ESCWA input to the Report of the Secretary-General for the 2013 Annual Ministerial Review of UN ECOSOC

"Science, technology and innovation, and the potential of culture, for promoting sustainable development and achieving the MDGs"

I. Introduction

The Western Asia and North Africa 17 Arab countries members of ESCWA are not homogeneous in all aspects of Science, Technology and Innovation (STI) inputs and outputs, and might compose 4 dissimilar groups. The population of the region is overwhelming young, and based on recent ILO report over 60% of the educated youth are out of school and unfortunately out of work. The same region is an accessible competitive reservoir of world energy sources, yet concurrent with frequently scheduled blackouts; migrating educated human resources while importing most products and labour force at all levels of the skills ladder; wealthy velvet islands floating in deprived oceans; and booming oases dispersed in stagnated deserts. The capacity is huge for population over 300 million with the available natural resources, strategic geographical location, and authentic rooted culture. The potential to improve industrial and agricultural productivity yielding better wages and improved quality of life for the people of the region through harnessing STI extends beyond the region to contribute constructively to more secured world and realistically sustained planet. Much has been invested in education and related infrastructure. Yet, there is a disappointment in the return towards employment, fighting poverty, reducing migration, strengthening political stability, improving security and sustainability.

In preparation of the 2013 annual ministerial review of the Economic and Social Council, a regional preparatory meeting on the theme *"Science, technology and innovation (STI) for sustainable development"* was held on 26 November 2012 in Amman, Hashemite Kingdom of Jordan. The meeting was hosted by the Government of Jordan, in cooperation with ESCWA, the United Nations Department of Economic and Social Affairs (UNDESA) and United Nations Educational, Scientific and Cultural Organization (UNESCO). The meeting brought together a diverse group of regional stakeholders to discuss the state and present role of scientific research and innovation in Western Asia and North Africa and options for improving policies and incentives for increasing investment in STI in the region.

II. The nexus between science, technology and innovation (STI), and culture, the sustainable development in Arab countries

The Arab region will have to rely on technology for future socio-economic progress given the importance of knowledge in determining the wealth of nations in the 21st century. The youth population have the chance to "leapfrog" into developing technology tools. Research and analysis on knowledge production and innovation in

the Arab World has grown exponentially in recent years, as quickly as scientific investigations themselves. There is still a lot of need for improving the quantity of research and innovation activities. Perhaps prematurely, Arab countries have wanted to be called 'knowledge societies' and everyone appears driven by the need to become '*knowledge economies.'* As globalization becomes an economic and political norm, the national orientation has been strategically under threat. Part of the issues involved in resolving the riddle of under-investment in research and innovation in the Arab World are related to strategic choices such as solar energy, desertification, water resources, use of non-conventional sources of energy, uses of nanotechnology in low tech environments, orphan and geographically-specific diseases, as well as management of local institutional forces, decision-making systems. The growing gap in knowledge production between a few Arab countries and the rest amplified the various issues related to human capacity and scientific capital and the special role of universities.

In most Arab countries, scientific research agencies are attached to higher education systems, rather than to production and service sectors, as they are in industrial countries. This has contributed to the creation of a wide gap between education and research on the one hand and economic and social needs on the other. The rare effort of private sector is (2.9%) in financing research. Arab research centers at first focused on the basic sciences, but subsequently diversified their programs to include medical and agricultural sciences, among other applied specializations. During the last two decades, human, social, and environmental sciences have also been added. A number of national funds for science, technology and innovation have been set up in recent years.

Innovation policies have been developed and sustained quite firmly in the last years by some governments. A specific emphasis was put by funding agencies and governments in the development of techno-parks and industrial clusters. Arab countries do not show a positive correlation between GDP and innovation. Despite the high GDP in oil-producing Arab countries, the ranking on the innovation and scientific research index of some of them remain low in comparison to other Arab countries with lower incomes. Innovation is not yet part of S&T parlance in the region. This may be attributed to the weak linkages overall between private and public R&D, as evidenced by the low output of patents. Recently many science parks were established in many Arabic countries. First in all Gulf there is a move towards partnerships in innovation between private and public R&D, and this can explain the relative optimistic opinions from business executives on innovation that have been interviewed for the World Bank Survey. The development of a "space for science" as socio-cognitive blocs can be an extra-terrestrial space of exception, in the sense that the law of city does not necessarily apply to them, so they can have the freedom to be critical of their own society and their cultural scripts, but also connect to society in the sense of responding to their needs.

