

PROMOTING ACADEMIA-INDUSTRY COOPERATION FOR INNOVATION

A Network of University Chairs In the Middle East and North Africa

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Abstract

Innovation and Innovation Management are essential instruments and methodologies to manage the changes that society and its productive sector are facing in order to find the right balance between competitiveness, trade demands, social equity and sustainable development. A clear role in this can be played by the local universities and by an international network of higher education institutions.

The EU/Tempus UNCHAIN project proposal takes its origin from an initiative started in 2007 by the Rectors of three European Universities (Delft University of Technology, Graz University of Technology, and the Politecnico di Milano) aiming at establishing a “Global Network of University Chairs on Innovation”. The overall objective of the UNCHAIN project is to bridge the gap between the innovation needs of industry and the supply of universities, in terms of human resources and technologies, by establishing a “University Chair on Innovation”.

At 6 universities in the east and south Mediterranean region (the MEDA region), SEKEM and Cairo University in Egypt, Hassan II in Morocco, Aleppo in Syria, S. Joseph in Lebanon and Sfax in Tunisia, specific problems and obstacles facing innovation and the university-industry relation have been analysed. In each of the universities a Chair on Innovation has been established in 2009. This Chair, together with the international partners, is responsible for developing Technology Transfer Policy, initiating a re-skilling program on Innovation, development of an EU-MEDA Twinning MSc Thesis Program, and development of an EU-MEDA Virtual Environment and Strategy for University-Industry Cooperation in Innovation. This paper describes the challenges and results of this project.

Keywords

University cooperation, capacity building in engineering, innovation, university-industry partnership

1. Introduction: The need for innovation

The globalization and the interdependency principles are more and more underlining the increasing need to comply with economic, social and environmental issues. In this framework, Innovation and Innovation Management (EC ESTD 2006, UN Millennium Project , 2005, Aubert, 2004, EC, 2006) become essential instruments and methodologies to be able to manage the changes that society and its productive sector are facing in order to find the right balance among competitiveness, trade demands, social equity and sustainable development. Following an Innovation Systems approach (Gu,1999) to analyze the effectiveness of introducing innovations, one can see that a specific set of competences are to be developed and taught within countries. In this context, there is a clear role that needs to be played by the local universities and by an international network of higher education institutions.

The need for innovation in the east and south Mediterranean region (The MEDA region) is emphasized in several studies: The Innovation Policy Trends Report for the MED-Zone Countries for 2006 (IPTR, 2006) covers the eight countries of Algeria, Egypt, Jordan, Lebanon, Morocco, the Palestinian Authority, Syria and Tunisia (5 of them are involved in this project). In 1960 the total labour force of the 8 Med-Zone partners was just under 20 million people. By 2000 this had grown to almost 58 million. Based on data published by the World Bank the population is expected to exceed 79 million by 2010 and 98 million by 2020. These projections indicate that in the decade through 2010 a total of 21 million new workplaces must be created in the MEDA region, and further 19 million in the period 2010-2020. The MED-Zone partners provide much more than a pool of cheap labor to perform low-tech tasks. They also provide an annual pool of approximately 100,000 high quality engineers and other graduates that are available for work.

The policy of the MEDA countries therefore tends to emphasize the role of education, the need of creating a workforce that is comfortable with technology and capable of knowledge work. The long-term goal of the governments is to create an innovative entrepreneurial society and recognizes the need for change at all levels in the education system. The biggest innovation problems in the MEDA countries are the quality of the relationship between the private and the public sector, mainly the poor linkage between industry and

academia, the poor matching between available skills and those needed by industry, as well as the lack of capability on the part of enterprises to recruit, manage and develop human resources in a modern, systematic way. Industry in general is unable to articulate its needs. MEDA universities in their current situation are not able to break this log-jam and provide the industry with graduates who have problem-solving skills.

2. Partnership

The rectors of Graz University of Technology (TU Graz), Politecnico di Milano (POLIMI) and Delft University of Technology (TU Delft), have initiated the idea of establishing University Chairs on Innovation in 2007. These are also leading universities in innovation with a very strong linkage to industry. The United Nations Industrial Development Organization (UNIDO) is fully supporting the establishment of the Chairs and ensuring the sustainability of the idea (UNIDO, 2005). The UNCHAIN project was co-funded by the EU TEMPUS programme. Expert support on MEDA countries is provided by Dr. Sewilam from the University of Aachen Germany and SEKEM Egypt.

