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## THE SCIENCE, TECHNOLOGY AND INNOVATION SYSTEM IN THE REPUBLIC OF IRAQ

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## НАУКА, ТЕХНОЛОГИИ И ИННОВАЦИОННАЯ СИСТЕМА В ИРАКЕ

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*В данной статье представлен краткий обзор стратегии научного и технологического развития Ирака, а также деятельности иракских университетов по инновационному развитию страны.*

*This article provides a brief overview of the strategy of scientific and technological development of Iraq, as well as the activities of Iraqi universities in the innovative development of the country.*

*Keywords: STI, ICT, MoHESR.*

### Introduction

Several countries around the world, both developing and developed, have put in place national programs designed to enhance awareness of the importance of science, technology and innovation for development. The main objectives of such programs include creation of an overall environment that is friendlier towards science, technology and innovation.

Programs of this nature are generally directed at two sets of recipient populations, the general public on the one hand, and the country's youth, on the other. Programs directed at the former category often target a variety of objectives; including promotion of particular national projects, in ICT (Information and Communications Technology), energy, water, the environment. While programs targeting youth are aimed inducing larger numbers of students to opt for studies, and future careers, in science, engineering, medicine and related disciplines.

Programs undertaken with the above objectives in mind include the organization of fairs and exhibitions, often at the regional level involving a number of schools whose students, mainly at the intermediate, secondary and university levels, contribute products and processes they were able to develop on the basis their own research and development activities, with prizes and other

incentives presented to winning entries, and with schools and regions amassing scores in competition for top placement at the national level.

Several countries also organize a “science week” during which debates and presentations are made on selected topics of current interest, sometimes with concurrent exhibitions and contests.

These and other modalities may well be included within future Iraqi strategies aimed at enhancing awareness of the importance of science, technology and innovation and creating interest in related professions among the country’s youth. It is also often that efforts intended to popularize science, technology and innovation take the form of national media campaigns that include diffusion of science-oriented programs, distribution of relevant publications as well as the design and dissemination of computer games that promote interest in science and engineering [1].

### **Research Organizations in Iraq**

The two major institutions with diversified research capacity in Iraq are public universities and Ministry of Science and Technology. A brief overview is given below:

- In Iraq, the greatest research capacity is in universities. Iraq has more than 24 public universities in addition to several more private universities. Iraqi universities have a total faculty of about 40000 members with postgraduate degree. In Iraqi university system, all faculty members are required to do research in addition to teaching activities. More than 25000 postgraduate students are enrolled in Iraqi universities. This number is to be doubled by the end of 2017 according to Iraq National Development Plan. Research in Iraqi universities covers all fields of natural sciences, technology, social sciences and humanities. Universities emphasize basic and applied academic research. All public universities are owned by government and offer free undergraduate and postgraduate education to Iraqi citizens.

- Research centers in the Ministry of Science and Technology cover the fields of Information and Communication Technologies, Space Technology, Industrial Research, Agriculture, Material Research, Renewable Energy, Chemical Waste Treatment, Environment and Water Technologies and Nuclear Decontamination and Waste Management. These centers carry out research work, lead inter-ministerial projects and provide specialized technical services to line ministries and governorates.

In addition, there are other research centers within some ministries specializing within the scope of the respective ministry [2].

### **Scientific research strategy by the Scientific Research Directorate (MoHESR, Baghdad)**

The Ministry of Higher Education and Scientific Research (MoHESR) initiated cooperation with UNESCO aimed at drafting a strategy aimed at enhancing the country's scientific research capabilities. This strategy includes projects targeting specific goals aimed at improvements within the following categories:

- a. research manpower;
- b. budgetary allocations;
- c. legislative and regulatory arrangements;
- d. access to published information;
- e. cooperation with research institutions abroad;
- f. research output of research papers and patents.

With regard to resources allocated to research activity, the Ministry is quoted as seeking increased allocations through amending a law that regulates private sector firms' operations so that 1 percent of annual profits is allocated to scientific research. Projects targeting goals of the MoHESR strategy are mostly to be implemented by the Ministry itself through funding allocated for its operations during 2011-2012. A proportion of these projects will require additional funding which would presumably be sought from the government's budget. With regard to encouraging higher levels of research productivity, the Ministry's strategy includes an item intended to award a total of Iraqi Dinar (ID) 20 billion between 2011-2020, i.e. an annual ID 2 billion to distinguished research output.

The MoHESR strategy includes a project aimed at the establishment of science and technology parks and incubators at Iraqi universities. However, no specific locations are indicated as candidates for hosting these entities. Additionally, no information is available on budgetary resources to be allocated for the project's implementation. Another noteworthy project is designed to establish a number of permanent chairs at selected Iraqi universities. However, it is not immediately clear how many chairs would be established, in what specializations and at which universities.

