The development of Science and Technology Parks in Iraq

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Preview

This note provides a short introduction on STP (Science and Technology Parks) and associated incubator proposal. It calls for expertise to study and develop the most appropriate STP models and plans that satisfy the conditions and ambitions of Iraq. It provides the prologue for workshop discussions on the subject and identifies scenarios that have the potential to form the nucleus for a first STP in Iraq.

What is our vision?

"To develop and use research and innovation to improve the prosperity and quality of life of the Iraqi population".

The aim is to develop Ministry-based strategies to initiate and exploit centres of world-class scientific research. This will be achieved by, among other things, developing policies on R&D, knowledge transfer, government and business support, skills, infrastructure, and communication links. These strategies will also promote a closer partnership between government and the research base.

The Science and Technology Park will:

1. Act as a facilitator for researchers, project initiators and innovative technologists. It ensures that research potential is adequately developed and used and it matches the skilled personnel required by the park's strategy.

2. Draw on the strengths of the Iraqi top-class universities and researchers in Iraq and abroad, as well as other key research facilities within the country.

3. Help achieve improved prosperity and quality of life in Iraq through activity such as sourcing new technology and working closely with government and universities,.

4. Initiate not just a short set of projects but a long-term vision that will contribute to Iraq's economy and people's quality of life.

5. Ensure that the focus of activity is on country-wide and also recognise that there are significant strengths in the rest of the Middle East region and that S&TP can meet the needs of the Iraqi society.

6. Promote knowledge exchange among universities, schools and other knowledge or learning organisations, so that there is better access to skills by and of the science and technology community.

7. Raise the profile of the country's strengths and expertise so that we demonstrate the value of research and innovation to governing, industrialization, healthcare and agricultural development and sustainment.

This proposal describes what we wish to do to turn the concept of a Science and Technology Park into reality for Iraq.

1. Our definition of Science and Technology is broad, with strong emphasis on applied science, applications and technology transfer. It includes medical, natural, physical and engineering sciences, and design and information technology. We see STP as a catalyst for translating science and technology into real benefits for innovation and quality of life.

2. This proposal aims to stimulate the creative thinking and planning needed to develop STP.

3. Those partnership with universities and other research organisations should facilitate demand-led activity. We would like to see more discussion, especially between government and scientists so that they understand what is expected from the STP concept.

4. This proposal is not the final plan – it is a starting point to encourage partners to support the vision, understand the objectives and commit to real action.

I. Introduction

The issue is not if or should Iraq have a science park but more pertinently, the issue is more: What sort of project? How will it be developed? Where will it be developed? And, who will be the stakeholders? There are various models in the western industrial world, some old, and more recently, new ones being established. There are also several science parks being built in neighboring countries (e.g. the Gulf States) that are less industrially developed than Iraq and with little home-born research and innovation base. Several types and sizes of STPs exist in emerging (e.g. China) and merging knowledge-based economies (e.g. Portugal). Some examples of STPs include national centers of excellence and government-run innovative industries and top-class laboratories. The initiatives vary from concept formed by a market pull or by technology push. In all cases a University and incubators from centers of research (excellence), the regional or provincial government and private companies and investors organizations are the main stakeholders and the setting is always within a close proximity or physical connection with a campus, university or national research clusters.

These concepts cannot be imported from the highly developed Western countries without adjustments and must be accompanied by intensive prior assessment. To plan such a project for Iraq, expert strategic, tactical and operational assistance is required to meet the needs of the differing stages from pre-design to successful operations of STP and Incubator development. Every effort must be individualized based on the ambitions, opportunities, aspirations, and competencies of the partners calling for the project. The expertise is also needed to provide assistance in initiating, reforming, de-clustering, and developing a cluster of research centers and firms (national or private) with their closely positioned facilities to improve their performance and leadership to become part of a STP and/or Incubator efforts. We could provide assistance to form such a team of experts for the initiative-taking phase that can provide assistance for the decision makers on the theme of Science and Technology Parks with Incubators. The first advice sought (work package) should include a feasibility study

carried out by experts from a distance and in the field (including a needs and competencies assessment) to propose the most appropriate form for Iraq: as stand alone commercial facilities, regional economic park facilities, university related efforts and/or national centers of excellence. This also requires a survey of the regional characteristics of similar requests for STP and the possibilities of collaborations with successful centers STP in Europe and the region to attract innovative international firms and create partnerships.

