Universities, Industrial Clusters, and Economic Development in Egypt

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Summary: This paper explores the role of industrial clusters in the development of the Egyptian universities & research institutes (URIs), and economic performance. The study hypothesizes that the large industrial clusters in Egypt are old and traditional, and have weak impact on URIs, and economic performance. To this end, we examine Egypt regions where that contain long-existing and traditional industrial clusters are compared to all other regions. The analysis is conducted separately for seven industries, and by using a Mann-Whitney U test and a spearman correlation we find that the more recent and technical industrial clusters in Egypt have a positive and significant impact on URIs , but they have a weak impact on economic performance**.** The Egyptian experience suggests that the most important contribution of clusters to URIS is one in which corporations contribute money to universities, or enter in to informal consulting arrangements with a professor, neither of which typically of professional patent applications or even through the mobility of university graduates.

Key words: Egypt, universities and research institutes, clusters, National innovation system, and development.

1 Introduction:

It is now widely accepted that universities and public research institutes (URIs) played a substantial role in the development of many high- technology regions in the United States and many other developed countries (Bresnahan & Gambardella, 2004). In the United States, the two most successful clusters of high – technology firms in both the information technologies and biotechnologies are the Boston and San Francisco Bay areas, which are also the locations of the top four universities (Kennery & von Burg, 1999).[1]

In developing nations as Taiwan (Saxenian, 2004) and India (Arora, Gambardella, & Torrissi, 2004), university research does not appear to have been a significant contributor to regional growth, well – trained university graduates were critical inputs.

The commercialization of university research and the establishment of clusters of entrepreneurial firms are often considered the magic seeds for driving economic growth in developed and developing countries (Miner, De Vaugh, Eesley, & Rura, 2000). Egypt is interesting , because its economy is growing, despite limited direct interaction between industry and universities and little clustering , though government research centers did provide benefits to industry , they were not pivotal to the growth of the Egyptian economy. The relative lack of significance of universities and research institutes (URIs) and clusters in the entrepreneurial firms in the national innovation system (NIS) is curious.

Through an examination of Egyptian Development, we raise questions about the prevailing wisdom that clusters and a particular style of a particular industry-university relationships are an important path to economic development

An industrial cluster comprises a geographic concentration of firms within a particular industry. It extends beyond core firms, however, and includes any other actor or agency in the region who can contribute to the industry's competitive success (Neil Reid, Carrol, M. C., & Smith,W.B. (2007, P.45).

The most important contribution came from Michael Porter 1990 and his theory of competitive advantage and the diamond model. Porter in 1998 defined clusters as geographic concentrations of interconnected companies and institutions in a particular field linked in a way , important to competition, they include , for example suppliers of specialized inputs such as components , machinery and services and providers of specialized infrastructure. He also pointed out that clusters include manufactures of complementary products and companies in industries related by skills, technologies or common inputs. Finally Porter (1998, p. 78) showed that many clusters include governmental and other institutions- such as universities that provide specialized training, education, information, research, and technical support.

From this point of view, necessary basic elements of a cluster are (Rosenfeld, M.T.W., Franz, P. & Heimpold, G. (2007, P.75) :

- Spatial proximity between a number of firms belonging to the same industry or group of industries;

- Relations between firms on a vertical level (suppliers, buyers) and on a horizontal level (joint R&D, joint membership in a business network, but also as competitors in the same product and labor markets).

Besides firms, universities, research units, technology parks and regional trade associations may also belong to a cluster. It is believed that high – tech ventures derive significant benefits from localized knowledge spillovers emanating from two common tasks performed by universities; i.e., basic research and human capital creation (Audretsch and Lehmann, 2005).

All previous researches , mainly on industrialized countries indicate that research – oriented universities can assist firms directly through a variety of linkages and the provision of skills and indirectly by way of spillovers. These universities contribute to national development, and there are also a number of notable instances where universities have supplied the crucial underpinnings of dynamic industrial clusters within metropolitan regions (Wu, 2007).

The literature provides little information about the impact of local industrial clusters on URIs, there is empirical evidence for a positive impact of local industrial clusters on growth and innovative activity (Baptista &Swann 1998, and Bonte 2004). However, it is not clear whether this impact remains true. (Brenner & Gildner 2009) showed a negative and significant correlation between old industrial clusters and involvement in new technologies measured by (URIs, and the share of workers with university or college degree).

The entire literature tries to examine, how strong university- industry relationships and high technology clusters are the keys to development. In contrast to the usual situation in the literature, we intend to understand how the existence of a local industrial influences innovations and technological developments within a region. This innovation activity should involve highly educated workers and publicly financed R&D measured by the number of universities of applied sciences, and number of public research institutes.

The purpose of this paper is to examine the impact of local industrial clusters on URIs, and the overall economic performance of a region in Egypt. It is assumed that local clusters that come with higher innovations, and a development to URIs within a region, will come with more employment and income effect.

The study hypothesizes that large local clusters in Egypt have less impact on URIs and economic performance, as most of them are traditional industries, and located in old regions.

The literature does not give us concrete information about how to identify industrial clusters in Egypt. This means that we know little about the implications of local industrial clusters on innovations and economic performance.

Therefore, we will use a strategy to identify local clusters in Egypt, and then examine their impact on innovation activity (URIs), and the current economic situation in the respective locations.

The paper proceeds as follows, first it provides a brief overview of the related literature on the university- industry relationship in the context of national innovation system (NIS). It is followed by a detailed discussion of the Egyptian university and research institutes (URIs). Because the cluster concept is relatively imprecise, and there is strong pressure to use the cluster concept as a framework for regional policy actions, regional economists need to provide an analytical framework to identify existing clusters empirically as precisely as possible. The fourth section deals with a strategy used to identify cluster in Egypt and presents the data used in the estimation. It is within this context that the paper turns to estimate the impact of a local industrial cluster on (URIs) and the economic performance of a region. In the concluding discussion, we point out that despite the relative weakness of Egyptian industry- URI relations and the inability to develop clusters, we find a positive and significant relationship between industrial clusters and URIs in the more recent and technical clusters, but the study finds weak relationship between industrial clusters (Old and the more recent, traditional or more technical), and economic performance.

2. **Literature Review on University- Clusters Linkages in the context of National Innovation System (NIS)** :

The systems of innovation framework, has received widespread attention in the last two decades (Freeman, 1987; Lundvall, 1992; Nelson, 1987). A national system of innovation is the " elements and relationships which interact in the production, diffusion, and the use of new, and economically useful, knowledge… and are either located within or rooted inside the borders of a nation state" (Lundvall,1992:12).