On the legislative and regulatory front, four projects within the strategy stand out. The first relates to a law stipulating an annual national budget assigned to scientific research activities as a percentage of the country's GDP. The second law is aimed at fostering scientists in Iraq and is expected to lead to improving their status as well as enhancing their contributions to sustainable development. The third law is aimed at establishing Iraq's Scientific Research Council, designed to promote scientific research across disciplines and

institutional entities throughout Iraq. The fourth is concerned with establishing statutory basis for scientific research personnel.

More importantly, considering the purpose of the present Roadmap, are recommendations made by the Director General of Scientific Research at the Ministry of Higher Education and Scientific Research in Baghdad which are clearly in favour of the formulation of a national policy with the intention of unification of scientific research policies in Iraq as a whole and rebuilding Iraq's scientific research capacity in a manner that is consistent with international practices [1].

### **New technologies**

Some universities in Iraq have already made moves to establish capabilities in a host of new technologies such as remote sensing at the universities of Baghdad and Mosul and laser engineering at the Al Nahrain University and the University of Technology.

The UNESCO survey of research institutions conducted in July-August 2011, has also shown that a few research centres have also been recently established in nanotechnology and biotechnology and genetics. In designing national STI initiatives in these and other novel technology domains, it would be necessary to address issues that reflect actual needs in addition to capacity building, which is a worthy objective, in itself, considering the novelty of such technologies worldwide, and on the Iraqi STI scene, in particular [1].

### **Modern Trends in Innovation – Technology Incubators and Technology Parks**

There has been great interest in recent years, especially after 2000 to create technology incubators, technology parks, science parks, research parks and variations on this theme. The idea is to intentionally create an ecosystem that supports innovation and link different stakeholders for better cooperation. Stakeholders considered include research organizations and facilities, new startups, engineering enterprises, commercial firms, regulatory bodies, venture capital ...etc. Such projects are now common in developed and emerging economies and are expanding at a fast rate.

International organizations interested in economic growth provide consultations and services to developing countries to start their technology incubator and park programs. The list of such international organizations includes the World Bank, UNIDO, UNCTAD, UNESCO and others. Almost all countries in the region have started their programs and created such institutions during the past decade and all neighbor countries have such programs. However, interest in such projects developed only recently in Iraq.

There are plans underway now. Hopefully, first technology incubator in Iraq will be launched soon [2].

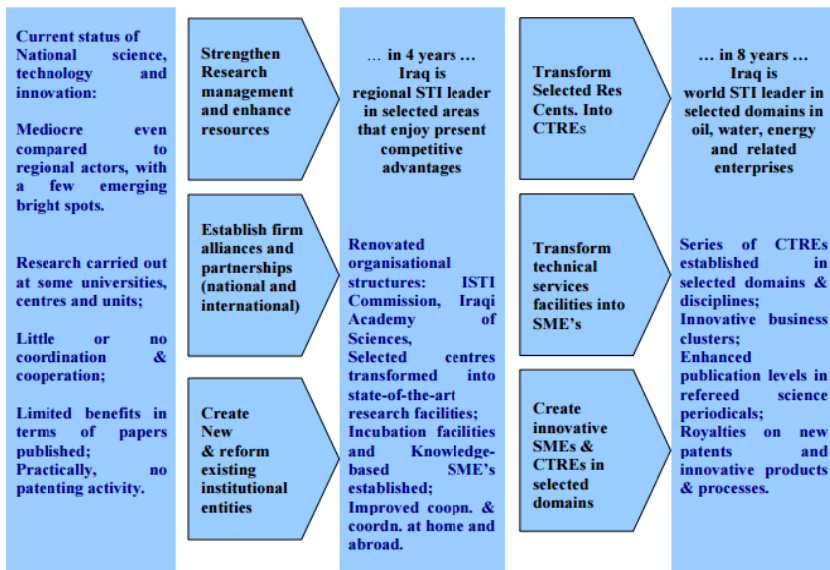


Fig.1. Possible paths for the evolution of Iraq's STI system

## Conclusion

A variety of new institutions and a host of reform and restructuring activities would be needed in order to firmly place scientific research, technology development and innovation high on Iraq's development agenda. resources at a time when Iraq still faces other serious challenges on several fronts, it should be remembered that establishing a functional national STI system holds effective solutions to many of Iraq's current challenges.

Figure (1) presents a concise summary of possible paths for the evolution of Iraq's STI system over the next eight years, and up to the year 2020 and examples of some transformations that are required to create a vibrant STI system in Iraq as well.

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