In section 2, we provide some generalities concerning the type of strategic services required. Similarly, in section three we provide a general description of some tactical efforts. In section 4, we display the general approach to initiate an STP proposal based on experts' views. Up to that point, our vision is affected by own experience coloured by western-style STP's, through which we operate. We utilize section five to present statements on a couple of scenarios without filling in any details. These, as well as the strategic and tactical issues statements, form pointers for questions and issues to be raised during a workshop devoted to the STP subject. These should be discussed to be Iraq-colored with the vision for the new Iraq. Short bios are provided of the authors of this document who are in a position to assist, with others, to be in a team of experts to formulate a proposal for STP and Incubators. That will require also a process of identifying the expert STP organizations with the best profiles to do the job and to invite one or more organizations with such hand-on experience to make a proposal statement outlining their approach to accomplish the project before making any commitments.

II. Needed Strategic Services

Science and Technology Parks are developed to meet a set of aspirations and ambitions that vary with the stakeholder groups and their backgrounds. In general, they are derived from public and private stakeholders interested in creating a sustainable commercial space which can help develop, nurture and utilize a cluster of enterprises that focus on important world based commercial problems, which are also important to the region in which the park is placed. Stakeholders often provide financial, political, innovation, and technological resources.

Science and Technology Parks along with Incubators, help to create regional critical mass that assist regions in becoming innovation centers based on proximity to technological and managerial excellence. Yet if this is well known, why are many Science and Technology Parks and Incubators ineffectual? We believe that successful parks and incubators must have processes that lead to better decisions concerning the difficult choices and resource implications that are required for their initiation at pre-design, build, start-up and throughout their lifecycle.

What is the rationale of this project?

STP and Incubators are initiated for many reasons. The rationale behind such parks and Incubators are diverse, and include an innate feel for the need for a process of economic development and the fact that most new knowledge centers have them. Some of the rationale is excellent but a poorly conceived effort can become a drain on a regions economic strength rather than a boon to it. In that case No STP is better than an ill-functioning one. This could be one of the strategic decisions to be made: do it properly from the start or do not do it at all.

A very important first advise that is needed is therefore an assistance to the decision makers to determine the type of STP or Incubator they wish to build. Furthermore the study must provide strategic processes that are based on focusing the STP or Incubators models so that they perform as intended or if refocusing is better. Finally many STPs and Incubator operational management is based on metrics. The selection of experts will be based on projects experience primarily to determine if they are good at providing a review of sets of operational metrics that are useful and conform to the defined strategic intent and nature of the facility versus those which mask the information required to manage a facility. Badly run projects are known to have poor metric use and a strategic disconnect even in STP facilities that were award winning companies and top research centers. The metrics include, among other parameter activities, numbers of jobs, amounts and types of funding, business to be attracted, training needed, cultural parameters, the main stakeholder's own workforce and firms, the amount of business transacted by firms in the STP, etc.

The following gives a brief discussion of three strategic issues that requires management. These statements provide an excellent platform for further discussion during the conference workshops.

Strategic issue I: Types of Science and Technology Park

Science and Technology Parks as well as Incubators have a wide variety of ownership models. They can have just one stakeholder or a host of them. Our experience is that most have multiple stakeholders. If the Park is primarily attached to a University it will be managed differently than if it is primarily attached to a national research center or the Ministry of Science & Technology. Further, if it developed through a province or region it will have differing management criteria than a national center. Moreover, if economic development and political monies are employed, metrics for job and wealth creation become more important, as does cluster development.

Strategic issue II: Nature of the Science and Technology Park

What is the nature of the Science and Technology Park that you are considering, trying to refocus or further develop? Or is the STP concept new and you need ideas? Can you try to define a market or technology set that will be the primary focus of a given STP or Incubators? Understanding of the type of activity wished by the stakeholder groups: what are the inbound and outbound activities?

