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Over the past decade, the role of science, technology and innovation in growth has received increased attention from policy makers, including from the developing world, the limelight being put in particular on innovation as a driving force of growth and economic catch up. This reflects partly the progressively greater place occupied by science, technology and innovation in growth and development theories, as well as a shift in perception as to what innovation actually is.

Viewed from an historical perspective, the strong focus on science and technology per se is relatively recent. Technology began to be really identified as a potentially key factor of economic growth in the 1950s only (the residual of Solow¹). S&T gradually came to occupy a more prominent role in development studies and development thinking in subsequent decades, with however oscillating periods of more or less intense focus. As time went by, especially by the end of the 20th century and beginning of the 21st, the focus gradually shifted from science and technology per se to innovation. A significant body of innovation research began to develop, based on a broader understanding of the concept of innovation and its role in economic and social change. In parallel, the policy debate has been gradually moving away from an emphasis on technology transfer to issues related to knowledge and technological capacity building for development.

The treatment of science, technology and innovation (STI) in UNCTAD has also experienced up and downs, reflecting the evolution in development thinking and the fact that, in some periods (for

¹ R. Solow, 1956, "A contribution to the theory of economic growth", Quarterly Journal of Economics 70; R. Solow, 1957, "Technical change and the aggregate production function", Review of Economics and Statistics 39

instance during the debt crisis of the 1980s), other issues were considered to be more pressing for developing countries and took precedence over STI related issues. From its inception UNCTAD was the main forum of the United Nations for the integrated treatment of trade, development and interrelated issues in the areas of finance, technology, investment and sustainable development.² Being an institution fully devoted to development, it considers all issues through this particular prism. In the late 60s to early to mid-1980s its work focused heavily, though not exclusively, on international technology transfer. The negotiations on the international Code of Conduct on the Transfer of Technology were the high time of the period; they were conducted under the auspices of UNCTAD which produced a vast amount of analytical work on this topic. A whole Division in UNCTAD was then devoted to Technology. The negotiations on the Code completely broke down in 1985, failing to produce any agreement. Since then, the focus of the UNCTAD Secretariat progressively shifted from technology transfer to technological change and development, and to technological capability building. The mid to late 1990s and early 2000s continued to see UNCTAD working on technology related issues but to a lesser extent than during the high days of the Code of Conduct.

In more recent years, UNCTAD reinvigorated its work on technology, strengthening the "innovation" dimension, an evolution reflecting the greater attention being given to it in the rich body of literature on economic development as well as the wider recognition by policy makers of its role in economic growth and development. As part of this, our work has been exploring the relation between innovation and many other areas of interface such as innovation and climate change, innovation and green growth and innovation and entrepreneurship. Recent reviews of science, technology and innovation policies undertaken by UNCTAD for a number of developing countries for instance focus particularly on innovation and entrepreneurship³. In the past few years and in response to the need to achieve a growth that is both inclusive and sustainable, UNCTAD has worked on how STI policies can address poverty, food insecurity, environmental threats and job creation. In this context, for instance, UNCTAD published various reports on science, technology and innovation for development, including for instance one on enhancing food security in Africa through STI, and another one on renewable energy technologies⁴. I would like to share with you some of the conclusions of these reports. They illustrate the extent to which analytical thinking and development theory can trickle down into concrete applications and policy making, and demonstrate how the work of organizations such as UNCTAD serves as an important interface between academics and policy changes. For instance, the common analytical framework shared by all these reports is built around the concept of innovation systems. They examine the various components of these systems (national and sectoral for instance) and their interrelations.

² UNCTAD was created in 1964. See UN (1964), *Proceedings of the United Nations Conference on Trade and Development*, Geneva, 23nMarch - 16 June 1964

³ See for instance the Science, Technology and Innovation Policies Reviews (STIP Reviews) of Dominican Republic (UNCTAD/DTL/STICT/2012/1), El Salvador (UNCTAD/DTL/STICT/2011/4), Ghana (UNCTAD/DTL/STICT/2009/8), Lesotho (UNCTAD/DTL/STICT/2009/7), Mauritania (UNCTAD/DTL/STICT/2009/6) and Peru (UNCTAD /DTL /STICT/ 2010/2).