III. Shaping the course of development: the potential of culture

Some of the Arab countries reliance on income from natural resources (Gulf), or from the development of services (Lebanon), might mean that they do not really need science and research! They may maintain universities, invite topflight teachers, and support the research they pursue for their own career and the prestige of sponsors, but their commitment is unclear. The nationalist governments that tried to develop import substitution, even when they failed in that plan, generally established a science base which remains a national asset for the country. It must be stressed that the (re)building of a science base is slower and more difficult than its demise, and that the tribulations of a "to and fro" strategy in support of science leave clear, long-lasting scars. However under the hammer of the market, the "national" mode of knowledge production fell into disgrace, and more linkages were established with the market economy. This shift, more often than not, led to a withdrawal of state support, and sometimes to the disparaging of local scientists as parasites. Scientists organized professionally, but the promises seemed a long time in coming. The liberal way of thinking changed things, and well-being was no longer sought from the state but from enterprises, progress no longer from science but from innovation. Social values all around are yet another dimension; some nations have traditionally held science in high regard. Others have not had such traditions or they have another understanding of what valuable knowledge is. Political power or material wealth may supersede all other aspirations in imparting a certain kind of status on science. Religious beliefs, values related to aristocratic ancestry or to the family may also override all other considerations. These tendencies may well interfere with a commitment to science and its standards. There are few examples of self-censorship for partially religious or political reasons, and of family duties superseding professional obligations. In many places, this may reach the point where practicing research has no other meaning than fulfilling the formal requirements of building one's career.

IV. An enabling environment for transformative change in society towards sustainable development through STI and culture

At present, Arabs are really aware of their chronic state of under development in science and technology. In every Arab country, scientists and policy-makers in charge of science have been trying very hard in the last ten years to create a transformation of their research systems. Governments usually discovered at their own expenses that when the trick worked and scientists began working, all sorts of unpredicted benefits were rushing in. They discovered that science is now professionalized worldwide and, more importantly, quite expensive. Interest in research by the specific policy-makers is thus not so much related to the national pride as to the defence of competitive advantage. Moreover, some countries outside

the Arab region, such as Brazil, Chile, Malaysia, Turkey and South Africa have shown that in a very short time, there may be the prospect of a spectacular growth.

Plaguing fact, Arab countries have small patenting figures. This is usually used as a reason to conclude that more patenting should be encouraged. Policies have been designed that are supposed to promote the development of research into patents. But this is only a small part of the more general issue of the relation of research with the economy and society. More generally there has been a broken cycle between research, university and the society. It expresses differently in different domains of economic, political and social life. One of the most important aspects has been the working conditions of researchers in their institutions. Since most of the researchers in Arab countries belong to Universities, this relates very much to the way universities are supporting research. In many universities, the sweeping majority of faculty are absorbed by heavy loads of teaching and capacity building for the institution where they work. Moreover, research has been too narrowly related to the individual promotion of professors. 'Research' has a distorted sense in this case since it only relates to the reception by the colleagues and the administration of the university and only for a specific person. Research should be promoted as part of a collective endeavour that has shared activities common working plans. A difficult issue relates to the evaluation systems and the way the academic institutions measure their own performance. There is a low correlation of the research output –even when restricted to academic publications –with the number of academic/research personnel. The evaluation systems should not restrict to measuring papers in journals. This leads to divorce of science from society and even the market. Patenting might not be the right tool to measure applied research (in fact it is not a good tool since it relates to commercial considerations as much as technical ones), but the fact is that there are too few patents. Patenting might be expensive, uneasy or not worth the risk as compared to other strategies, but it should in any case be examined by a support and technology transfer unit with high degree of institutionalization.

Business incubators, technoparks and technopoles or industrial clusters in high-tech are not necessarily a cure, or at least will probably be less of a solution than was initially thought of. But at the same time this is not to say that these efforts should be abandoned. These are usually initiatives that have a real meaning and, as far as they associate business practitioners, companies, and real markets, they should be promoted and supported. Technoparks and the like are also part of a regional economy, and they function not without developing strong links with actual economic and social entities that surround them; thus, they should be included into regional development considerations and economic programmes that support local businesses and not initiatives restricted to the academic dynamic.

While national companies are more innovative than the branches of multinationals, success stories of companies show that innovation is to be found in rather large "medium-sized" companies, around 300 employs, based on a long technical expertise that can be fed by continuous improvement in actual markets and

interactions with clients and providers. On one hand, there is growth of innovation activities, in all kind of companies and even firms that were not interested in this activity some years before; on the other hand, innovation surveys indicate a low level of interest of the companies with public support to innovation. Entrepreneurship is often said to be lacking and this is considered as explaining the low level of innovation. This is not the case in most Arab Eastern economies, it isn't true either of economies that have a strong and centralized state like in Maghreb; rather it appears that entrepreneurship is the most abundant resource. What seems to be more difficult is to secure regular market support and continuing expansion.

The fact that research landscape in each Arab country is fragmented and in small scales, it is very debatable whether one can talk of a science "system" in many of these countries, as they do not exhibit typical systemic characteristics. Institutions are not typically aligned through input, process and output flows, and there is no systemic behaviour in response to external changes and demands. Rather, the image of an "assemblage" of fragile, somewhat disconnected and constantly under-resourced institutions is perhaps a more appropriate metaphor to describe the science arrangements in most of these countries.

