UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

INFORMATION AND COMMUNICATION TECHNOLOGY DEVELOPMENT INDICES



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This publication seeks to contribute to the exploration of current science and technology issues with particular emphasis on their impact on developing countries.

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PREFACE

In conjunction with the work programme of the Commission on Science and Technology for Development (CSTD) for the inter-sessional period 2001–2003 on "Technology development and capacity-building for competitiveness in a digital society", UNCTAD reviewed and evaluated existing work to measure ICT development from different sources, including academia, the private sector and international organizations (UNDP, UNIDO, OECD and ITU). On the basis of this earlier work, a theoretical framework has been formulated with a view to measuring ICT development, including indicators for connectivity, access, usage and policy. The framework was used to benchmark and analyse the diffusion of ICT capabilities across 160-200 countries for 1995-2001. This cross-country study compiles data and calculates ICT Development Indices for the following: connectivity (physical infrastructure for ICTs, in penetration rates of Internet hosts, PCs, telephone mainlines and mobile phones per capita); wider access to ICTs (literacy, GDP per capita and cost of local calls, as well as actual number of Internet users); usage of ICTs (incoming and outgoing telecom traffic, as an alternative to Internet data traffic flows in the absence of publicly available statistics on these); and policy environment (a wider policy framework conducive to the adoption and absorption of ICTs, which can be evaluated in terms of the presence of a domestic Internet exchange, as well as competition in the local loop, domestic long-distance and ISP markets). This study analyses country and regional rankings based on these index measurements, and reviews results over time to identify interesting trends. It also seeks to evaluate the extent and evolution of the digital divide, using basic measures of hardware equipment and numbers of Internet users in each country, to determine how the digital divide is evolving over time.

This paper was prepared by Ms. Philippa Biggs under the guidance of Mr. Mongi Hamdi of the UNCTAD secretariat. Comments were received from Ms. Lorraine Ruffing and Ms. Dong Wu. Production assistance was provided by Ms. Maria Lourdes Pasinos. The cover page was designed by Mr. Diego Oyarzun-Reyes.

Comments were also received during the various stages of preparation of the report from Sanjaya Lall, Calestous Juma, Jean Camp, Alan Porter and Larry Press, as well as from a number of CSTD members.

EXECUTIVE SUMMARY

This report analyses and evaluates information and communication technology (ICT) development using indicators of ICT diffusion across countries. It develops a conceptual framework for and selects key indicators measuring ICT development, with a specific focus on information and communication technologies (ICTs) as pervasive technologies of global impact, wide application and growing potential. Also, it benchmarks levels of existing infrastructure connectivity, as well as measures of future potential and important determinants affecting countries' abilities to absorb, adopt and make use of these rapidly evolving technologies.

The challenges in such a benchmarking exercise are manifold, in the selection of a representative set of indicators measuring the complex concept of technology development; in the "breadth versus depth" trade-off in the nature and number of these indicators; and in the integration of the results of benchmarking into policy analysis. Despite these challenges, used wisely and with caution, benchmarking can provide useful information and meaningful analysis for policy purposes. This cross-country analysis permits comparison between countries and monitoring of progress over time. Comparison with better-performing countries helps identify policies for further improvement and progression. Although benchmarking cannot investigate causation, it nevertheless allows straightforward identification based on evidence of "success stories" for closer investigation yielding policy conclusions. Approached thoughtfully, benchmarking is a useful input to policy analysis in allowing more informed and insightful study of policy and, ultimately, in promoting better, faster and more effective ICT development.

Classification of countries as falling behind, keeping up or getting ahead on the basis of rankings in these indices shows stable rankings over time, with strong regional influences apparent. As a generalization, African and South Asian countries are classified as falling behind, Latin American and transition economies as keeping up and OECD countries and South-East Asian Tigers as getting ahead. However, this classification masks considerable diversity in individual country experience, with Arab and "island States" as notable successes having good connectivity despite less competitive policy measures. Strong positive correlations are observed between connectivity and access and, to a lesser extent, connectivity and competitive telecommunications policy. Country rankings are stable and consistent over time, and in line with expectations based on income. Such stability in rankings is consistent with long-term time horizons required for telecommunications investment. It also implies that these indices are based on indicators measuring central ICT development.

The international digital divide regarding inequality in distributions of hardware equipment and Internet users across countries was also analysed and measured using Gini measures of inequality. Trends in connectivity over time suggest that, despite stable country rankings, there are small reductions in inequality in the distributions of hardware across countries, yielding the intriguing result of a diminishing digital divide. Gini analysis reveals some small, incremental reductions in inequality from highly unequal original levels. Our results show that more recent technologies such as the Internet (as measured by Internet hosts and Internet users) are more unevenly distributed relative to older technologies, such as fixed-line telephony. Our findings demonstrate "leapfrogging" in mobile telephony (with lower levels of inequality than expected, which decrease the fastest), suggesting greater potential for mobiles as more equally distributed technologies in bridging the digital divide. However, Gini coefficients are relative measures across the whole distribution and do not identify the origins of decreasing inequality. Therefore, relative movements in rankings were analysed to identify how countries and regions are faring in basic connectivity, in order to see which countries are contributing to reducing inequality, increasing inequality or preserving the status quo. On the basis of a regional analysis of relative rankings, OECD countries were found to be more tightly bunched in the upper "tail" of the distribution, while sub-Saharan African countries continue to occupy the lower tail of the distribution. It is therefore likely that the incremental reductions in Gini coefficient derive from the centre of the distribution of hardware equipment across countries. China in particular has a steady and significant rise in relative rankings that influences the Gini coefficient strongly, since China accounts for one fifth of the world's population. It is considered that, taken together, these analyses of the digital divide and the insights derived from benchmarking provide a detailed comprehensive picture of developments in the evolution in countries' ICT development.

Overall, these reductions represent small, incremental reductions in inequality from their original high levels. There is still considerable work to be done in extending ICTs to the large majority of the world's population, so as to bring them within reach of modern communications. However, the benefits of extending ICTs to the world's rural and poorer populations may be enormous.





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