Literature on NIS shows three key institutional actors – industry, research organizations, and government (Fujita & Hill, 2004; Mowery & Rosenberg, 1993). The notion of clusters fits into the innovation systems framework given its systemic, networking features as well as reliance on URIs, and institutions.

Clusters are not necessarily innovation systems (Mytelka and Oyelaran-Oyeyinka, 2000); they showed that transforming clusters in to innovation systems requires sustained policy support. Many developed countries succeed in transforming traditional sectors in to advanced innovative clusters.

Universities have long been considered important institutions in national innovation systems (NIS) (Lundvall, 1992; Nelson, 1993). The role of universities was not only education and research, but also they improve national competitiveness, and regional economic development.

In terms of the relative importance of universities, universities are often found to be important part in clusters. University research and knowledge is, somehow, flowing from university to firms in the cluster (WU, Weiping 2007), for example showed how universities in China can supply the crucial underpinnings of dynamic industrial clusters within metropolitan regions through technology transfer.

This knowledge diffusion can take place as formal cooperation, through mobility of graduates, and through informal social networks. URI- industry relations are myriad and can include: Labor market related Linkages, linkages for acquisions creation, and dissemination of knowledge, and linkages to create new enterprises. Well educated students and professionals gain their knowledge and training in URIs and become part of the labor pool in regional economies (Jaffe, 1989).

There are several ways through which linkages between universities and business community can be developed. A popular mechanism is when a firm contracts with a university researcher to conduct R&D for the firm. At the other extreme is when the university researchers develops an idea for commercialization and enters into a contract with a firm. An intermediate mechanism occurs when the university helps the firm improves its understanding of the underlying basic science and the firm develops the product or technology (Weiping Wu et al., 2007). Another type of intermediate link is through joint collaboration between a firm and university to develop a product or technology (Poyago- Theotoky, 2002).

The NIS perspective highlights the fact that countries organize innovation differently; the role of universities in each NIS differs significantly within the countries. For example the Korean experience suggests that the most important contribution of universities to economic development was not through the transfer of research results, rather it was indirect and through the preparation of high – quality graduates, Korean universities and research institutes have contributed little to the creation of clusters, but the role of graduates has achieved has achieved considerable success (Dong - Won, S & Kenney, M. 2007).

In Japan's national innovation system, large industrial firms have taken the initiative to integrate the process of innovation from basic or product research to commercialization, thus private firms are the core actors in the (NIS). In addition to commercialization, enterprises are seen as a way to provide supplemental funding for university operation and absorb surplus personnel on campus (Zhang, 2003).

More recently, there has been great interest in the role of universities as a source of spin-offs, and they are adopting a policy of encouraging entrepreneurship, and they are moving toward a more entrepreneurial paradigm (Bathelt, H., kogler, D.F., and Munro,k.A. (2010).

A system of innovation framework also is essentially undergirded by the theory of institutions and this paper appropriately places a strong premium on institutions and institutional change. The creation, validation and distribution of learning and knowledge, which are prerequisites of economic change, are mediated by institutions. These institutions operate in such areas as research and development (R&D), finance and investment, intellectual property rights, patent laws and so on.

As with clusters, innovation systems have spatial and geographic dimensions. An innovation system could be national, regional, local or sectoral. Geographers argued that innovation systems had a strong regional characteristic which is known by regional innovation system (RIS) (Cooke, 1992, 2001; Storper, 1997). Recent research has shown that URIs, and innovative clusters can be key elements in RIS because of the geographic spillovers of knowledge both through their roles as human capital provider and as a technology incubator.

For the purpose of this study we identify some factors that distinguish an innovative cluster that will affect the regional innovation activity (URIs), and performance. First, this cluster will exhibit high rates of learning and knowledge accumulation within its component firms and institutions, which lead to continual changes to the knowledge base of the cluster. Second, it will be characterized by high levels of collaboration and interaction between key agents and institutions. Third, successful local innovative clusters will possess a certain optimal skills and knowledge structure in engineering, mathematics and sciences that support industrial development, regional innovation activity, and regional development. While general knowledge acquired from educational institutions forms an important component of a nation's human capital, firm level training, R&D and production are necessary for the knowledge bases of firms (Freeman, 2002; Lall, 1992, 2001).

Despite the importance of local clusters, and universities in the local development plans, the relationship between the RIS, local clusters, and URIs should be understood in a national context. For this reason, the next section begins with a discussion of the Egyptian innovation system, including, its mains three actors, the government, the URIs, and the industry.

3- The Egyptian Context:

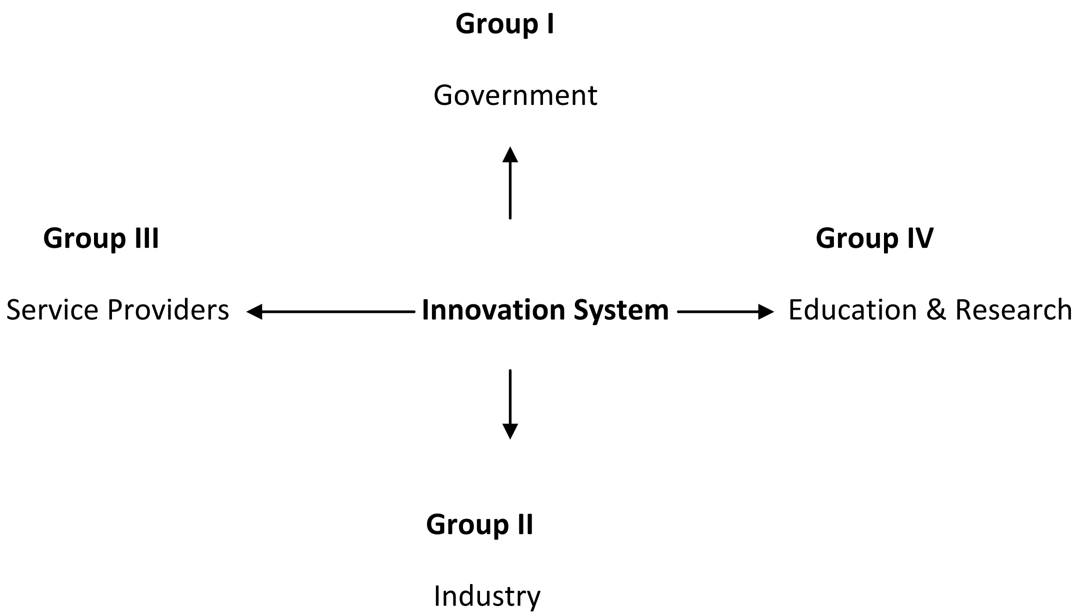
Innovation is central to the development of successful economies. Egypt like many other developing countries often lack the capacity to innovate and, consequently, to improve their positions in the competitive global market. The innovation framework defines the broader conditions and structural, legal, economic, financial, and educational factors that determine the rules and opportunities for innovation (OECD, 2010, Ch 7, PP.213-214).

