



TECHNOLOGY AND INNOVATION REPORT 2021

Catching technological waves
Innovation with equity



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NOTE

Within the UNCTAD Division on Technology and Logistics, the STI Policy Section carries out policy-oriented analytical work on the impact of innovation and new and emerging technologies on sustainable development, with a particular focus on the opportunities and challenges for developing countries. It is responsible for the *Technology and Innovation Report*, which seeks to address issues in science, technology and innovation that are topical and important for developing countries, and to do so in a comprehensive way with an emphasis on policy-relevant analysis and conclusions. The STI Policy Section supports the integration of STI in national development strategies and in building up STI policy-making capacity in developing countries; a major instrument in this area is the programme of Science, Technology and Innovation Policy Reviews. The section also serves as the core secretariat of the United Nations Commission on Science and Technology for Development (CSTD).

In this report, the terms country/economy refer, as appropriate, to territories or areas. The designations of country groups are intended solely for statistical or analytical convenience and do not necessarily express a judgement about the stage of development reached by a particular country or area in the development process. Unless otherwise indicated, the major country groupings used in this report follow the classification of the United Nations Statistical Office. These are:

Developed countries: the member countries of the Organisation for Economic Co-operation and Development (OECD) (other than Chile, Mexico, the Republic of Korea and Turkey), plus the European Union member countries that are not OECD members (Bulgaria, Croatia, Cyprus, Lithuania, Malta and Romania), plus Andorra, Liechtenstein, Monaco and San Marino. *Countries with economies in transition* refers to those of South-East Europe and the Commonwealth of Independent States. *Developing economies*, in general, are all the economies that are not specified above. For statistical purposes, the data for China do not include those for the Hong Kong Special Administrative Region of China (Hong Kong, China), Macao Special Administrative Region of China (Macao, China) or Taiwan Province of China. An Excel file with the main country groupings used can be downloaded from UNCTADstat at: <http://unctadstat.unctad.org/EN/Classifications.html>.

References to sub-Saharan Africa include South Africa unless otherwise indicated.

References in the text to the United States are to the United States of America and those to the United Kingdom are to the United Kingdom of Great Britain and Northern Ireland.

The term “dollar” (\$) refers to United States dollar, unless otherwise stated.

The term “billion” signifies 1,000 million.

Annual rates of growth and change refer to compound rates.

Use of a dash (–) between dates representing years, such as 1988–1990, signifies the full period involved, including the initial and final years.

An oblique stroke (/) between two years, such as 2000/01, signifies a fiscal or crop year.

A dot (.) in a table indicates that the item is not applicable.

Two dots (..) in a table indicate that the data are not available, or are not separately reported.

A dash (–) or a zero (0) in a table indicates that the amount is nil or negligible.

Decimals and percentages do not necessarily add up to totals because of rounding.

FOREWORD

Recent developments in frontier technologies, including artificial intelligence, robotics and biotechnology, have shown tremendous potential for sustainable development. Yet, they also risk increasing inequalities by exacerbating and creating new digital divides between the technology haves and have-nots. The COVID-19 pandemic has further exposed this dichotomy. Technology has been a critical tool for addressing the spread of the disease, but not everyone has equal access to the benefits.

It is time to ask how we can take full profit from the current technological revolution to reduce gaps that hold back truly inclusive and sustainable development. The UNCTAD Technology and Innovation Report 2021 examines the likelihood of frontier technologies widening existing inequalities and creating new ones. It also addresses the national and international policies, instruments and institutional reforms that are needed to create a more equal world of opportunity for all, leaving no one behind.

The report shows that frontier technologies already represent a \$350 billion market, which could grow to \$3.2 trillion by 2025. This offers great opportunities for those ready to catch this technological wave. But many countries, especially the least developed and those in sub-Saharan Africa, are unprepared to equitably use, adopt and adapt to the ongoing technological revolution. This could have serious implications for achieving the Sustainable Development Goals.

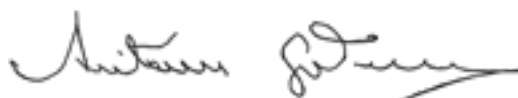
The Technology and Innovation Report 2021 urges all developing nations to prepare for a period of deep and rapid technological change that will profoundly affect markets and societies. All countries will need to pursue science, technology and innovation policies appropriate to their development stage and economic, social and environmental conditions. This requires strengthening and aligning Science, Technology and Innovation systems and industrial policies, building digital skills among students and the workforce, and closing digital divides. Governments should also enhance social protection and ease workforce transitions to deal with the potential negative consequences of frontier technologies on the job market.

The report also calls for strengthened international cooperation to build innovation capacities in developing countries, facilitate technology transfer, increase women's participation in digital sectors, conduct technological assessments and promote an inclusive debate on the impact of frontier technologies on sustainable development.

A key takeaway from the report is that technologies are not deterministic. We can harness their potential for the common good, and we have an obligation to do so. That is why I launched a Strategy on New Technologies in September 2018 to guide the United Nations system on how new technologies can and must be used to accelerate the achievement of the Sustainable Development Goals and the realization of the promise of the United Nations Charter and the Universal Declaration of Human Rights.

New technologies hold the promise of the future, from climate action and better health to more democratic and inclusive societies. As this report highlights, the guiding principle of the 2030 Agenda for Sustainable Development to leave no one behind provides a compelling incentive for harnessing frontier technologies for sustainable development.

Let us use them wisely, for the benefit of all.



António Guterres
Secretary-General
United Nations

PREFACE

The Technology and Innovation Report 2021 critically examines the possibility of frontier technologies such as AI, robotics and gene-editing widening existing inequalities and creating new ones. The debate about the relationship between technological change and inequalities has a long tradition in development studies. However, the broad reach, the seemingly unlimited and tight integration of these new technologies through digitalization and connectivity, and the rapid pace of technological change have put in doubt the relevance of the experiences of previous technological transformations to inform the current policy debate.

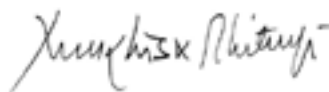
Frontier technologies can bring enormous benefits to the lives of poor people. Prospects are immense in agriculture, health, education, energy and other areas of development. There are numerous examples on successfully mobilizing frontier technologies. However, many of these technology deployment remains at pilot level. This Report discusses how to scale them up, how to bring their benefits to the poor, what government interventions and business models work, what good practices and lessons are there, and what the missing links are.

There is also a concern that automation, AI, robotics will destroy jobs and with that the dream of poor people in developing countries to get out of poverty. There is a fear that the chasm between haves and have nots would widen, while benefits are captured by a few with skills and capital. This Report discusses the impact of these technologies on labour markets and how to prepare the work force to benefit from the frontier technologies and minimize the risks.

The Report focuses on low and middle-income developing countries and least developed countries, as well as on the most vulnerable segments of societies, while providing discussion on the effects on high-income countries as parts of the broader context and major drivers of frontier technologies.

The Report argues that frontier technologies are essential for sustainable development, but they also could accentuate initial inequalities. It is up to policies to reduce this risk and make frontier technologies contribute to increasing equality. Low- and middle-income developing countries and the least developing countries cannot afford to miss the new wave of rapid technological change.

Harnessing this new technological revolution will require countries to promote the use, adoption and adaptation of frontier technologies. A balanced approach building a robust industrial base and promoting frontier technologies is a must for success in the twenty-first century.



Mukhisa Kituyi
Secretary-General
United Nations Conference on Trade and Development

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