The four key areas of activity are:
Research Base
Knowledge Transfer
People / Skills Base
Demonstrator and Flagship Projects

Strategic issue III: Resources Required by Science and Technology Park

Depending on the nature of a Science and Technology Park or Incubator differing physical, technical and managerial infrastructure will be required. It is simply not enough to have a desire to develop a park of a given nature. There must be at least a minimal amount of

physical, intellectual, and capital resources in order to embrace it. An audit structure to assist in this effort is required.

III. Tactical Issues

Every strategic decision has tactical consequences. Here we provide further items for discussion. They include but are not limited to: Type of infrastructure required, metrics development, type of industry to be attracted and type of services to be offered.

Tactical issue I: Type of Infrastructure

Infrastructure requirements and resources are not only a strategic concern. The strategic decision to focus on a type of technology suggests serious infrastructure needs. If a Park is looking to attract large and multi-national firms, for example, there are a variety of successful cases, one could investigate how Intel embraced China or how IBM has progressed in India. For example, recently China funded the vast majority of the development of a modern semiconductor fabrication facility in order to entice Intel to come to China. IBM embraced India and has now well more than 50,000 employees centered on information, health and operations through the creation of many entrepreneurial enterprises. Moreover, if an STP seeks to encourage home grown entrepreneurial efforts the inclusion of an incubator should be considered.

Tactical issue II: Metrics

The most used manner to present the validity of Science and Technology Parks is metrics management. Metrics allow for the rapid transmission of knowledge but due to their unit-less status are often misused. As a base for discussion a series of activity metrics can be considered; Metrics which are focused on job and wealth creation or innovation capacity. An example of an innovative capacity metric would be the difference between institutes in term of their focus on production, R&D and commercial development. The development of the right set of metrics for a given Science and Technology Park depends on its type and policies. Over time you would expect STPs to change and/or expand.

Tactical issue III: Industry Attraction

All Science and Technology Parks must attract firms. Here tactically speaking an STP requires a sound proactive strategy that allows operational managers to react quickly to an opportunity. The type of firm varies by the nature of their technology product paradigm (service or physical product based) and in general the size of the firm. When dealing with the size of a firm it is often best accomplished though a mix of different size government and private, regional and international enterprises and industry in areas of interest to the stakeholder groups, partnerships and consortiums, and multi-national interests. Each type of industry requires differing features and is attracted by differing rationales.

IV. A proposed approach

The goals, ambitions, and aspirations of the partners (government stakeholders) initiating the project are the best guide. The competencies and required resources need to be considered. The partners are essential part in the process of project development but the initiative could be taken in this conference to start the feasibility study phase forming an authorised project study group to set this phase in motion .

Generally the approach leading to a STP consists of the following (including training and expertise):

- Initiate the action for a mentored self evaluation. Training and expertise is needed.
- Develop a model using one that captures what the stakeholders hope to achieve.
- Create management systems that allow you to evaluate your direction, continually improve and re-evaluate when necessary.
- Adopt the axiom: "if we build it right, plan it well, attract the right people, provide the resources and show sufficient perseverance the result will be excellent".
- Establish mentorship programs for start-up in Parks.
- Form Management and Technology Support programs.

This should lead initially, to a visual model of an STP for Iraq to start with within 2009-2010 and a completion within 5 years.

V. STP Scenarios for discussion

Iraq has the prestigious universities and scientific base that show it can meet the challenges of becoming a knowledge-based economy. With Science and Technology Parks we will focus on key science and technology activities that will increase prosperity and improve quality of life.

The following section provides in more detail options on how we will begin to turn the vision into reality. This is intended to give options that indicate directions and without providing arguments to provoke discussion with the decision makers and members of the Network of Iraqi Scientists Abroad (NISA) and to lock-out further scenarios. The options are based on the following concepts:

1. Understanding the real need of the country and demand from government organisations will be an important outcome of discussions flowing from STP activity.
2. Innovation can be "bottom-up", but it can also be stimulated by "top-down" planning that is driven by ambitious aims and seeks to anticipate demand.
3. The STP provides a dynamic environment, with effective connections between end users and suppliers of technology.

Option I: An STP connected to the University of Technology and/or the University of Baghdad as the main stakeholders. In this SPT model a number of the projects proposed by NISA can be adopted to form the nucleus SPT project.