The latest European charts on innovation shows that Egypt has an innovation policy implemented via measures to stimulate investment, venture capital, business incubators, industrial modernization, small and medium enterprises development and entrepreneurship. As far as these activities are concerned, the Egyptian innovation policy is characterized according to the European Trend Chart on innovation as a clear but incomplete policy .There is no formal coordination body yet (ARTI, 2008, P.45).

Until recently, Egypt had adopted a highly centralized policy with a single ministry in charge of scientific research, development and innovation, the State Ministry of Scientific Research (MOSR) with a relatively small competitive grant funding, and RDI is primarily carried out by full- time personnel in public research institutions (PRIs), while university faculty, although larger in numbers than their counterparts in PRIs, produced less output (OECD, 2010 P.219).

The main innovation actors can be divided into four groups: [2]

Fig.1 the four groups of innovation Actors



Source: ARTI, 2008, P.46.

The development of a dynamic innovation system is one of the important goals being strived for by Egypt. In the 1985-2005 period, various long- term innovation polices were generated by the Egyptian authorities and several government – controlled innovation programs were set up (Hahn, P. and Kocker, M.G. 2008, P.7).

As early as the 1980s, the Egyptian authorities became aware of the fact that information technologies would play an important part in the economic and industrial development of the country. Raising to this challenge, in 1985 the Information and Decision Support Centre (IDSC) was set up under the supervision of the Cabinet of the Prime Minister. The most important objective of IDSC was to accelerate technological development; in 1993 it introduced the Technology Development Program (Hahn, P. and Kocker, M.G. 2008, P.7).

In 1998, the secretary of State for scientific Research was established under the auspices of the ministry of Higher Education and Scientific Research in order to give scientific and technological issues more importance. In addition, the Supreme Council for Research Centers, an organization co-chaired by the Minister for Higher Education and scientific Research and the secretary of State for Scientific Research, was set up in 2000 in order to improve the coordination of research efforts at national level and across all ministers. It meets once a month and brings together representatives from some ministries (Ministry of Higher Education, PMU 2009, p.10).

The Academy of Science and Technology continues to play a key role. It represents Egypt in WIPO (World Intellectual Property Organization) and manages research councils on energy and renewable energy, nuclear science and technology, space sciences and technology, and national critical technologies. It finances the R&D activities of universities laboratories and research centers, although these centers have many linkages with industry, but they have not yet had a great impact (ARTI, 2008 P.49).

The Social Fund for Development (SFD) finances the enterprise Development Program (EDP); this provides support for the setting up of technology incubators. The incubator program was launches in 1995, the first incubator was in Tala in 1998 and seven incubators are planned for the Sixth of October city, Mansoura, Asuit, Asawan , Ain Shams , Tabbin, and Sharqiya. (ARTI, 2008 P.45).

The Mubarak Science City is an important science center, located inn Alexandria, and was established in 1993, its main objective is to create twelve research centers and institutes focused on information technology, genetic engineering, laser technologies, pharmaceuticals, new materials, and small scale industry development. (ARTI, 2008 P.49).

Recognizing the importance of improving science, technology and innovation to Egypt's competitiveness and development, the Egyptian government made two structural reforms in February 2007. The first was concerned with the establishment of a Supreme Council for Science and Technology chaired by the Prime Minister, and the second was the establishment of a Science and Technology Development Fund (STDF) to support the Egyptian innovation capabilities. The Egyptian Ministry of Higher Education and Scientific Research (HESR) has prepared a reform strategy for five years started from 2007 till 2012. It focuses on the restructuring of science and technology governance, human resource development, enhancing informal education and national innovation.

Among others, the Ministry of Trade and Industry MTI has started to become active in the field of innovation. It owns various institutions for implementing its innovation policy in Egypt. The two most important institutions are; the Industrial Modernization Center (IMC) which was started through an initial contribution of ₤ 250 m from the EU , and the Egypt Technology Transfer and Innovation Centers (ETTICs), which are mainly sectorally oriented.(ARTI,2008).

The main objective of the ETTICs is to meet the technological needs of the Egyptian industry, more specifically the transfer and diffusion of new technologies and innovations from global technology markets to enhance the competitiveness of Egyptian industry.(Hahn, P., and kocker, M.G,2008).

In addition, national joint Research- Industry Fund supported by the Ministry of HESR and the MTI was established and a number of projects funded under the European frame work program of research with the objective of promoting links between industry and the research community in Egypt.[3]

3-1 The URIs and Industry in the Egyptian Economy:

Egypt has a well established institutional infrastructure developed over the previous years that bears the legacy of the traditional continental European and some of the Soviet era approaches that separated scientific research from the system of higher education.

The role of non- university public research institutions relative to universities in most OECD countries, as well as in middle and lower- middle income countries has substantially diminished since the turn of the century (OECD, 2003).

Analysis of the RIs performance in enhancing innovations and productivity growth gives support to public researches undertaken in universities rather than public non-university labs, as government labs limits the generation of economic spillovers. Furthermore, public labs, in many countries including Egypt face common problems of ageing staff, lack of access to graduate students, and relative isolation from the main avenues for knowledge exchange.

a) Universities

Higher education in Egypt is provided by universities and higher institutes of technical and professional training, both public and private. The responsibility of higher education is mainly lies under the Ministry of Higher Education and scientific Research. The State universities are under the authority of the Supreme Council of Universities. Private universities are entitled to implement their own criteria of admission and to set fees without the intervention from the ministry.

Higher education in Egypt has a long history which dates back to 988 AD, a few years after the building of the Al-Azhar mosque in 969 AD. Al- Azhar University founded by the Fatimids, is considered to be the oldest operating university in the world, which issued academic degrees, and had individual faculties for Islamic law and jurisprudence, Arabic grammar, Islamic astronomy, early Islamic philosophy and logic (OECD, 2010 P.64).