Specific criteria have been decided to select the MEDA partners; a) universities showing interest to implement the objectives of the project; b) universities that can establish the Chair with the lowest possible administrative complexity and risk; c) geographical distribution of the partners within the MEDA region, d) big universities that can introduce changes in their countries; e) one university to represent the private universities as a model spreading very fast in the MEDA region; f) university from a country that has no clear innovation policy; g) a university from a country progressing well in implementing its innovation policy (for disseminating its best practices). Finally, it was important for a such big consortium to involve an organisation with two arms (Education/research and industrial experience). It was essential for the sustainability and political support of this project to involve the Industrial Modernisation Centre in Egypt.

3. Relevance of the project

The project is strongly linked to the specific needs of countries and universities that may be different from nation to nation but also show some common elements.

3.1 General needs and problems addressed

This project is targeting specific problems and obstacles facing innovation and the university-industry relation in the MEDA region. The preliminary analyses that have been carried on by the MEDA partners of this consortium (SEKEM and Cairo, Hassan II, Aleppo, S. Joseph and Sfax Universities) identified the problems to be targeted in this project as:

1.

MEDA industry lags behind in terms of its ability to exploitation of knowledge and the use of R&D and Innovation to create value.

2.

Research conducted by universities is generally of little interest to industry or relevance to the economy.

3.

Graduates lack the problem-solving skills applicable to real life situations.

4.

The needs of industry are real and industry is generally aware of its problems. However, few people in industries, industry associations or research in a relevant domain are currently able to translate these problems into needs and requirements for R&D or innovation [5].

5.

There is limited communication between universities and industry. The process is not managed systematically by the universities and when it happens, it is usually based on personal contacts of the company and someone based at the university.

6.

There is a lack of awareness among university researchers of the importance of devoting their research to solve local industrial problems.

7.

There is a lack of public awareness of the importance of university-industry link in particular and innovation in general.

8.

There is a lack of communication and exchanging information not only between the MEDA universities but also between MEDA and EU universities. This prevents the exchange of experiences and making benefit of the best practices.

3.2 Target countries and specific needs

In Egypt, the two main innovation and R&D problems are: a) overall poor match between the educational/ research sector and needs of industry and society; b) general mistrust of public administration by the private sector (ETCI, 2006). Egypt has developed an innovation policy implemented via measures to stimulate university-industry links, venture capital, business incubators, industrial modernisation, SME development and entrepreneurship. The Industrial Modernisation Center (IMC) is considered the most significant body implementing this policy

in Egypt (IMC is a partner in this consortium). SEKEM development foundation (partner in the project) is also playing a significant role in the Egyptian society in terms of R&D, education and innovation. Cairo University CU (250,000 students, partner in the consortium) has been constantly looked at as a main leader of the higher education sector in the Middle East and North Africa region. CU itself is suffering from the poor linkage with the industry for the same mentioned reasons.

Morocco has a clear policy for innovation. This policy is a result of initiatives taken by the Ministry for Industry to develop a dialogue on innovation related issues with the Ministry responsible for Higher Education and Scientific Research, as well as with the CNRST – National Council for Research in Science and Technology, OMPIC – the national intellectual property organisation and R+D Maroc - the Moroccan R+D Association. CNRST has clearly aligned its strategy with the goal of creating an environment to support innovation. It has implemented a program of radical change intended to provide industry with access to university facilities, know-how and information.

In Syria, as mentioned in the same EU report, the public research system including universities is under-resourced with very weak links to industry. For instance, Aleppo University (partner in this consortium) which is the second largest university in Syria has a very variable relation with the industry depending on different faculties, but it remains in general in a low level with respect to the expectations of such a big university. Syria has also developed an innovation policy. This concerns all ministries but there is no coordination structure and no system for policy evaluation.

In Lebanon, the STIP or Science Technology and Innovation Plan (April 2006) specified the innovation problem in the need to strengthen the research system and better align its activities with that of the economy. The STIP plan aims also at strengthening partnerships among universities, NCSR and institutes; and between these organizations on one hand and private enterprise, on the other. It also focuses on how the higher educational system can adjust to the needs of an innovation driven economy. Saint Joseph University (partner in this consortium) which is one of the oldest private universities in Lebanon has no clear mechanism that links the education and research activities to the industry.

In Tunisia, the situation seems to be better than in other MEDA countries. Industry-academia links exist but must be developed both in kind and in intensity. Industry has started to express needs in terms of the sociotechnical skill. The initiatives of pioneering academics in this regard need stronger institutional support. This is because the government is establishing the Sfax Technology Park (STP). University of Sfax (partner in this consortium) as a partner in STP should find a way to improve its linkage with the industry.