• Science, Technology and Innovation Policy Review of Mauritania (Symbol

⁴ *Technology and Innovation Report 2011: Powering development with renewable energy technologies* (UNCTAD/TIR/2011), and *Technology and Innovation Report 2010: Enhancing food security in Africa through science, technology and Innovation* (UNCTAD /TIR/2009)

They also put particular emphasis on the importance for policy makers to develop domestic absorptive capacity, and technological learning. By embracing a broad understanding of innovation⁵, they make the notion of innovation fully relevant to all developing countries and not only to the most advanced or emerging nations. By doing so, they encourage policy makers in developing countries, including poorer ones, to make STI policies an integral part of their development strategies.

- The report on "Enhancing food security in Africa through Science, technology and innovation" examined how the decline in agricultural productivity that could be observed in a number of developing countries, particularly in Africa, could be reversed through building agricultural innovation systems that not only provide the framework required to develop new technologies and adopt existing ones, but also deal with other constraints that may lie both on and off farm (such as agricultural infrastructure, services extension, land management practices, marketing networks, credit and financing scheme). The report underlines that current needs are not so for significant discoveries or technological breakthrough, but rather for developing technological capabilities to apply knowledge and technologies and adapt and build upon them. As the Report states, "much of what is relevant today to African agriculture relates more to incremental improvements in processes, products, inputs or equipment needed to adapt existing technologies to the local environment in ways that enhance productivity and lower costs"⁶.

The report also highlights the importance of focusing on smallholder farmers in Africa as they make up for the bulk of the continent's farmers. It notes in that respect that the tendency to focus on science and technology in the agricultural sector had limited the capacity of the agricultural innovation system to respond to the needs of the sector. Indeed, technology of importance to agriculture is created by a variety of actors, such as universities, firms, research institutes, and farmers. However, in this chain of actors, farmers in Africa (especially small scale farmers) have overall been overlooked. Focusing primarily on science and technology has resulted in an absence of mechanisms to promote linkages between the various actors of the agricultural system, often preventing the ability of the system to use available knowledge for practical application.

In that context, the report calls in particular for placing smallholder farmers at the center of agricultural innovation policies. Such policies must be oriented towards ensuring that agricultural research, development and extension services meet the real needs of small- scale farmers. For modern technologies and innovations to be adopted by these farmers, it is important that the production processes, and the socio-economic determinants of labor (for instance the role of female labor) be fully understood, and imperfections in the rural factor markets be removed through a combination of policy measures, structural changes and bold institutional reforms.

⁵ In this broader perspective, innovation refers to new products and services, methods of production, and organizational arrangements that are new to a given context (a firm or a country) but not necessarily to the world.

⁶ *Technology and Innovation Report 2010: Enhancing food security in Africa through science, technology and Innovation* (UNCTAD /TIR/2009)

- The Report on "Powering Development with Renewable Energy technologies" examined how renewable energy technologies could help address the dual challenge of promoting industrial development and ensuring universal access to energy in developing countries while mitigating climate change. The report analyzed the important role that STI policies can play in promoting and facilitating the development, acquisition, adaptation and deployment of RETs for sustainable development and poverty reduction. Here again, the report emphasizes the need for developing the required knowledge and technological capabilities to ensure the benefits of RETs do accrue to developing countries. Noting in particular that evidence showed that basic approaches to solve technological problems had long been off-patent⁷, the report points to the need for reinforcing the technological absorptive capacity of countries (through the strengthening of their innovations systems, linkages between their components and policy frameworks for instance) to facilitate the development of RETs responding to developing country needs and their wider dissemination. The Report shows how indeed technological and innovative capability are fundamental not only for the development of new RETs but also, and as importantly in many developing countries and LDCs, to introduce incremental technological improvements enabling cost reductions and facilitate the adaptation, dissemination, maintenance and use of RETs within key sectors of the economy.

