700	4,600	3,400	2,900	4,700	5,300	23,600	2,200	0	0
Kiribati	100	100	100	0	100	1,500	0	0	0	0
Tuvalu	1,500	300								
Vanuatu	0	0	0	0	0	0	0	11,800	11,800	12,300
Total	**383,200**	**455,100**	**475,200**	**736,800**	**726,400**	**808,100**	**802,280**	**661,700**	**584,300**	**475,200**

127 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

7.2.2 Sector Investment Estimates: 2003-2014

For the period 2005 through 2014 we estimate that LDC telecommunications sector-related CAPEX will rise from about USD 3.5 billion to USD 4.7 billion, corresponding to investments per new fixed, mobile and Internet subscriber of USD 414 and USD 117, respectively. The overall new investment per subscriber will decrease from USD 105 in 2005 to USD 20. The decline in CAPEX per new subscriber is largely the result of a number of key sector factors:

- improved price/performance of telecommunications equipment, hence lowering investment on a per subscriber basis;
- shift from fixed line to wireless communications, hence avoiding the heavy expenditures into land-based infrastructures;
- shift from circuit switched to packet switched technology, hence improving network performance, thus lowering the cost of transmission; and
- the merger of data networks – Internet – and voice networks, hence avoiding the investment into parallel network infrastructures.

Table 37: LDC CAPEX Estimates[128]

	2003	2004	2005	2006	2007	2008
CAPEX New Sub (USD)	314	478	414	396	319	256
Total CAPEX (USD 'M')	1,458	3,286	3,540	3,675	3,775	3,915
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
CAPEX NEW Sub (USD)	225	194	170	152	132	117
Total GDP (USD 'M')	4,050	4,187	4,324	4,415	4,559	4,688

The forecast prepared by us for LDC telecommunications revenues and CAPEX for the period 2005 through 2014 suggest that revenues as a% of LDC GDP will remain flat at about 5.1%, after peaking in 2010 at 6.0% in 2011. Investments, on the other hand, will decline from 31.9% of telecommunications sector revenues in 2005 to 18.2% in 2014.

128 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

Table 38: LDC GDP, Telecommunications Revenues and CAPEX Estimates[129]

	2003	2004	2005	2006	2007	2008
GDP (USD 'M')	192,067	204,053	217,725	232,939	250,681	271,032
Telecom Revenues (USD 'M')	7,946	9,470	11,091	12,257	13,823	15,381
% Revenue of GDP	0.0414	0.0464	0.0509	0.0526	0.0551	0.0567
CAPEX (USD 'M')	1,458	3,286	3,540	3,675	3,775	3,915
% CAPEX of Revenue	0.1835	0.3470	0.3192	0.2998	0.2731	0.2545
	2009	**2010**	**2011**	**2012**	**2013**	**2014**
GDP (USD 'M')	297,184	327,662	364,114	404,481	453,209	512,536
Telecom Revenues (USD 'M')	17,097	19,303	21,777	23,266	24,623	25,809
% Revenue of GDP	0.0575	0.0589	0.0598	0.0575	0.0543	0.0504
CAPEX (USD 'M')	4,050	4,187	4,324	4,415	4,559	4,688
% CAPEX of Revenue	0.2369	0.2169	0.1986	0.1898	0.1852	0.1816

The cumulative capital investments in the telecommunications sector of the LDCs amounted to USD 6.1 billion between 1993 and 2002. During the same period the LDC group of countries added about 12.2 million new fixed line, mobile and Internet subscribers. The investment per subscriber amounted therefore to approximately USD 502. The projected cumulative investments for the period 2003 to 2014 will reach USD 45.9 billion, while the estimated new fixed line, mobile and Internet subscribers are projected to total 228.6 million. Thus, the investment per subscriber will amount to USD 201, or 60% less than it had been during the preceding period.

This reduction in per subscriber investment cost is a clear indicator of the impact of wireless communications and technology advances on the telecommunications cost structure. Already during the period 1993 through 2002 the impact of these factors on the cost of building the telecommunications infrastructure was evident since at an average per subscriber investment cost of USD 502 was significantly lower that the USD 2,000 to USD 4,000 cost range for providing a new subscriber with fixed line access in the developing world as was the case until the early 1990s.

We have calculated the average investment cost per new fixed line subscriber for the LDCs for 1993, 1994 and 1995 when the number of mobile subscribers was small and when the cost for providing wireless connections was high. The results of our analysis should not come as a surprise: namely, in 1993 the average cost was USD 4,032, in 1994 it was USD 3,396, and in 1995 it had dropped to USD 2,715. The findings have been summarized in Table 38.

129 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

Table 39: Investment Cost per Subscriber (USD)

	1993	1994	1995	1993-2002	2003-2014
New Subscribers[130] (000)	95	134	175	12,160	226,620
CAPEX (M)	383	455	475	6,109	45,872
CAPEX/New Subscriber	4,032	3,396	2,715	502	201

130 Including mobile subscribers of 15,000, 30,000 and 58,000 for 1993, 1994 and 1995, respectively. The fixed line subscriber base at the end of 1992 was 1,555,000.

8. LDC pro-forma financial analysis of the telecommunications sector

In order to ascertain the prospects for private investments in the LDC telecommunications sector we have prepared pro-forma income statements and cash flow analyses for the LDC group of countries. For the purpose of our analysis we have assumed that the LDC telecommunications sector would be one homogeneous market that is served by one company. Clearly, the results for the aggregate LDC market will differ substantially from individual country markets in respects to income, cash flow and ROI, hence caution is advised when interpreting the prospects of the sector in its totality as a guide to the performance of the individual country markets. Nonetheless, the aggregate analysis will serve as useful guide to the potential opportunities provided by LDCs to investors in telecommunications related ventures.