Option II: Similar model in Kurdistan and other regions of Iraq.

Option III: Reorganising previous research (sciences, engineering, health, etc.) centers and core competencies (now ineffectively and unproductively placed under different ministries with some previously military research facilities under the MoS&T) to become the new business and innovation core in an STP to provide answer to solve industry problems and bring their products into the market? Main stake holder is MoS&T (possibly with other Ministries such as the MoHE&SR., MoO., MoEnv., MoH. and MoAg.

VI. About the authors

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Dr. Karim is born in 1953 in Baghdad, Iraq and is a resident of the Netherlands since 1990. He speaks several languages fluently (Dutch, English, and Arabic). After finishing secondary school in Babylon he started his international education in Britain and then the US. After finishing his PhD studies and post-PhD work in the US he went to Iraq 1996-1990 to do his military service taking a lecturing post at the University of Technology with partial posts at the National centers of Construction Laboratories and Center of Engineering Consulting. Dr. Karim is married to Prof. dr. Celeste Wilderom, also working presently at the the same University (the University of Twente) as the Chair of Change Management in Private and Public organizations. Together they have 2 children (Noor 13 and Senna 10).

After finishing his PhD at Buffalo State University in NY, he worked in the US as a specialist in onshore and offshore (marine) geomechanics and foundation engineering. The bulk of the work was for the oil research and the constructions industry, working on projects in the Middle East, Europe, Asia, North and South American continents. His professional work took him around the world: after finishing his Bachelor at Queen Mary College, the University of London, he worked as a civil engineer. In the US he lived and worked in Buffalo, NY as post-doctorate researcher, in Denver, Colorado with Applied Mechanics inc. as consultant engineer, and in the NJ Department of Transportation as foundations engineer. His Dutch experiences include working with Fugro (on off-shore site investigations and foundations) and with Vrijhof (on offshore anchors research, design and installation). He is a member of several International professional and engineering institutions (ASCE, ICE, KIVI) as well as a member of several other professional networks and service organizations (NISA, IHEOC, IPNA, NMNH). He is a consultant on research and training since 2009 for two Ministries in Iraq (Science and Technology, and Oil) and held an honorary advisory role for the Embassy in The Hague from 2005. Currently the work of Dr. Karim includes research, teaching and the management of Middle East operations including projects in the Gulf States. He is attached to both the Twente Knowledge Park and the Faculty of Engineering, where he is based as a researcher and lecturer in management and civil engineering and has over 40 publications in scientific journals and proceedings.

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Mohamed Ali Fadhil Al-Rubeai obtained his BSc from the College of Science, University of Baghdad and appointed after graduation as a Demonstrator in the same college. He later obtained his PhD in Genetics from QMC, University of London in 1979. Immediately after receiving his PhD he joined the University of Garyounis as a lecturer in Biology. He returned to the UK to work as a research fellow at the University of Surrey. He moved to the University of Birmingham in 1988 and was appointed to the Chair of Biotechnology in 1998. In 2005 he moved to University College Dublin to take up the newly established Chair of Biochemical Engineering and to headship the Cell Culture Engineering Research Centre. He is also an adjunct professor at the University of Birmingham and University Technology of Malaysia and was an adjunct professor at the University of Queensland, Australia between 1997-2000. He is the editor of "Cell Engineering", review editor of “Cytotechnology”, and member of editorial board of several journals, recipient of SFI-PI award (2005) and Donald Medal (2008), co-author of “Engineering a Knowledge Island 2020”, member of Sigma-Aldrich and Vivalis advisory boards, consultant to industry, nominated member of the Royal Irish Academy, Fellow of the Conway Institute, Fellow of the UK Institute of Biology (FIBiol), honorary scientific advisor to the Ministry of Higher Education and Scientific Research since 2003, honorary scientific advisor to the President of Iraq since 2006, advisor to UNESCO Iraq, and author of over 400 professional papers that reflect his broad interest in cell culture and tissue engineering. He supervised 34 PhD and 38 MSc dissertations, gave more than 50 invited talks in international conferences, lectured in more than 48 universities, research institute and biopharmaceutical companies and was awarded more than 15M Euro in research grants.