3.3 Target groups

The project is designed to meet the needs of the following target groups:

- Academic: the project will allow the professors and university researchers to work with the local and European industry. This will allow them to get funds for their research and bring their innovative research into real applications. It will provide them with the re-skilling training program. The project provides also the students to carry out their MSc thesis together with European students on innovative research subjects together with local and European enterprises.
- Industries need to get access to the innovative research and new techniques. They also need to get the best quality of university graduates. The project will give them opportunity to access the university facilities (e.g. labs). They will be also invited as lecturers for the re-skilling program and in turn get to know the best graduates.
- Enterprises know their problems but they need professionals who can translate them to R&D problems. The University Chair will offer a clear mechanism to identify the R&D subjects and bring the industry and innovative researchers in collaboration.

4 Objectives of the project

The EU higher education policy towards African and in specific MEDA countries is to strengthen the role of higher education institutions in society at large (COVIDSET, 2005); to address the "knowledge triangle" of education, research and innovation at university level; and to encourage links between higher education institutions and the labor market, including the promotion of entrepreneurship and the creation or support of business start-ups.

The overall objective of this project is bridging the gap between the innovation needs of industry and the supply of universities, in terms of human resources and technologies by establishing a "University Chair on Innovation". The overall objective of this multi-country project is in line with the EU programme-wide priorities (Higher Education and Society) and it matches also the two main national priorities identified by the involved MEDA countries (Development of partnerships with enterprises and knowledge triangle: education-innovation-research).

In 1992; UNESCO launched the initiative of establishing UNESCO Chairs for covering different research and education aspects and strengthening international cooperation in higher education (ANSTI, 2005).

The programme has rapidly grown into a worldwide inter-university cooperation network operating in all of UNESCO fields of competence and promoting higher education (OECD, 2005).

Starting in 1992 with some 17 Chairs, today 634 UNESCO Chairs are established within the programme, involving over 760 institutions in 125 countries and covering 70 disciplines. The Chairs are strongly contributing in covering many of the educational and research issues as well as international cooperation.

This initiative of establishing Innovation Chairs should benefit from the UNESCO experience but covers a completely different significant weakness area. This project has 5 specific objectives that will be achieved through different activities as it will be described below.

The pedagogical methodology, contents of the training programme, involvement of academics, students and stakeholders as well as the quality assurance process is described in the following sections.

5 Preliminary results of the project

The following results have been reached in the project until July 2010.

5.1 Establishment of five University Chairs on Innovation in the MEDA region

The general role of this University Chair is to reduce the gap between the available innovation knowledge of universities and the need for application in industry within the MEDA region. The Chair should be integrated in the mainframe of the structure of the MEDA universities. The Chair will be carrying out academic and administrative activities. However, carrying out multidisciplinary R&D activities is a post objective.

The Chair has the following tasks:

- Help enterprises translating their needs to R&D subjects in the field of industrial innovation.
- Encourage and support the enterprises to pursue innovation in collaboration with university thereby availing themselves of existing facilities and expertise.
 - Promote university departments to carry out commercially relevant innovation projects with industrial enterprises.
- Disseminate new and useful knowledge resulting from University research, license technology to industry in order to promote the development of inventions towards practical applications,
- Employ a range of activities such as training of faculty, staff consultancy, seminars and specialist training courses, facilitating R&D activities such as innovative products, processes and systems.

- Form different cooperation models with the industry such as closer and longer-term strategic alliances for mutual benefit.

In 5 of the MEDA universities (SEKEM being an observer partner) Chairs were appointed during the first phase of the project. In all cases, a support staff team was assembled, and the chair is embedded in an operational team of fellow professors from the university. The position of the Chair in the university structure is different per university. In Cairo University for instance, the Chair is established in a new research-service unit: the Cairo University Innovation Support and Patent Registration Facilitation Office. In St Joseph University, Lebanon, the chair is accommodated by the Pole Technologie Santé, the universities medical business centre. In other universities, the Chair is integrated in one of the existing research centres.

All Chairs have organized public workshops attended by companies, university staff and other stakeholders, creating more contacts and starting networking activities.