The institutional complexity of a research system is always a difficulty here. Moreover recent exercises in priority setting in Arab countries usually produce a catalogue, which is possibly relevant but not feasible with local resources. The pursuit of some programmes, which imply the energetic support from the state in areas considered "strategic" and applied research, where the public authorities promote active collaborations or "clusters" with dynamic firms. The areas for funding are nowadays well known: water, desertification, renewable sources of energy, agro-food and so on. The main evaluation criteria here would be relevance to local economy and intensiveness of linkages with the productive sector. Promotion of some research areas with clear socio-economic objectives that are specific to the country, where users and social actors are present, and where the economic interest is not the first objective, such as health for example. These areas related to users, real users, not users that are imagined by the promoters of the projects, could also be recollecting and using local knowledge, for example in agriculture, medicine, pharmaceutics, fisheries and the like. 'Traditional knowledge' is better introduced into research and new developments when it is linked to communities using this traditional knowledge. The main criteria here would be relevance to social needs and creation of strong teams. In areas of basic sciences, collaboration with foreign colleagues is sought after actively and the objective is neither socio-economic, nor innovation driven. Excellence and novelty should be the main evaluation criteria. Research needs to be clearly identified and not only included into larger objectives like industrialization, promotion of food and health or other socio-economic objectives. Public budgets should clearly identify the research part. If not, sooner or later, a powerful alliance of misunderstanding and economic interest will always make it disappear in benefit of often "sexier" objectives. Funding should go to teams, not individuals. Teams need time to be created. The research teams have to adapt quickly and respond to the offer, and

function as consultancies instead of consolidating their human resources and equipment. Naming "clusters of activities" is not a sufficient manner to induce the creation of strong teams around specific objectives. One needs a mechanism that would permit to guarantee regular funding on the medium-term and not exclusively from outside sources. Research in a social and economic environment that shows little interest for research is possible. International cooperation is one of the main tools of consolidating a competence: it does not permit to develop its own basis of research themes that are more relevant locally than they are for their foreign partners.

It is clear that scientific networks at the level of sub-disciplines could be promoted and that the resources form Gulf countries would be useful in that effort. The idea that inter-regional cooperation will be promoted by Gulf, Turkish or Iranian funding is somehow ideal. Bilateral programmes might be more efficient at first. The good idea to use the full capacity of the region by using the Gulf funding, or any other source, does not make sense if it not accompanied by a policy with stated objectives.

During recent Arab Summits, the Heads of State adopted resolutions mandating the General Secretariat of the League of Arab States to develop an S&T strategy for the entire Arab region, in co-ordination with specialized Arab and international bodies. There are 14 priority areas, including water, food, agriculture and energy. Also the launching of an online Arab S&T observatory to monitor the S&T scene in Arab states and highlight any shortcomings in implementation. One of the keys to implementing measures at the country level will lie in identifying some of the national challenges that Arab countries face.

At the same time, lessons learnt from many countries in Latin America suggest the importance of connectivity in the level of institutions and individual researchers. With the advent of Open Science, strong protests have emerged from working scientists that have used the force of 'social digital networks' to mobilize the community giving way to a renewal of peer partnerships. The Arab World could profit intellectually from this tendency. Moreover, universities and science councils should defend the popularization of science. A massive effort should be given to create a wider audience for science, technology and innovation by creating lively journals, websites, films, documentaries and other dissemination tools for scientific and technological activities. Citizens shouldn't be kept in the ignorance of what happens in their own countries in the laboratories, schools and universities.

Scientists and engineers would probably accept comparatively lower salaries from their colleagues in the USA or Europe if they have better conditions in the academic institutions in their own country.

V. Recommendations

- Governments should adopt national innovation strategies and coherent science and technology policies as

important first steps to ensure that the necessary policy framework for the flourishing of innovation is in place. For even greater coherence, these could also be adopted at the regional level.

- When planning national innovation strategies, policymakers need to take into consideration how features of the wider social and political environment do or do not encourage innovation, and design incentives accordingly.
- Increase the gross expenditure in research and development (GERD) to demonstrate the national commitment to science, technology and innovation, in line with national sustainable development priorities and strategies to grow sustained scientific research teams.
- The role of higher education and research systems needs to be re-thought. Higher education and research systems should be hubs for scientific and technological development, as well as innovation. Where possible, degree and research programmes should be strategically oriented toward addressing future and emerging challenges in high-demand, high-growth sectors.
- Although higher education systems in the region must adapt to new challenges, remember the importance of basic science education for many dimensions of the sustainable development agenda, including public health literacy, general scientific literacy for problem-solving and sustainable consumption patterns.
- Financing entities should bear in mind that much of the private sector activity in the region occurs among micro-enterprises, making it difficult for entrepreneurs to take risks that could result in innovation.
- Local private sector and policy entrepreneurs should take advantage of developments in STI made elsewhere using information and communication technologies to leapfrog the intermediary steps of technological development.
- New STI tools for sustainable development being developed at the global level are important to harness but can't be used without sufficient capacities and skills developed in the region.
- Actors in the region should put just as much effort into strengthening intra-regional networks as they have into forging partnerships with actors outside of the region (e.g., in Europe and North America).
- The UN system and development cooperation providers should consider the great potential of international research collaborations and other international innovation-oriented networks to help deliver on the post-2015 UN development agenda.