Till 1957, there were five public universities in Egypt located in Cairo, Alexandria, and Assiut and one private university, the American University in Cairo. Until the 1950s; Egypt was able to maintain international standards in higher education and research. The growth of higher education in Egypt started in 1957, after the establishment of Assiut University. Later in the 1970s, the government took further steps to enhance higher education by opening seven new universities throughout the country, such as Al- Menya University, the former branch of Assiut University. (ARTI , 2008). The higher education in Egypt in 2009 is made up of nineteen public universities with more than 1.9 million students, 12 private universities. There are more than 310,000 public universities graduates and more than 6900 graduates from the private universities, and more than 75000 teaching staff in the Egyptian higher education, compared to almost 3984 teaching staff in the private universities. Tables (1-2), show the structure of public and private universities in 2008/09.

Table 1: The structure of Public Universities in 2008/09

Universities	Location	Enrolled Students	Graduates	Teaching Staff and their Assistants
Cairo	Giza	293425	29871	10608
Alexandria	Alexandria	175230	30266	6460
Ain Shams	Cairo	212799	33992	9095
Asyout	Asyout	72560	13358	3297
Tanta	Gharbia	93526	20408	3303
El Mansura	Dakahilia	124743	23993	5217
El Zagazig	Sharkia	105181	20647	5245
El Menia	El Menia	48697	9113	2727
El Menoufia	El Menoufia	75470	16089	3118
Suez Canal	Suez and Ismailia	48132	11500	3817
Ganoub El Wadi	Qena	45060	8957	1441
Helwan	Helwan	98689	19092	4204
Al-Azhar	Cairo	322809	42932	9500
Al-Fayoum	Fayoum	23724	4399	1569
Beni- Suef	Beni-Suef	44367	8700	1219
Banha	Kalyoubia	59428	11538	3002
Suhag	Suhag	29584	6210	1229
Kafr El- Sheikh	Kafr el Sheikh	25342	6233	696
Mobarak Police Academy	Helwan	6167	-	43
Total		1904951	317298	75790

(-) Information is not available.

Source: Egypt in Figures Book, March 2010, PP.106, 108, and110, Central Agency for public Mobilization and Statistics (CAMPAS).

Various projects were initiated to modernize the higher education system in Egypt , the most prominent projects are the Tempus and HEEP projects; since 2002 , the EU Tempus project in Egypt aimed at improving the quality of higher education in different disciplines in the Egyptian universities, with more than 170 individual mobility grants being awarded to staff members. Higher education development programs in Egypt passes through three interlinked circles, Known by progress, modernization and construction of higher education. The Ministry of Higher Education (MOHE) in the period from (1986-1998), developed a plan for reforming the engineering and technical education, this project was evaluated positively by the World Bank (WB), followed by a comprehensive strategic plan (Higher Education Enhancement Program HEEP) to reform the entire higher education with a partial funding from WB.

From 1998 to 2000, the higher education plan was completed and later endorsed at the Higher Education National Conference held in February 2000. This strategy has been translated in to 25 projects to be implemented over three stages consistent with the GOE (Government of Egypt) five- year plan from 2002- 2017. Six key projects were implemented in the first phase 2002-2007, with WB funding at $50 million, and a contribution of $10 million from GOE, subsequently, the implementation period was extended until the end of 2008 (MOHE,2009).

The HEEP project aims at creating a positive environment to improve the quality and efficiency of the higher education in Egypt, Accordingly, the strategic objectives of the project are: (WB, 2009 P.49).

- First, The comprehensive reform of the public management and efficient administration of the higher education system.
- Second, improving the quality and relevance of higher education.
- Third, improving the quality and relevance of the mid- level technical education.

The Egyptian higher education reform strategy included 25 projects implemented over three phases until 2017, and corresponds to the government's five year plans as follows: First phase from 2002-2007.

- Second phase from 2007-2012. Third phase from 2012-2017. The HEEP six priority Projects (2002-2007):[4]
- Higher Education Enhancement Fund (HEEPF).
- HEEPF develops competitive competencies of HEIs (Higher Education Institutes) and supports decentralization and administrative autonomy to upgrade the quality, efficiency, and effectiveness of the higher education systems and institutions.

This is achieved through creating a competitive environment for reforming higher education system and institutions, encouraging decentralization and institutional autonomy, and sustaining self development of the educational process.

Table 2: The Structure of Private Universities in 2008/09

Universities	Location	Enrolled Students	Graduates	Teaching Staff and their Assistants
American University	Cairo& Helwan	4530	688	394
6 October University	6 October	13641	2616	587
October Modern Science &Arts University	6 October	7102	531	786
Misr Technology & Science University	6 October	12082	1745	848
Misr International University	Cairo	5821	692	356
El- Ahram Canadian University	6 October	-	88	58
British University In Egypt	Cairo	-		271
French University In Egypt	Alexandria	88		36
The Egyptian-Russian University	Suez	-		51
Sinai University	North Sinai	-		159
Faros University	Alexandria	-		301
The Modern University For Technology& Information	Helwan	-		137
Total		55206	6360	3984

(-) Information is not available.

Source: Egypt in Figures Book, March 2010, PP.107, 109, and111, Central Agency for public Mobilization and Statistics (CAMPAS).

- Information and Communications technology Project (ICTP).

ICTP is concerned with raising the efficiency of basic infrastructure in order to benefit from the information revolution and to provide fast, effective access to information, link universities to the Egyptian universities network and to the national network for scientific research. It also prepares the university community to deal with this revolution by raising the efficiency of the universities' information infrastructure networks and the Egyptian universities' network at the Supreme Council of Universities (SCU).

- Egyptian Technical Colleges Project (ETCP).

ETCP improves governance and the performance of middle technical institutes to achieve management decentralization through grouping the 45 institutes in eight technical colleges, each of which manages colleges located in its geographical domain. ETCP also develops human capacities and the physical resources of these colleges, and allows community participation in monitoring the improvement of their performance toward qualifying technical cadres who can serve the business sectors. Moreover, the project supports the colleges to become accredited training centers serving the employees of these sectors and community members who wish to develop their skills and obtain a professional license in different disciplines.

- Faculty of Education Project (FOEP).

FOEP aims to achieve a comprehensive modernization of faculties .This is addressed systemically while taking into account the specifics of the Egyptian context and the uniqueness of each faculty environment. It increases the effectiveness of teaching and learning and total quality as major points of reform based on a new vision, mission, and conceptual framework for the faculties of education.