8.1 Sector Pro-Forma Financials Baseline Case

In preparing the baseline case income statements and financial analyses for the years 2003 through 2014 we have made the following assumptions:

- Operating expenses (OPEX) are 64% of revenues, which is based on the average performance of North American telephone operators.
- Depreciation is allocated on a straight-line basis at 10% per annum, hence assuming an average capital recovery cycle of 10 years.
- Interest expense/income are assumed to be 20% per annum on outstanding balances.
- Profit taxes are assumed to be levied at the rate of 40%.
- Allowances have not been made for changes in working capital or any financial transactions affecting cash flow.
- Operations have been assumed to commence in 2003, but no allowance has been made for capital investments, loans and/or other debt instruments.
- Legacy investments, working capital items, cash balances, long-term debt, accumulated depreciation allowances were not taken into consideration
- Annual revenues were taken from our revenues forecasts presented in Table 32.
- CAPEX was taken from our capital investment forecasts presented in Table 36.

The financial results for the LDC telecommunications market under these assumptions were very positive; both for profitability, cash flow and CAPEX cash flow coverage. Specifically, the LDC performance under as if one-company and one-market conditions indicate that on a pro-forma basis a company serving this market would be profitable from the first year, with profits rising from USD 1,643 million in 2003, to USD 1,938 million in 2005, to USD 2,011 million in 2009, to USD 2,803 million in 2012, and to USD 3,522 million in 2014.

Free cash flow, on the other hand, because of capital expenditure requirements, remained negative, from 2004 through 2008 for the cumulative negative cash flow of USD 3,591 million. From 2009 forward free cash remained positive, increasing from USD 47 million to USD 554 million, 1,185 million, 1,731 million, USD 2,216 million and USD 2,684 million in 2010, 2011, 2012, 2013 and 2014, respectively. During the 12-year period under consideration the LDC pro-forma cumulative free cash flow is projected to amounted to USD 4,826 million, hence producing an internal rate of return (IRR) of just under than 20%.

Table 40: LDC Pro-Forma Margins – Base Line Case[131]

	2005	2008	2011	2014
Gross Margin (%)	36	36	36	36
Pre-Tax Margin (%)	29	21	20	23
Net Margin (%)	18	12	12	14
Free Cash Flow (%)	(10)	(2)	6	10

Table 41: LDC Pro-Forma P&L and Cash Flow Baseline Case (USD M)[132]

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Revenues	7,946	9,470	11,091	12,257	13,823	15,381	17,097	19,303	21,777	23,266	24,623	25,809
OPEX (64% of Revenue)	–5,085	–6,061	–7,098	–7,844	–8,847	–9,844	–10,942	–12,354	–13,937	–14,890	–15,759	–16,518
EBITDA	**2,861**	**3,409**	**3,993**	**4,413**	**4,976**	**5,537**	**6,155**	**6,949**	**7,840**	**8,376**	**8,864**	**9,291**
Depreciation (10% Straight Line)	–123	–268	–597	–951	–1318	–1696	–2087	–2492	–2911	–3344	–3663	–3850
Gross Margin	2,738	3,141	3,396	3,462	3,658	3,841	4,068	4,457	4,929	5,032	5,202	5,441
Interest (20%)	–	–	(165)	(366)	(539)	(657)	(718)	(709)	(598)	(361)	(15)	429
Pre-Tax Margin	2,738	3,141	3,231	3,096	3,118	3,185	3,349	3,748	4,331	4,671	5,187	5,870
Profit Tax (40%)	(1,095)	(1,256)	(1,292)	(1,238)	(1,247)	(1,274)	(1,340)	(1,499)	(1,732)	(1,869)	(2,075)	(2,348)
Net Income	**1,643**	**1,885**	**1,938**	**1,857**	**1,871**	**1,911**	**2,010**	**2,249**	**2,598**	**2,803**	**3,112**	**3,522**
Depreciation	123	268	597	951	1,318	1,696	2,087	2,492	2,911	3,344	3,663	3,850
CAPEX	–1,458	–3,286	–3,540	–3,675	–3,775	–3,915	–4,050	–4,187	–4,324	–4,415	–4,559	–4,688
Free Cash Flow	**307**	**–1,133**	**–1,005**	**–867**	**–586**	**–308**	**47**	**554**	**1,185**	**1,731**	**2,216**	**2,684**
Accumulated FCF	307	–826	–1,831	–2,697	–3,283	–3,591	–3,544	–2,990	–1,805	–73	2,143	4,826
IRR @ 25%	–	–	(804)	(555)	(300)	(126)	15	145	249	290	297	288
IRR @ 20%	0	0	(837)	(602)	(339)	(149)	19	186	331	403	429	433
												(499)
												(126)

8.2 Sector Pro-Forma Financials Optimistic Case

For our optimistic scenario of the LDC as if considered a company we have assumed that

- OPEX would amount to 60% of revenues;
- and a profit tax rate of 36% would be applied.

All other assumptions have remained the same. The result was a significant increase in net income and free cash flow. In fact, the IRR increased to about 35% from the 20% of the baseline case. Specifically, net income increased from USD 1,956 million in 2003 to USD 5,788 million at the end of the forecast period in 2014. The cumulative free cash flow under this scenario amounted to USD 17,623 million, being only negative in 2004, 2005 and 2006 to the amounts of USD 765, USD 504, and USD 278, respectively.