5.2 Development of Technology Transfer policy

The importance of improving the effectiveness of knowledge transfer are clear; it is one of the key drivers to help achieve the economic, social and environmental ambitions outlined in the Lisbon Strategy for Growth and Jobs in Europe but also addressed worldwide including MEDA countries. This project considers the issue of closer collaboration between the practitioners of the knowledge-triangle from 4 perspectives:

- Training and staff exchange has been taken place in Delft, Graz and Milano for creating a Technology Transfer Profession (TTP) with the identification of skills and expertise essential to be an effective TT practitioner.
- A Euro-MEDA model for a technology transfer policy (TTP) was developed based on a review of existing technology transfer experiences. Policies of the involved MEDA and EU governments and universities were reviewed to identify the similarities and differences. In particular this analysis was useful to establish a SWOT situation for each Country. A general guideline document was produced to help each country in setting up its own TT policy within their university, with a detailed checklist based on European experience.
- Intellectual Property Strategy (IP): Input was given to the MEDA Universities for development of standard procedures and tools for protecting inventions through patents, identification of key elements of a framework agreement for managing IP with industries (cooperative research), identification of key elements of exploitation agreements. Case studies and exercises on the IP development were disseminated.

- Spin-off creation and incubation: strategies, policies, procedures and tools for promoting entrepreneurship within the MEDA university and research centres, good practices on business plan support and evaluation were exchanged and implemented.

5.3 Preparation of a re-skilling programme on innovation

This program will be one of the programs to be offered by the University Chairs after the project lifetime. The target groups of this training program after the project are the researchers, and graduate students of the MEDA universities. The training program qualifies the trainees to:

- identify unarticulated industry innovation needs and get to the heart of the problem;
- apply a structured roadmap for innovation to solve industry problems;
- take research ideas and turn them into product, process and system solutions, then demonstrate success with prototyping and piloting.

This training program will also prepare the graduates for the labor market and to start their own business (business start-ups). The total duration of this program is 6 weeks to be carried out during the summer holidays in the MEDA countries. The lecturers will be academics from the MEDA universities and visiting lecturers from the industry. It includes mainly courses on innovation, promotion of entrepreneurship and the creation of business start-ups.

To prepare for this re-skilling programme, during the project lifetime, selected academic and research members from the MEDA universities will be trained in a Train-the-Trainers setting. The trainees will be the trainers who can offer this program regularly after the project. The program is composed of three modules that have been identified based on a preliminary analysis of the MEDA innovation and R&D problems.

The ToT programme was harmonised based on these qualifications and the specific content was developed by the TU Delft team. The didactic approach used was problem-based learning, giving the trainees a very active role in gathering information, generating ideas and coming up with appropriate solutions based on theory and practice delivered in the ToT. Case studies, course materials, background literature as well as lively discussion and groupwork were all part of the course. A log assignment for reflection and deeper understanding was offered to the participants and was continuously monitored during the course.

Several topics on Innovation management (Tidd and Bessant, 2009) (module 1) and Entrepreneurship (module 2) were dealt with extensively. Topics included:

- Creative workshop on innovation potential in MEDA countries

- Innovation theory and Innovation management approaches, including Technological Innovation
- Examples of student projects and start-up companies
- Use of IPR databases for development of innovation projects
- Entrepreneurship (collaborative, corporate, technological and sustainable)
- Excursions to innovative companies and research projects
- Development of MEDA innovation projects

All materials - background information, literature, presentations, assignments and case studies - were delivered to the Virtual Environment of the project (see 5.5). Further development into the third module will commence in cooperation between the EU and MEDA Universities.

The training were appreciated by the participants, and it was emphasized that further training in soft skills (training and educational skills, communication) would be welcomed, as well as further training in practical implementation of innovation approaches. This last elements was already planned for the third train-the-trainer module, and soft skills training will be prepared additionally.

5.4 EU-MEDA twinning MSc thesis programme

The aim of the twinning programme is to initiate a mechanism that will allow Mediterranean and European MSc students from different disciplines to carry out their thesis in innovative subjects together with EU and MEDA industry. This program will be open for all the MSc students from all involved universities, mainly for engineering and innovation subjects. The program should allow for

- Translation of industrial problems into R&D subjects;
- Continuous transfer of the European university-industry cooperation experiences in innovation to the MEDA universities;
- Bringing industries from MEDA and EU together on common R&D objectives;
- Building trust between universities and industry in the MEDA region; and
- Giving the students the opportunity to improve their qualifications for the labor market.

The twinning programme is currently under development, topics being very diverse and ranging from organic grown products to the use of sustainable energy in industry and in cities and regions. The topic of sustainable technologies, products and systems is a common element of most proposed topics.

TU Graz is in charge of the twinning programme.