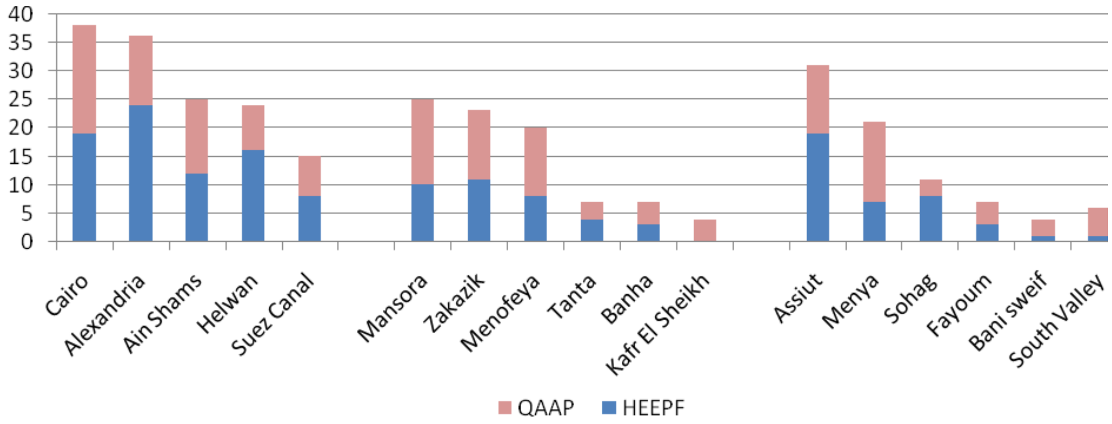
- Faculty Leaders Development Project (FLDP).

FLDP aims at improving the institutional, professional and individual capacities of HEIs in addition to developing leadership capacities in particular to enable leaders to cope with global competitiveness.

- Quality Assurance and Accreditation Project (QAAP).

QAAP enables HEIs to establish quality systems and prepares them to apply for NAQAAE (National Authority for Quality Assurance and Accreditation in Education).

Graph (2) Universities distribution according to their participation in HEEPF & QAAP (%)



Source: World Bank (2009). A Report on Higher Education Enhancement Project for the Arab Republic of Egypt, P.41.

Projects performance is bi- annually evaluated by the WB supervision missions by a group of Egyptian experts from the U.S., Canada, and European Union countries. This takes place with beneficiary entities during the implementation phases. Each university has prepared a study to evaluate the impact of project implementation on academic performance within universities.[5]

b) Research Institutes (RIs):

Until recently, Egypt had adopted a highly centralized model, with a single ministry in charge of scientific research, development and innovation, the State Ministry of Scientific Research (MOSR), providing top- down priority setting, with stakeholder involvement only on advisory basis, and a relatively small competitive grant funding.

As mentioned previously in this research, Egypt at present has 18 state universities and twenty two private universities; they play an important role as research centers.

Regarding Cairo university , the oldest Egyptian university ,now has 20 faculties in Agriculture, Archaeology, Arts, Commerce, Computer and Information Sciences, Dar El-Ulum (Islamic Studies), Oral Dental Medicine, Economics and Political Sciences, Engineering, Law, Mass Communications, Medicine, Pharmacology, Physiotherapy, Regional and Urban Planning, Science, Veterinary Medicine, Nursing, Kindergarten Education and Specific Education (ARTI, 2008).

Beside researches undertaken in scientific faculties, the university established four research institutes: The Institute of African Studies and Research, The Institute of Educational Studies and Research, The National Cancer Institute and the National Institute of Laser Enhanced Science. Research Institutes in Egypt are primarily carried out by full – time personnel in public research institutes (PRIs), such as National Research Center, Central Metallurgical Research and Development Institute, Agriculture Genetic Engineering Research Institute, New and Renewable Energy Authority, Mubarak City for Scientific Research and Technology Applications, and the Information Technology Industry Development Agency, while university faculty and research institutes, although larger in numbers than their counterparts in PRIs , produced less output.[6]

A new Research and Development Institute program was launched with a grant of EUR 11 million from the European Union in October 2007 in cooperation with the Ministry of Scientific Research. The aim of the program is to enhance Egypt's overall performance in RDI, more specifically the program strengthens the link between the RDI sector and Egyptian industry, facilitate Egypt's participation in the program of the European Research Area. This program has three main components: the EU-Egypt Innovation Fund (EFIF); the RDI Network (RDIN); and policies for monitoring and evaluation of RDI initiatives (OECD, 2010 P.226).

Another important project is the Grant Scheme 1, which is related to EEIF (Egypt Environmental Initiatives Fund), its main objective is to support research output, exploitation and innovation with closer links to national or European industries. Grants in this program will be awarded to cooperative projects that aim at enhancing the innovative capabilities of industrial companies and notably the privately owned small and medium sized enterprises (SMEs). Projects proposals must be submitted by a consortium that consists of at least one partner from the industrial sector and one partner from R&D sector (URIs), or projects that include an EU or Mediterranean partner from industry or research sector. Financing of these projects is provided from the EU Development Projects institution (ARTI, 2008 P.54).

This program enables the transfer of technology, and the know how, to the Egyptian institutions from The European and regional counterparts. The main research areas are energy, water, biotechnology (with applications in agriculture), pharmaceuticals, Information and Communication Technology, manufacturing industries, space applications, Environmental applications, materials, and health related applications.

The Joint US- Egypt Science and Technology Funds was established in 1995, and then renewed in 2001 by the United States and Egypt. The joint fund receives $3 million per year distributed equally per year. The main goal of this fund is to strengthen the scientific and technological capabilities of both countries in biotechnology, environmental technologies, manufacturing technologies, information technologies and energy. Other fields include geology, anthropology, new materials, nanotechnology, economics, and other social science. (ARTI, 2007 P.55).

Despite all these reforms, the R&D collaboration between the URIs and the Industry is limited. Traditionally, neither the university nor the professors had incentives for developing industrial linkages. It is only recently that there have been incentives for collaboration at an institutional level; the most common role of university researchers has been as consultants, not the production of commercializable knowledge Table (3) shows the degree and years of experience of technology transfer personnel. The fields of the study included commerce, law, sciences, applied sciences and engineering as indicated by a survey made to diagnose the Intellectual Property (IP) commercialization in the public universities and research institutes in Egypt in 2009 after the entering of IP law number 82 in 2002 in to force (Gadallah, Y.M, 2009) .