131 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

132 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

Table 42: LDC Pro-Forma Margins – Optimistic Case[133]

	2005	2008	2011	2014
Gross Margin (%)	40	40	40	40
Pre-Tax Margin (%)	34	28	29	35
Net Margin (%)	22	18	19	23
Free Cash Flow (%)	(5)	3	12	19

Table 43: LDC Pro-Forma P&L and Cash Flow Optimistic Case (USD M)[134]

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Revenues	7,946	9,470	11,091	12,257	13,823	15,381	17,097	19,303	21,777	23,266	24,623	25,809
OPEX (60% of Revenue)	–4,768	–5,682	–6,655	–7,354	–8,294	–9,229	–10,258	–11,582	–13,066	–13,960	–14,774	–15,485
EBITDA	**3,178**	**3,788**	**4,436**	**4,903**	**5,529**	**6,152**	**6,839**	**7,721**	**8,711**	**9,306**	**9,849**	**10,324**
Depreciation (10% Straight Line)	–123	–268	–597	–951	–1318	–1696	–2087	–2492	–2911	–3344	–3663	–3850
Gross Margin	3,056	3,520	3,840	3,952	4,211	4,457	4,751	5,229	5,800	5,963	6,187	6,474
Interest (20%)	–	–	(29)	(130)	(185)	(162)	(56)	153	503	1,027	1,708	2,539
Pre/Tax Margin	3,056	3,520	3,811	3,822	4,025	4,295	4,696	5,382	6,303	6,990	7,894	9,012
Profit Tax (36%)	(1,100)	(1,267)	(1,372)	(1,376)	(1,449)	(1,546)	(1,691)	(1,937)	(2,269)	(2,516)	(2,842)	(3,244)
Net Income	**1,956**	**2,253**	**2,439**	**2,446**	**2,576**	**2,749**	**3,005**	**3,444**	**4,034**	**4,474**	**5,052**	**5,768**
Depreciation	123	268	597	951	1,318	1,696	2,087	2,492	2,911	3,344	3,663	3,850
CAPEX	–1,458	–3,286	–3,540	–3,675	–3,775	–3,915	–4,050	–4,187	–4,324	–4,415	–4,559	–4,688
Free Cash Flow	**620**	**–765**	**–504**	**–278**	**120**	**530**	**1,043**	**1,750**	**2,621**	**3,402**	**4,156**	**4,930**
Accumulated FCF	620	–145	–649	–927	–808	–278	765	2,515	5,135	8,538	12,693	17,623
NVP @ 25%	–	–	(403)	(178)	61	217	342	459	550	571	558	529
NVP @ 20%	0	0	(420)	(193)	69	255	419	586	731	791	805	796
												2,705
												3,841

8.3 Sector Pro-Forma Financials: Pessimistic Case

For our pessimistic sector scenario of the LDC under one-company and one-market consideration of the pro-forma financial statements and cash flow analyses we have assumed that

- OPEX would amount to 70% of revenues; and
- a profit tax rate of 30% would be applied.

All other assumptions have remained the same. As would be expected, the results have precipitated a significant decrease in net income and free cash flow. In fact, the IRR decreased to about 10% from 35% and 20% of the baseline and optimistic cases, respectively. Although net income increased form USD 1,583 million in 2003 to USD 2,237 million at the end of the forecast period in 2014, the cumulative free cash flow under this scenario amounted to a negative USD 2,082 million, being only

133 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

134 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

positive in 2003, and for 2011, 2012, 2013 and 2014 to the amounts of USD 247, USD 335, USD 734, USD 1,073 and USD 1,400, respectively.

Table 44: LDC Pro-Forma Margins – Pessimistic Case[135]

	2005	2008	2011	2014
Gross Margin (%)	30	30	30	30
Pre-Tax Margin (%)	23	14	11	12
Net Margin (%)	16	10	8	9
Free Cash Flow (%)	(11)	(5)	2	5

Table 45: LDC Pro-Forma P&L and Cash Flow Pessimistic Case (USD M)[136]

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Revenues	7,946	9,470	11,091	12,257	13,823	15,381	17,097	19,303	21,777	23,266	24,623	25,809
OPEX (70%ofRevenue)	–5,562	–6,629	–7,764	–8,580	–9,676	–10,767	–11,968	–13,512	–15,244	–16,286	–17,236	–18,066
EBITDA	2,384	2,841	3,327	3,677	4,147	4,614	5,129	5,791	6,533	6,980	7,387	7,743
Depreciation (10%StraightLine)	–123	–268	–597	–951	–1318	–1696	–2087	–2492	–2911	–3344	–3663	–3850
GrossMargin	2,261	2,573	2,730	2,726	2,829	2,918	3,042	3,299	3,622	3,636	3,724	3,893
Interest(20%)	–	–	(194)	(427)	(650)	(837)	(989)	(1,094)	(1,125)	(1,058)	(911)	(696)
Pre-TaxMargin	2,261	2,573	2,537	2,299	2,178	2,082	2,053	2,204	2,497	2,579	2,814	3,196
ProfitTax(30%)	(678)	(772)	(761)	(690)	(653)	(624)	(616)	(661)	(749)	(774)	(844)	(959)
NetIncome	1,583	1,801	1,776	1,609	1,525	1,457	1,437	1,543	1,748	1,805	1,969	2,237
Depreciation	123	268	597	951	1,318	1,696	2,087	2,492	2,911	3,344	3,663	3,850
CAPEX	–1,458	–3,286	–3,540	–3,675	–3,775	–3,915	–4,050	–4,187	–4,324	–4,415	–4,559	–4,688
FreeCashFlow	247	–1,217	–1,168	–1,115	–932	–762	–526	–152	335	734	1,073	1,400
AccumulatedFCF	247	–969	–2,137	–3,252	–4,184	–4,946	–5,472	–5,623	–5,288	–4,554	–3,481	–2,082
NVP@25%	–	–	(934)	(714)	(477)	(312)	(172)	(40)	70	123	144	150
NVP@20%	0	0	(973)	(774)	(539)	(367)	(211)	(51)	94	171	208	226
												(2,161)
												(2,218)

The pro-forma financial and cash flow analyses of the LDC telecommunications sector under one-company and one-market conditions indicate that, overall the sector performance is positive, providing IRRs ranging from about 10% to 35%. More positive still is the fact that with the exception of the earlier years, cash flow is sufficient to meet annual estimated capital expenditures on infrastructure and equipment in all three scenarios.