5.5 Development of an EU-MEDA virtual environment

To ensure the internal and external dissemination, communication between universities as well as sustainability of the Innovation Chair initiative, a virtual environment was developed. This virtual environment is considered the foundation stone of establishing an EU MEDA network of University Chairs on Innovation (project post objective). The virtual environment enables the Chairs to: facilitate personal relationships and the exchange of ideas between the MEDA Chairs and EU technology transfer offices through the using of specific tools encouraging distance communication and cooperation (synchronous and asynchronous); share in the partnership the most significant project experiences through the construction of a knowledge sharing system; contribute to the development of a common strategy definition. The virtual environment was designed and developed by Politecnico di Milano during the first year of the project. In order to spur relationships, different types of collaborative online activities can be developed using the virtual environment like the creation of “live events” archive (e.g. seminars held at the Universities); university lessons on specific subjects, organisation of online workshops, seminars, online training short workshops on specific subjects with synchronous (e.g. web conference, Skype and Cmap) and asynchronous tools (Wikipedia, Blog, etc..), development of multimedia contents of different types, development of experimentation for research activities and dissemination.

During this first part of the project specific training workshops in MEDA Universities have been realized to explain the partnership how to take full advantage of the proposed tools.

The virtual environment will also help the consortium to disseminate the initiative by the end of the project to other EU and MEDA universities and can play an important role in bridging the gap of the university-industry cooperation.

6. Sustainability of the project

Projects which meet the real need of the graduates, universities, industries and labor market are more likely to be sustainable (in the meaning of continued, ongoing activities after the project is finished). This project is covering a very serious issue in the MEDA region.

The implementation of the university Chair activities, twinning MSc program and re-skilling training activities as it is now taking place will proof for the different beneficiaries that the project idea is really covering their needs and delivers benefits to them. This will be the main issue that ensures the sustainability.

The practical steps for ensuring the sustainability of the project are

- Quality of project design in meeting academic, professional and/or social needs
- Involvement of all partners: sense of ownership and motivation
- Effective management and leadership

- Active participation of the audience (direct target groups)
- Capacity for securing adequate resources for continuation

An important element for ensuring sustainability also is the development of a strategy for University-Industry cooperation for all MEDA countries. The experiences from the project can act as a blueprint for similar successive cooperation with further Universities in the regions. A suitable documentation of the processes should help to improve the efficiency of more projects and to establish a sustainable cooperation.

Next to this, the consortium will take the following concrete actions to ensure sustainability:

- Promote the internal and external (project and context levels) to fund and facilitate the activities of the university Chairs. Active lobbying will be the core activity, organizing meetings with University presidents, key persons from the Higher education ministries, key persons from the industry ministries and politicians.
- Develop the capacity of the wider community (including enterprises) to promote greater understanding of the meaning of innovation for the developing the society.
- Expose the success of the project implementation and its impact on improving the production chain to the industrial partners and explain them how the project activities are meeting their needs.
- Promote the feeling of ownership among all the involved partners and targeted groups and explain how the project meets their needs.
- Advise other task groups to include the sustainability dimension in the related activities.
- Involve European companies to joint research projects to open the process for both directions.

As a final observation on sustainability, it should be noted that the idea of a university chair is highly appreciated and well received from many other organizations not only in the MEDA region but also worldwide. The involvement and commitment of the United Nations Industrial Development Organization (UNIDO) can open the doors to donors and international organizations to support and spread the idea. The potential financial sources such as World Bank, UN organizations, and industry can ensure to cover the estimated costs.

7. Concluding remarks

This initiative for University Chairs on Innovation originated from the European universities of technology in Graz, Delft and Milano and was inspired by the success of the worldwide UNESCO Chairs network. The MEDA partners in five east and south Mediterranean countries were selected basing on their interest in the concept and matching it to their university and country needs.

All MEDA-country partners turned out to be very different. This regards to the experience they have with the cooperation with business, but also to the approaches chosen in the project.

Since all partners succeeded in establishing the Chairs of Innovation, it can be concluded that there is great interest from all Universities. The public workshops linked to the project meetings were attended by companies and Universities and created more contacts between businesses and academia.

Most research ideas developed so far are mainly driven by interests from researchers, but more proposals are coming from industry as the project becomes better known in the target countries.

The trainings have been appreciated by the partners, but much more training would be welcomed. This regards to soft skills (training skills, communication) but also to systematic innovation approaches.

The idea of linking all the established university Chairs through a 'Global Network for University Innovation Chairs' supported by UNIDO will be a real motivation for all the consortium members to further achieve the project objectives. First initiatives have been taken to set up regional networks in Sub-Sahara Africa and in South-East Asia.

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