Since firms developed their own technology or imported technologies from advanced countries, they did not expect economically valuable scientific knowledge from the university. There was good reason for this as specified by the survey that there is no clear policy concerning the ownership of IPRs created at universities and research institutes except for a small number e.g., 12 institutions in software and databases versus 34 institutions in educational material, 27 institutions said that researchers only own their IPRs in education material and there is joint ownership (institution and researcher) in software field. In most universities and research institutes, there is no any idea on commercialization of IPRs (62%), while only 23% stated that the researchers have the right to decide that their inventions will not be commercialized, especially in research institutes. (Gadallah, Y.M, 2009).

The number of research contracts was 85 contracts with a value of almost LE 32 million which shows a negligible ratio in the Egyptian gross domestic product. The main types of research contracts were collaborative R&D at LE 19 million and services at 12.2 million, as shown in table (4).

Table (3) Degree and Years of Experience of Technology Transfer Personnel

Degree	No. of Personnel	%	Number of years	No. of Personnel	%
(B.Com)	10	10	1-2 yrs	12	15
(B.Eng)	9	9	3-4 yrs	29	36
Other B.	6	6	5-9 yrs	34	42
Other M.	8	8	10-14	6	7
B.Sc, M.Sc.,M.B.A	9	9			
Pd.D.	3	3			
B.Sc.,M.Sc.,Ph.D.	57	55			
Other+ Ph.D	2	2			
Total	104	100		81	100

Source: Gaddalah, Y.M. (2009).Intellectual Property Policy For University & Research Institutes and Economic Development: The Egyptian Case. Paper presented to ATRIP Congress. University of Vilnius. Lithuania. PP: 10-11.

Table (4): Research Contracts by Type and its Value

Type of Research Contract	No. reporting	Value of Contracts (LE million)
Service contracts	3	12.2
Collaboration R&D	2	19
Sponsored research contracts	1	0.2
Sponsored Value	1	0.575
Total	7	31.930

Source: Gaddalah, Y.M. (2009).Intellectual Property Policy For University & Research Institutes and Economic Development: The Egyptian Case. Paper presented to ATRIP Congress. University of Vilnius. Lithuania. P.14.

Given this situation it is not surprising that the R&D collaboration between the university and the industry is limited. The common pattern or relationship is one in which corporations contribute money to universities, or enter in to informal consulting arrangements with a professor, neither of which typically of professional patent applications. The highest percentages of formal external faculty consulting were found in engineering, agricultural and biological sciences and health fields.

Table (5): Formal recording of consulting activity

Consulting activity	No. of institutions	%
Yes – recorded	68	48
No – not recorded	41	29
No information	32	23
Total	141	100

Source: Gaddalah, Y.M. (2009).Intellectual Property Policy For University & Research Institutes and Economic Development: The Egyptian Case. Paper presented to ATRIP Congress. University of Vilnius. Lithuania. P.13.

Concerning patenting activities in 2007/2008, the number of patent applications is 34, 16 patents issued in Egypt , 7 in agricultural and biological science, 22 in engineering and applied sciences, 3 in health professions and sciences, and 2 in mathematics and physical sciences. Data on patenting activities in Egypt does not provide the contribution made by universities, research institutes, and industrial enterprises in these activities, data on patenting activities also does not consider a sufficient indicator to give a good idea on the impact of patent activities (licenses, income from IPRs, and new companies established in technology (spin- off companies), and their contribution to economic development in Egypt.

When considering the role of Egyptian Industrial clusters and universities in urban development, we need in the following section to identify the leading industrial clusters in Egypt.

4. Identification of Industrial Clusters in Egypt:

In order to analyze the impact of local industrial clusters on URIS, and economic situation in the respective regions, two kinds of data are necessary. First, we require knowledge about the locations of industrial clusters. Second; we also require data about URIS, and the current situation in these locations.

Due to lack of appropriate data related to the identification of industrial clusters in Egypt, this study looks at geographic concentration of firms at industrial level.

In searching for clusters of firms, we will use the same method applied by (Madsen, Smith, and Hansen 2003), but with some modification to be matched with the nature of the Egyptian economy.

The area of a municipality is used as the basis for evaluation of firms' location and their concentration is measured along two dimensions. First, for a concentration of firms to qualify for a cluster in this study the specialization share of workers within a given industry must exceed one for the municipality in 2008. An industry specialization index – the Location Quotient (LQ) in industry i, and municipality j is defined as:

$$LQ = \frac{\frac{Lij}{Lj}}{\frac{Li}{L}}$$

Where Lij is the number of workers within industry i in municipality j and Lj is the total number of workers in municipality j, Li is the total number of workers in industry i and L is all workers in manufacturing in the country. So if LQ takes the value more than one, the interpretation is that the share of workers within this particular industry and municipality is more than the share for this industry in the whole country.

The second condition for a concentration of firms to qualify for a cluster is that the number of firms within a given industry in a municipality should be at least ten firms, and the share of workplaces in an industry within the municipality should be at least 2 or 3 compared to the average for the country, to guarantee a high degree of spillovers in the region in 2008.

The data set for defining the clusters in the different industries is retrived from Industrial Production Statistics (IPS) for the year 2008 provided by the Central Agency for Public Mobilization and Statistics (CAMPAS), in this study the public sector has been excluded.

To define the clusters, data from 2008 are used, the municipalities are used as the unit of geography as mentioned above and for a municipality to house a cluster of firms within an industry there must be at least 10 firms in the industry. Furthermore as mentioned above, the share of workplaces in an industry within the municipality should be at least 2 0r 3 compared to the average for the country.

Table 6 lists the number of clusters in different industries in Egypt for these two different definitions of a cluster. Industries with high clustering are manufacturing of food products, non ferrous meal products, rubber &gums products, textile, formed metal products, furniture, and chemicals.

By using the narrow definition with a specialization share from 1-2, 41 clusters exist compared to only 30 clusters if a share from 2-14 is applied. It is worth mentioning, that these figures overestimate the number of clusters as some of the clusters by this definition are placed in municipalities next to each other and therefore they belong to the same cluster.

4.1 Characteristics of Clusters in Egypt:

As the identification of all local clusters in Egypt shows that the major clusters belong to food manufacturing, Nonferrous metal products industry, Rubber and gums products , Formed metal Products, Textile, Furniture and wooden products, and Chemical Products. Hence, we concentrate our analysis on these seven industries and study the characteristics of those clusters and the regions in which they are located.

Table 7 lists the location characteristics of the selected clusters.