What is true for the LDC telecommunications sector as a whole may not be true, however, for individual countries within the LDC group. Hence, for private investors and multilateral agencies it is important to choose both the individual country investment opportunities from a return-on-investment (ROI) perspective carefully, but also to analyse the political and economic risk factors, which also vary greatly amongst these countries.

135 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

136 LDC Access Line, Mobile Subscriber, PC and Internet Subscriber Forecasts, NDAI, Inc. 2004.

9. Conclusion and recommendations

This report has not made it its purpose to pick the winners or the losers as a result of our analysis of LDC telecommunications sector investment opportunities, but instead to point out that the LDC countries as a whole do deserve another look. As our report has shown, investment opportunities abound and a win-win by both governments and investors outcome is possible despite the fact that some of the countries remain somehow volatile.

In fact, the factors providing either positive or negative stimuli to the LDC markets in general go beyond ICTs opportunities in the LDC markets. Clearly, ICTs are a key growth ingredient to the economic growth – poverty reduction nexus for LDCs, but the investor is well advised to look beyond the specific ICTs opportunity by evaluating an individual country's macroeconomic stability, trade and export policies, market openness, education and health care investments, governance matters, property rights, political transparency, as well policies on regional and social inclusion.

Furthermore, we have argued in this report that the headcount "digital divide" between LDCs and the developed countries matters and is real, but at the same time it is closing fast on its own as our evidence suggests. What is in our opinion of greater importance is the level of ICTs absorption and the in-country "digital divide" within the respective LDC countries. In these two areas the "digital divide" between the LDCs and the developed countries is growing and requires therefore active intervention in order to reverse this trend. In other words, whereas in the developed world ICTs skill sets are increasingly disseminated to all social and ethnic groups while decreasing prices for ICTs makes them also affordable to most people to acquire such instruments, the diffusion of ICTs and their absorption in the LDCs is still largely limited to the affluent segments of society.

It is without doubt that the ICTs headcount in the LDC will increase. However, what are required from policy makers first and foremost are programmes that accelerate the diffusion and absorption of ICTs in the LDCs. This will require courage since it implies increased educational funding, the reduction of income inequality, market liberalization, transparency and efficiency in judicial effectiveness, improvements in property rights and macroeconomic reform. What is needed above all is sustained economic growth, which is an essential driver in the effort to reduce poverty in the LDCs. And economic growth is closely intertwined and dependent upon the governments' success in reforming institutions, jurisprudence, markets, education, health care, credit facilities, or the body politic.

While in the past LDC countries have engaged repeatedly in reform drives, the effort has often failed, largely because it did not change fundamentally the LDCs unfavourable terms-of-trade, foreign debt overhang, inadequacy of ICTs resources, shortage of human and financial capital, high incidence of poverty and income inequality and lack of transparency in the political economy. Furthermore, multilateral institutional and donor countries have often contributed to the failure of many LDC reform drives through their insistence on "one-size-fits-all" programmes and/or politically motivated lending/aid action. It should therefore not be surprising that the LDCs are still poor, despite having for more than three decades been the beneficiary of special programmes and aid.

Since the causes of the failure of the LDCs to improve their socio-economic conditions have been identified, it is now necessary to determine the inhibitors of economic growth. First, the barriers to economic growth have become institutionalised on the international level. Second, the LDCs have not been willing to take full ownership of international programmes. Third, donor countries, multilateral agencies and poverty experts differ on the causes and effects of the LDCs' economic malaise. Fourth, in the LDCs where there is generalized poverty, poverty itself acts as a major constraint to economic growth.

It is clear that the causes of poor economic performance and the formula for achieving economic growth in the LDCs are well known, the formula itself has not been implemented because of:

- lack of growth-oriented macroeconomic policies;
- inability to advance domestic productive capacity;

- inability to change the terms-of-trade;
- difficulty of moving up the product value chain;
- unsustainable level of external debt and debt service payments;
- absence of a competitive market, secure property rights, an effective judiciary, and availability of credit; and
- lack of ICTs absorption and diffusion.

This report has made its central theme that ICTs are a key input factor to the economic growth formula upon which poverty reduction is dependent. Clearly, there exist other key factors that my be of greater or lesser importance than ICTs. They are more effectively dealt with in World Bank reports, IMF papers, NGO initiatives and other United Nations actions. This report has depended on these resources for data inputs; informational background and parameter formulation to explore and develop the importance of the ICTs input factor in the economic growth formula. But it has been the ICTs factor that has been the emphasis of this report.

There exists general agreement that ICTs are a key factor in promoting economic growth, and further that it is the centre of an economic and social transformation that is affecting all countries. This has been accepted by policy makers, enterprises and society. In fact, ICTs and globalisation have combined to create a new economic and social landscape. In so doing ICTs have brought fundamental changes in the way enterprises and economies as a whole function. It is also true that unless a country participates effectively in the exchange of knowledge and information, the country is bound to be marginalized, as it is not capable to fully take part in activities and interactions on the national and global levels. Hence, the more connected and active a country is in the global knowledge and information economy, the better the chances of that country to achieve accelerated socio-economic development. This accelerated development also normally results in improvement of the quality of life of its people, as well as an upsurge in the exchange of goods and services, which in turn stimulate wealth creation and economic growth.