The Report calls for a repositioning of the issue within the international agenda, with a more positive approach, where the obligations of countries to mitigate climate change are not antagonistic to development, but on the contrary build upon the virtuous relationship between, on the one hand, technology and innovation capacity for RETs and, on the other, climate change mitigation. This requires that a greater focus be devoted to 1) strengthening international financial support for RETs and 2) articulating more clearly access to RETs and technology transfer (including through the creation of flexibilities in the IPRs regime) and shifting international debates from a narrow focus on technology transfer to a broader one on enabling technological assimilation.

At the national level, the Report also proposes a number of policy incentives not only for R&D, innovation and production of RETs but also, and as importantly, for promoting technological absorptive capacity and learning related to RETs, which will be required for their wider use within the economy. In addition, and pushing further the systemic approach, the Report calls for an integrated innovation policy framework for RETs linking national innovation systems for RET development on the one hand and energy policies on the other

These are just two examples of the research and policy work of UNCTAD on science, technology and innovation for inclusive and sustainable growth. There are a number of others that I did not mention but are also very important, such as the work we have been doing for several years on ICT and

⁷ The report however also notes that a few studies point to an increase in RET patenting in recent years (see for instance the 2010 study by UNEP, EPO and ICSTD, UNEP, EPO and ICTSD (2010) "*Patents and Clean Energy: Bridging the Gap between Evidence and Policy*", (www.epo.org/clean-energy)).

development (on ICT, enterprise development and poverty alleviation, for instance) and on ICT and gender⁸.

In conclusion, the renewed emphasis on technology and innovation and their role in the development process is all to be welcome. Such enhanced focus can be seen not only among scholars but also at the level of policy makers, including in developing countries. An increasing number of these countries are undertaking a review of their STI policies; a number of them, including poorer ones, are developing strategies for innovation and technological learning. This in a way departs from a traditional attitude, at least in the world of politicians and policy makers: except for a few major developing economies, science, technology and innovation did not usually figure very high up on the political agenda, largely because short term - often vital - needs had to be taken care of. The increasing body of research on technology and innovation for development and the broadening of the concept of innovation, combined with the work of regional and international organizations (such as UNCTAD) have led to a wider acceptance, including in least developed countries, of its importance for development and of the need for countries to adopt the policies required to foster it. As an illustration, one can note for instance that the Plan of Action adopted at the latest Conference of the United Nations on Least Developed countries (LDCs) in Istanbul in 2011, features prominently science, technology and innovation among its priority areas for action. It recognizes in particular the need to acquire new technologies and build domestic capacity and a knowledge base to be able to fully utilize acquired technologies and promote indigenous capacity for research and development⁹. As well, it is interesting to note that in the major technical cooperation package for LDCs announced by the government of Turkey at the Conference, technology figures, along with trade and investment, as one of the main targeted areas.

As regards UNCTAD specifically, I hope that we will continue to collaborate and discuss with scholars, including in settings like this one. First, to contribute to the development of a body of research and analytical work on technology and innovation for development, keeping abreast of current academic thinking. Secondly - and as importantly - to bolster the link between this growing body of research and policy makers, so that they not only benefit from it, but also test it, validate it, and provide you with feedback from the front line. Academic and international organizations have much to gain and much to offer by working together on innovation. This is worth the effort and the time has never been more auspicious to do it.

⁸ See for instance *"Information Economy Report 2011: ICTs as Enabler for private sector development "* (UNCTAD/ IER/2011), *"Information Economy Report 2010: ICTs, enterprises and poverty alleviation"* (UNCTAD/IER/2010), *"Applying a Gender Lens to Science, Technology and Innovation"* (UNCTAD/DTL/STICT/2011/5)

⁹ Programme of Action for the Least Developed Countries for the Decade 2011-2020.