Most of these clusters are old industries and located in rural regions, and the table shows also the population density measured as the percentage of total number of population in the governorate. Regarding the number of public /private and foreign universities, the study included all universities located in these regions that are of applied sciences that fit all of the following criteria: 1) more than 500 students enrolled in 2009, 2) established before 1996, and 3) containing departments in at least two of the following areas: agriculture, business administration, natural sciences, engineering or design, fashion and media. The table also shows the number of public research institutes that belong to these universities or belong to some ministries, which contain at least one department in either engineering, food technology, basic and applied science, and medicine.

Table 6: Number of Industrial Clusters within the different industries in 2008.

Industries	Number of workplaces	No of municipalities where LQ>1<2	No of municipalities where LQ>2<14
10 Food manufacturing	4730	4	12
11 Beverage	30	0	0
12 Tobacco	27	0	1
13 Textile	646	2	2
14 Garment Industry	505	1	1
15 Leather Industry &its Products	176	1	0
16 Wood, wooden products and cork industry	86	0	0
17 paper & its products	189	3	0
18 print and copying of recorded multimedia	153	2	1
19 oil refining industry	14	0	0
20 chemical products	386	3	1
21pharmateutics,chemicals, medicine products & medical plants products	50	2	0
22Rubber and gums products	336	5	0
23 Nonferrous metal products industry	850	2	5
24 Base- metal industry	120	2	0
25 Formed metal products except machines and equipment	481	3	2
26 Computers, electronic & visual products ,its components& medical devices	49	1	0
27 Electrical machines	173	2	1
28 Other Machines& Equipment	125	2	1
29 Vehicles of engine			
30 Other transport equipments	80	1	2
31 Other furniture & wooden	17	0	0
products	179	2	2
32 Other manufacturing industry			
33 The reform of equipments and machinery	97	3	0
	8	0	0
Total			
	9507	41	30

Table 7: location Characteristics of clusters in 2008

Cluster	Location	Type	Populat -ion Density	Public and private& foreign Universities	Public Research Institutes
Food manufacturing	- Alexandria	Urban	5.6	4	3
	- Dakahlia	Rural	6.9	1	4
	- Kafr el Sheikh	Rural	3.6	1	0
	- Behera	Rural	6.5	1	0
	- Ismailia	Rural	1.3	1	0
	- Giza	Urban	4.3	2	7
	- Beni Suef	Rural	3.2	1	0
	- Fayoum	Rural	3.5	1	0
	- Menia	Rural	5.8	1	0
	- Asyout	Rural	4.8	2	2
	- Suhag	Rural	5.2	1	0
	- Qena	Rural	4.1	1	0
	- Luxor	Rural	0.6	0	0
	- El Wadi El Gidid	Rural	0.3	0	0
	- Matrouh	Urban	0.5	0	0
	- North Sinai	Urban	0.5	1	0
- Nonferrous metal products industry	- Helwan	Urban	2.4	2	5
	- Dakahlia	Rural	6.9	1	1
	- Kalyoubia	Rural	5.8	1	2
	- Kafr el Sheikh	Rural	3.6	1	0
	- Behera	Rural	6.5	1	0
	- Beni- Suef	Rural	3.2	1	0
	- Fayoum	Rural	3.5	1	0
- Rubber and gums products	- Alexandria	Urban	5.6	4	3
	- Helwan	Urban	2.4	2	5
	- 6 October	Rural	3.6	4	0
	- Sharkia	Rural	7.4	1	4
	- Kalyoubia	Urban	5.8	1	2
	- Cairo	Urban	9.2	5	19

- Formed metal Products	- Alexandria - Helwan - 6 October - Dakahlia	Urban Urban Rural Rural	5.6 2.4 3.6 6.9	4 2 4 1	3 5 0 1
- Textile	- Alexandria - Sharkia - Gharbia - Menoufia	Urban Rural Rural Rural	5.6 7.4 5.5 4.5	4 1 1 1	3 4 0 3
- Furniture and wooden products	- Cairo - Damietta - 6 October - Kalyoubia	Urban Rural Rural Rural	9.2 1.5 3.6 5.8	5 0 4 1	19 0 0 2
- Chemical Products	- Cairo - Alexandria - Gharbia - Giza	Urban Urban Rural Urban	9.2 5.6 5.5 4.3	5 4 1 2	19 3 2 7

Sources of data: - Egypt in Figures, CAMPAS (March 2010).

- Guide to Higher Education in Egypt, Ministry of Higher Education (2007).

Table 8: Employment characteristics within and outside industrial clusters from 2004 to 2008:

Cluster	**Within clusters** **Total employment**		**Within and outside clusters** **Technical* employment 2008**		**Within clusters** **Growth in employment**
	2004	**2008**	**Size**	**%**	**2004-2008**
- Food manufacturing	54359	89221	12051	8.2%	+39%
- Nonferrous metal products industry	29478	55777	6850	7 %	+89%
- Rubber and gums products	23271	18783	3634	11%	-19%
- Formed metal	22591	22315	3884	12%	-1.2%

Products	56484	57653	11792	14%	+2%
- Textile	5212	9554	1022	7.8%	+83%
- Furniture and wooden products	35504	19909	7734	20%	-44%
- Chemical Products					
All industries	226899	273212	46967	5.7%	+20%

(*) as a percentage of total employment in the industrial sector.

Sources of data: Industrial Production Statistics (IPS), CAMPAS, 2004, and 2008.

Table 8 shows the employment characteristics within and outside clusters in 2004 and 2008 and the growth in this period for the selected industries. In this period, the total number of employment has increased by 20% but the rubber and gums products has decreased by 19% , the formed metal products decreased by 1.2, and the chemical products decreased by 44%, whereas Food manufacturing, Nonferrous metal products industry, textile, and furniture increased by 39%, 89%,2%, and 83% respectively.

The table also shows the share of technical employment measured by the percentage of managers, and technicians for the whole industry (within and outside clusters) from the total employment in the industry, the percentage of technical employees in the selected industries is almost 46% of the total technical employees in all industries, and 5.7% of the total employees in all industries.

Table: 9 Growth in number of workplaces within clusters from 2004-2008:

Industries	2004	2008	Change (%)
- Food manufacturing	2778	4730	+ 70
- Nonferrous metal products industry	318	850	+167
- Rubber and gums products	245	336	+ 37
- Formed metal Products	288	481	+ 67
- Textile	336	646	+ 92
- Furniture and wooden products	103	179	+ 74
- Chemical Products	196	386	+ 97
All industries	**4264**	**7608**	**+ 74**

Sources of data: Industrial Production Statistics (IPS), CAMPAS, 2004, and 2008.