The impact of ICTs on firms' and industries' performance and competitiveness is achieved above all through increased information flows, which result in knowledge transfer as well as improved organization. In particular, ICTs have become important tools for improving productive capacity and increasing international competitiveness by reducing the transaction costs involved in the production and exchange of goods and services, increasing the efficiency of management functions, and enabling firms to exchange and access more information, and accessing it virtually in real time.

While ICTs improve productivity in existing productive activities, they also make possible the emergence of new activities such as online outsourcing of services and the production of different types of ICTs goods. These activities enable countries, including developing ones, to diversify their economies, enhance their export competitiveness and produce high-value-added services that boost the local economy.

Unfortunately, the LDCs have not been able to fully participate in the development of an ICTs driven economy because the absence of a constructive policy framework, the slowness of the establishment of the network infrastructure, and the training of people to use it and to exploit commercially the information and knowledge that it makes available. Furthermore, regulatory frameworks need to be put in place to assist digital commerce and provide protection to those who use it. Financing needs need to be available for infrastructure development. Finally, local content needs to be created.

Already in 1984, the Maitland Report found that there was a direct correlation between the availability of, and access to, telecommunications infrastructure and a country's economic growth. Hence, the disparities in the use of ICTs and the availability of ICTs tools as measured in telephones, computers and Internet connections, as well as network infrastructures between the developed world and the LDCs is important. But new ICTs with their ability drive down cost while increasing performance exponentially will allow LDCs to close the existing ICTs gap quickly. And the closing if the headcount ICTs gap will result in accelerated economic growth if it is accompanied by ICTs diffusion and absorption.

The existing difference in the availability of ICTs is often the focus of particular concern among policy makers, academics and NGOs, as it should be indeed. Unfortunately, this gives rise to argument that the far wider availability of ICTs in rich countries will therefore enable the rich to get richer, while the poor are left behind. In short, not only is there a worrying "digital divide" between rich and poor, the divide is widening. The debate over the "digital divide" has sadly obscured the real issue: namely, how worrying is the "digital divide", especially since ICTs growth in the LDCs has significantly outpaced growth in the developed countries in recent years. Since the poor countries are catching up in the headcount of ICTs, it is clear that the debate should revolve therefore around the adoption and absorption of ICTs by LDCs, rather than the number of new ICTs installations.

What is worrying however is the fact that ICTs has less impact on productivity in poor countries than in rich countries because of lower adoption levels. Another worry is that the adoption level may be hugely unequal, and limited to the relative affluent minority, so that the divide within countries may grow even as the divide between the poor countries and the rich countries narrows. After all, the importance of ICTs lies in its ability to educate people and improve economic performance. In other words, ICTs represent an active instrument for people to improve income and enhance economic empowerment, rather than a passive tool for entertainment and comfort.

If this measure is used then the gap is not closing because the in-country diffusion is not taken place, and as a result the impact of ICTs on productivity in LDCs is small. And as World Bank studies have shown, the LDCs are already electronically integrated into the world economy; the problem is the lack of widespread use of ICTs within LDC countries. Furthermore, much of the in-country ICTs are owned by supply chain intermediaries whose sole purpose it is to act as feeders of raw materials or semi-finished products to manufacturers and distributors in the developed countries.

Hence, the crux of the "digital divide" as a measurement of ICTs relevance to accelerating economic growth may not be between LDCs and developed countries, but rather within the LDC countries themselves. Without the diffusion of ICTs to wider segments of society as is currently the case, LDC countries will continue to lack market information and market access, as well as the key ingredient for improvements in education and human skill-sets in order to move up the product value-chain.

The existence of the LDC in-country digital divide has important implications for policy makers from multilateral agencies, donor countries and LDC governments. The tools for overcoming the intra-country "digital divide" are available, and are deployed already, but not yet in a systematic or coordinated fashion. And too much emphasis is still placed on providing narrowband voice telephony, which is very profitable to the equipment suppliers, but inefficient and expensive for the LDCs. It is thus our contention that LDCs should concentrate their ICTs deployment efforts on new technologies that break with the traditional fixed line circuit switched engineering model based on national exclusivity service provisioning. In fact the success of mobile communications and wireless Internet have demonstrated of what can be accomplished in a span of a few short years at a relative modest investment and competitive markets. It has taken mobile telephony a mere eight years to sign up 7.0 million subscribers by 2002, while fixed telephony after almost a century of existence has only managed to provide access to 4.7 million customers.

Our study has shown that the headcount digital divide is disappearing fast, and hence should be of less concern to policy makers. As a group, the forty-nine-countries comprising the LDCs had in 1993 a population of about 552 million. By growing at an average annual rate of about 2.5% the population had grown by 2002 to 685 million. The population weighted average per capita GDP for the LDC group of countries increased only marginally from USD 261 in 1993 to USD 266 in 2002. A clear indication that the LDCs as a group had made little progress in improving their economic performance during the last decade of the 20th century.

Headcount ICTs surged however despite the poor economic performance of the LDCs. Fixed lines grew between 1993 and 2002 from about 1.7 million to 4.8 million, representing a 190% increase for a CAGR of 13%. As a result fixed line teledensity rose from 0.31 in 1993 to 0.74 in 2002. More dramatic still than the access line increase has been the growth in mobile telephony where the number of subscribers rose from 15,000 in 1993 to 7.0 million in 2002, hence raising penetration from 0.003% to 1.1%. As a matter of fact, the number of mobile subscribers exceeded those of fixed line subscribers in the LDC countries by over 2.0 million in 2002.

Furthermore, the number of embedded PCs rose from 491,000 in 1997 to 2,565,000 in 2002, for a cumulative growth rate of 422%, or a CAGR of 38%, hence increasing penetration from 0.07% to 0.36%. The Internet subscriber base rose from 135,000 in 1998 to 1,868,000 in 2002, for a CAGR of over 90%, thus raising the penetration rate from 0.02% to 0.27%.

This has been a great improvement over the earlier decades. And much more growth is bound to come as our projections to 2014 suggest. Specifically, in order to ascertain the prospects of ICTs in the LDCs for the period beyond 2002 we have made projections for a number of country indicators and telecommunications sector statistics, as well as sector revenues and capital expenditures for the period 2003 to 2014. These estimates will permit us to prepare sector-wide financials in order to determine whether the sector as a whole will be able to support the project growth in LDC ICTs subscribers from internal sources of capital.

Clearly, positive financial results, and the results are positive, will allow LDCs to tap private domestic resources and foreign capital markets for funding. Further, the positive outcome of our financial and cash flow analyses will support the contention that the LDC telecommunications sector in the aggregate is a viable market for ICTs related investments with potentially high ROIs. Although in the aggregate the LDC ICTs sector's outlook is positive, the performance will vary from country to country. Most importantly, the positive outlook for the ICTs sector should also buttress the argument that the "digital divide" for both "headcount" and adoption measurements between LDCs and the developed countries is closing.

The LDC population, assuming that CAGR will continue at the same rate as during the earlier 1993 to 2002 period, is expected to increase between 2004 and 2014 from an estimated 720 million to approximately 990 million. The population weighted average per capita GDP, which had reached according to our estimates USD 266 in 2002, will increase to USD 277 in 2003, and it will reach USD 284 in 2004. By the end of the forecast period we expect the population weighted average per capita GDP to reach USD 518 since we expect sustained economic growth for the LDCs.

The number of fixed lines is expected to grow during the same period from about 6.2 million to 26.5 million, representing a 327% cumulative increase for a CAGR of 16%. As a result of this increase fixed line teledensity will rise from 0.86 in 2004 to 2.7 in 2014, or threefold between 2005 and 2014. Mobile telephone subscriptions will continue to increase at a very dramatic pace, rising from an estimated 15.0 million in 2004 to 191.8 million by 2014, hence raising the penetration level from 2.2% to 19.4%. The reasons for this more-than-tenfold increase are the result of the exponential increase in mobile technology price-performance, competitive market forces, the prepaid business model.

The number of embedded PCs will continue to rise from an estimated 4.2 million in 2004 to approximately 29.5 million by 2014, for a cumulative growth rate of 600%, or a CAGR of 21%, hence increasing penetration from 0.5% to 3.0%. The number of Internet users will rise from about 3.5 million in 2004 to 20.5 million during the forecast period, for a CAGR of almost 25%, thus raising the penetration rate for LDC countries collectively from 0.52% to 2.1%. These growth numbers are impressive indeed.

As far as sector revenues are concerned, our estimates of the LDC sector aggregate revenues suggested that they amounted to about 1.9 billion in 1993, representing about 1.3% of the LDCs' estimated GDP for that year. By 2002 revenues they had increase to approximately USD 2.4 billion for a CAGR of 2.5%. The analogous ratio of telecommunications revenues to GDP remained essentially flat at 1.3%,

increasing only marginally by 0.05% during the period. Because the number of access line and mobile subscribers increased dramatically during the period from about 1.7 million to 11.7 million, revenues per subscriber declined from USD 1,222 to USD 207 as one would expect. Other factors contributing to the decrease were reductions in international tariffs, the use of VOIP, and the undoing of the accounting rate system.

For the period from 2004 through 2014 we anticipate that subscriber revenues will decrease further from our adjusted 2002 figure. Despite the decline in per subscriber revenues, telecommunications sector revenues will increase due to the projected large jump in the subscriber base of ICT users, be they Internet, fixed line or mobile subscribers. Specifically, our estimates suggest that revenues will increase from about USD 11.1 billion in 2005, to USD 25.8 billion in 2014. The annual revenues per subscriber are expected decrease from an adjusted USD 333 in 2005 to USD 108 in 2014.

In 1993, CAPEX was according to our estimates USD 383 million, representing 20.7% of estimated telecommunications sector revenues. Investments in telecommunications for the LDCs peaked in 1998 at USD 808 million according to our estimates, and then declined through 2002 when it stood at USD 475 million, amounting to 15.5% of telecommunications revenues. The decline in telecommunications investments in the post-1999 period should not come as a surprise since it coincided to a considerable degree with the bursting of the "dot.com" bubble in the developed countries and the glut in international capacity due to the failure of anticipated demand to materialize. Hence, funding for ICTs-related ventures became much more difficult to secure afterwards. We expect funds to become again more readily available after 2005. For the period 2005 through 2014 we estimate that LDC telecommunications sector-related CAPEX will rise from about USD 3.5 billion to USD 4.7 billion for a cumulative total of USD 45.9 billion, corresponding to investments per new fixed, mobile and Internet subscriber of USD 414 and USD 117, respectively.

The forecast prepared by us for LDC telecommunications revenues and CAPEX for the period 2005 through 2014 suggest that revenues as a% of LDCs' GDP will remain flat at about 5.1%, after peaking in 2010 at 6.0% in 2011. Investments, on the other hand, will decline from 31.9% of telecommunications sector revenues in 2005 to 18.2% in 2014.

In order to ascertain the prospects for private investments in the LDC telecommunications sector we have prepared pro-forma income statements and cash flow analyses for the LDC group of countries as a whole as if the countries were one market and serviced by one telephone operator. The results of the aggregate will differ substantially from the return on investment prospects for individual countries, hence caution is advised when interpreting the prospects of the sector in the aggregate and then relating it to the individual country markets. Nonetheless, the aggregate analysis will serve as useful guide to the potential opportunities provided by LDCs to investors in telecommunications related ventures. For our analysis we have prepared three scenarios: namely, baseline, optimistic and pessimistic.

The results for the LDC baseline case with OPEX at 64% and the tax rate at 40% were very positive; both for profitability and cash flow. Specifically, our analysis indicate that the market would be profitable for the entire forecast period with profits rising from USD 1,643 million in 2003, to USD 3,522 million in 2014. Free cash flow, on the other hand, because of capital expenditure requirements, remained negative, from 2004 through 2008 for a cumulative total of USD 3,591 million. From 2009 forward free cash was positive, increasing from USD 47 in 2010 to USD 2,684 million in 2014. For the 12-year period the LDC pro-forma cumulative free cash flow amounted to USD 4,826 million, hence producing an IRR of just under than 20%.

For our optimistic scenario, with OPEX at 60% and the tax rate at 36% the result improved significantly. In fact, the IRR increased to about 35%. Specifically, net income increased form USD 1,956 million in 2003 to USD 5,788 million at the end of the forecast period in 2014. The cumulative free cash flow under this scenario amounted to USD 17,623 million.

For our pessimistic sector scenario, with OPEX at 70% and the tax rate at 30% the results declined substantial for both net income and free cash flow. In fact, the IRR decreased to about 10%. Although net income increased form USD 1,583 million in 2003 to USD 2,237 million in 2014, the cumulative free cash flow under this scenario amounted to a negative USD 2,082 million.

The pro-forma financial and cash flow analyses of the LDC telecommunications sector under one-company and one-market conditions indicate that overall that the sector performance is positive, providing IRRs ranging from about 10% to 35%. More positive still is the fact that with the exception of the earlier years, cash flow is sufficient to meet annual estimated capital expenditures on infrastructure and equipment in all three scenarios.

What is true for the LDC telecommunications sector as a whole may not be true, however, for individual countries within the LDC group of countries. Hence, for private investors and multilateral agencies it is important to chose both the individual country investment opportunities from a return-on-investment (ROI) perspective carefully, but also to analyse the political and economic risk factors, which also vary wildly amongst the countries.

The performance of the LDC telecommunications sector will build on the embedded growth of the 1990s, except at a much-accelerated rate. Several factors stand out that are of importance to policy makers and investors: namely, the

- headcount ICTs divide between the developed countries and LDCs will narrow from twenty-fold or more today to four-fold or less by 2014;
- investment costs per subscriber will decline from USD 500 to USD 200 between 2003 and 2014, but total CAPEX will amount cumulative to USD 45.9 billion;
- revenues will amount to cumulative USD 179.8 billion from 2003 through 2014, while free cash flow will total USD 4.8 billion or our baseline scenario; and
- private investment should be the primary driver for ICTs expansion.

These are heady numbers indeed, but for the projections to materialize a number of important policy decisions have to be made by LDC governments. Our recommendations point to some crucial decisions, which will determine whether the LDC telecommunications sector can realize its potential. The performance of the sector in the 1990s indicates that the demand for ICTs exists in spite of high poverty incidence and lacklustre economic growth. And now is the time to set the stage for the continuation of the growth and diffusion/absorption of ICTs by building on the performance of the past ten years.

- **Technology Model:** Wireless, IP telephony, packet switched and router-based, off-the-shelf migrateable hardware and open source software, unified voice-data platform, and fibre optics in business districts.
- **Business Model:** Competitive markets for all services, business units, non-hierarchical decision-making, professional management, unbundled and cost-based rates, reliance on private capital funds, and corporatization of incumbent operator.
- **Regulatory Model:** Competitive markets, independence of regulators, cost based tariffs, only basic service regulated, price caps, USOs, unbundled interconnection rates, auctioning of licenses, and emphasis on diffusion of ICTs to all social/ethnic groups and regions.
- **Government Actions**: Telecommunications Act that is commensurate with a competitive market, licensing regime that allows free market entry, regulatory agency that is independent, improvement of credit market, improvements in the recognition of property rights, enhanced efficiency and transparency of the court system, take ownership of aid/development programmes, and stimulate economic growth through institutional reform.

- **Donors and Agencies:** Facilitate access to foreign capital markets, create seed funds for ICTs investments, make available loans at preferential interest rates to private investors, create loan guarantees for domestic investors, continue to provide debt relief, improve access to international markets by reducing tariffs and ending subsidies, and increase aid and resources for development.
- **Private Investors:** Analyse opportunities which are substantial, assess risks, select countries carefully, expect solid returns but take a longer term view, look for support from agencies, and obtain government support.

In the final analysis, this exercise has led us to three main: first that the headcount ICTs divide is narrowing fast; secondly, that the LDC ICTs sector is growing at a fast rate and that it is profitable; and thirdly, that the market can generate sufficient cash flow to provide the financial resources for the expansion. This is all positive news for the LDCs and for the private sector seeking investment opportunities. By increasing ICTs headcount it will precipitate diffusion and absorption levels, hence stimulating economic growth, thus reducing poverty. It is now up to governments, private sector, and multilateral agencies to play part.

Drawing from the issues raised in this publication, there is no doubt that a win-win outcome is possible for both LDCs and development partners especially the private sector. Whilst the least developed countries provide a large market for potential taping by the private sector, this group of countries stand to benefit from increased financial inflows into the telecommunication and ICTs sector as this will contribute towards the establishment of an information and knowledge-based society.

There is significance in the positive future outlook for the LDCs because, in these countries, increased connectivity and access to ICTs tremendously increase chances of achieving the eight Millennium Development Goals, and the 18 targets, that are all aimed at ensuring that the number of people living on less than a dollar a day is halved by the year 2015.

Bibliography

François Bourguignon – The Poverty-Growth-Inequality Triangle, World Bank Paper presented at the Indian Council for Research on International Economic Relations, New Delhi, India, February 4, 2004.

François Bourguignon – The Growth Elasticity of Poverty Reduction: Explaining Heterogeneity across Countries and Time Periods, World Bank Policy Research Working Paper, March 2004.

François Bourguignon and Christian Morrisson – Inequality Among World Citizens: 1820-1992, World Bank Policy Research Working Paper, March 2004.

François Bourguignon and Luiz A. Pereira da Silva – The Impact of Economic Policy on Poverty and Income Redistribution – Evaluation Techniques and Tools, World Bank Policy Research Working Paper, February 2004.

Craig Burnside and David Dollar – Aid, Policies, and Growth: Revisiting the Evidence, World Bank Policy Research Working Paper, March 2004.

César Calderón, Norman Loayza and Luis Servén – Greenfield Foreign Direct Investment and Mergers and Acquisitions: Feedback and Macroeconomic Effects, World Bank Policy Research Working Paper, January 2004.

George R. G. Clark and Scott Wallsten – Has the Internet Increased Trade? Evidence from Industrial and Developing Countries, World Bank Policy Research Working Paper, February 2004.

Benedict Clements, Rina Bhattacharaya and Toan Quoc Nguyen – External Debt, Public Investments, and Growth in Low-Income Countries, IMF Working Paper 2003.

Mark Gradstein and Denis Nikitin – Educational Expansion Evidence and Interpretation, World Bank Policy Research Working Paper, March 2004.

Philip Keefer – What does Political Economy tell us about economic development – and vice versa? World Bank Policy Research Working Paper, March 2004.

Aart Kraay – When is Growth Pro-Poor? Cross-Country Evidence, World Bank Policy Research Working Paper, March 2004.

Luc Laeven and Christopher Woodruft – The Quality of the Legal System, Firm Ownership, and Firm Size, World Bank Policy Research Working Paper, March 2004.

Martin Ravallion – Pro-Poor Growth: A Primer, World Bank Policy Research Working Paper, March 2004.

Jahangir Saleh – Property Rights Institutions and Investments, World Bank Policy Research Working Paper, May 2004.

Mans Söderbom and Francis Teal – Size and Efficiency in African Manufacturing Firms: Evidence from Firm-Level Panel Data, UNIDO, Vienna, Austria.

Scott Wallsten, George Clark, Luke Haggarty, Rosario Kaneshiro, Roger Noll, Mary Shirley and Lixin Colin Xu – New Tools for Studying Network Industry Reform in Developing Countries: The Telecommunications and Electricity Regulation Database, World Bank Policy Research Working Paper, April 2004.

ITU – World Telecommunication Development Report: Access Indicators for the Information Society, World Summit on the Information Society, Geneva 2003, ITU, Geneva, Switzerland, 2003.

ITU – Trends in Telecommunication Reform 2003: Promoting Universal Access to ICTs – Practical Tools for Regulators, ITU, Geneva, Switzerland, 2003.

ITU – Final Report – World Telecommunication Development Conference, Istanbul, Turkey, March 18-27, 2002, ITU, Geneva, Switzerland, 2002.

ITU – Least Developed Countries – Basic ICT Statistics, ITU, Geneva, Switzerland, 2003.

ITU – Telecommunications and Information and Communications Technologies in the Least Developed Countries 1989-1999, ITU, Telecommunication Development Bureau, Geneva, Switzerland, 2001.

The Economist – How to make Africa Smile – A Survey of sub-Saharan Africa, *The Economist*, Supplement, January 17, 2004.

The Economist – More or less equal? Is economic inequality around the world getting better or worse? *The Economist*, Special Report, March 13, 2004.

The Economist – Economic Focus – Pessimistic on Poverty? *The Economist*, Supplement, April 10, 2004.

The Economist – The "Digital Divide" – Canyon or Mirage? More or less equal? *The Economist*, Special Report, January 24, 2004.

UNCTAD – The Least Developed Countries Report 2002 – Escaping the Poverty Trap, United Nations Conference on Trade and Development, UNCTAD Secretariat, Geneva, Switzerland, and New York, USA 2002.

UNCTAD – E-Commerce and Development Report, United Nations Conference on Trade and Development, UNCTAD Secretariat, Geneva, Switzerland, and New York, USA 2003.

UNCTAD – World Investment Report 2003 – FDI Policies for Development: National and International Perspectives – United Nations Conference on Trade and Development, UNCTAD Secretariat, Geneva, Switzerland, and New York, USA 2003.

World Bank – Distribution of Income and Consumption Statistical Tables, World Bank, Washington, DC 2004.

World Bank – Private Sector Development Statistical Tables, World Bank, Washington, DC 2004.

World Bank – Integration with the Global Economy Statistical Tables, World Bank, Washington, DC 2004.

World Bank – Basic Economic Indicators Statistical Tables, World Bank, Washington, DC 2004.

World Bank – Size of the Economy Statistical Tables, World Bank, Washington, DC 2004.

World Bank – Population Dynamics Statistical Tables, World Bank, Washington, DC 2004.

World Bank – Growth and Output Statistical Tables, World Bank,Washington, DC 2004.

World Bank – Distribution of Income Statistical Tables, World Bank, Washington, DC 2004.

World Bank – FDI Statistical Tables, World Bank, Washington, DC 2004.