Table 9 lists the number of workplaces in 2004 and 2008 and the growth in this period for the selected industries. In this period, the total number of workplaces has increased by 74%, the table shows that the selected industries which have large number of clusters are rising industries.

5- The Impact of Local Industrial Clusters on URIs and Regional Development:

As the selected local clusters are all old clusters that exist in Egypt for more than 50 years, and traditional, at least most of them, so the study hypothesizes that these clusters are less involved in economic performance and URIs linkages.

The study will measure the impact of local industrial clusters on URIS by using some measures for URIS in a region, such as number of universities that contain departments in at least two of the following areas: business administration, natural sciences, engineering or design, fashion and media, and the number of public research institutes in medicine, natural sciences or engineering, and food technology. Data on URIS collected from (CAMPAS Egypt in figures book 2010), and the guide to higher education, the ministry of higher education 2007.

In order to measure the impact of a local industrial cluster on economic situation we will use three characteristics, the unemployment rate in 2008, and average income (wages and incentives), and spin-off rate companies (the rate of new companies established in the industry from 2004 till 2008) data collected from IPS 2004, and 2008.

We will include two additional characteristics for the region that might effect the impact of local industrial cluster on URIs, and economic situation, the population density (measured by the percentage of population in the region from total population), and the type of the region (Urban or rural), data on region characteristics provided by Egypt in figures book 2010.

We will analyze the impact of local industrial clusters on URIS and local development based on a Mann-Whitney U test because none of the variables included is normally distributed, the existence of a cluster is the independent variable, and the above mentioned region characteristics are the dependent variable. We intend to understand how the existence of a local industrial cluster influences these variables. We also know that all of these clusters are traditional industries that exist in Egypt more than 50 years, at least in most of the cases.

The Mann- Whitney U test allows us to state whether each of the characteristics is significantly higher or lower in the regions that contain a local cluster. The results are given in Table 10.

The differences in the average ranks listed in table 14 are difficult to interpret.

Therefore we conduct a correlation analysis (according to Spearman). This means that for each industry and local characteristic a correlation is calculated between the existence of a local cluster and the value of the local characteristic. The results are given in Table 11.[7]

We find from table 10 that the studied local clusters are, at least, significantly positive correlated with some measures of economic performance. Average income (INCOME) is significantly higher in regions that contain a local cluster in the rubber& gums, chemical and metal industry, while it is significantly low in regions that contain the food cluster. According to unemployment rate (UNEM), the study found a significant higher value in those regions that contain local clusters in chemical and metal industry as these clusters have negative employment growth as shown in table 8.[8] In addition, the spin off rate (SPIN-OFF) in manufacturing is significantly higher in all regions that contain local clusters in textile and nonferrous metal industry.

Table 10: Results of the Mann- Whitney U test

Factor	Food cluster	Rubber & Gums Cluster	Textile Cluster	Chemical Products Cluster	Nonferrous Metal Cluster	Furniture Cluster	Metal products Cluster
UNEMP	-100.5 (0.878)	35.500 (0.157)	14.00 (0.262)	11.50** (0.015)	38.50 (0.1)	28.50 (0.173)	23.50* (0.093)
INCOME	-36.0*** (0.003)	8.00*** (0.003)	8.00 (0.102)	18.00** (0.043)	69.00 (1.00)	28.00 (0.164)	8.00*** (0.008)
UNI	99.500 (0.846)	24.00** (0.022)	14.00 (0.216)	13.00** (0.010)	66.00 (0.858)	34.00 (0.263)	1.00*** (0.001)
RESEARC	-86.00 (0.336)	24.50** (0.012)	8.00** (0.046)	18.00** (0.014)	-64.50 (0.768)	37.500 (0.335)	19.00** (0.017)
SPIN OFF	-96.500 (0.742)	37.50 (0.193)	4.00** (0.047)	-24.00 (0.1)	36.500** (0.080)	45.00 (0.751)	41.50 (0.590)
POP	99.00	32.00	15.00	18.00**	39.00	31.00	30.50

	(0.826)	(0.106)	(0.302)	(0.043)	(0.106)	(0.229)	(0.217)
TYPE	-75.500 (0.119)	53.50 (0.640)	21.500 (0.555)	24.50** (0.044)	-42.00* (0.070)	-46.50 (0.782)	24.50** (0.044)

Results of the Mann- Whitney U test: Differences in the average ranks of regions with and without clusters (positive values represent a situation where region with clusters have higher values), p- value are given in the brackets and significance is highlighted by *(0.1), ** (0.05) and * (0.01).**

We can conclude that, there is somewhat, on average positive economic impact of local clusters that are some what more recent than the others (the food cluster). This positive relation concerns variables that represent the average income and the spin-off rate in manufacturing.

All correlations regarding URIs variables are positive except the number of research institutes variable with the food cluster, but they are only significant in the cases of rubber& gums, textile, chemical, and metal which are more recent than the other clusters (Food, furniture, and the nonferrous industry), such positive and significant impact could be referred to the location of the cluster, since URIs are usually located in urban regions with high population density , it could also be referred to some characteristics of the local clusters as they are all rising clusters , and with a low employment growth . In the theoretical section we also concluded that the common pattern or relationship is one in which corporations contribute money to universities, or enter in to informal consulting arrangements with a professor, neither of which typically of professional patent applications or even through well – trained university graduates.

Hence, our study confirms that regions with a local cluster in an old industry are less involved in economic performance and URIs linkages.

Table 11: Results of Spearman Correlations:

Factor	Food cluster	Rubber& Gums Cluster	Textile Cluster	Chemical Products Cluster	Nonferrous Metal Cluster	Furniture Cluster	Metal products Cluster
UNEMP	-0.027 (0.890)	0.244 (0.202)	0.185 (0.337)	0.537*** (0.003)	0.266 (0.163)	0.314* (0.097)	0.396** (0.034)
INCOME	-0.312 (0.10)	0.116 (0.549)	0.049 (0.799)	0.036 (0.854)	-0.121 (0.531))	0.038 (0.845)	0.105 (0.587)
UNI	-0.075 (0.700)	0.448** (0.015)	0.290 (0.127)	0.591*** (0.001)	-0.087 (0.0.654)	0.426** (0.021)	0.838*** (0.000)

RESEARC	-0.230 (0.231)	0.148 (0.443)	0.103 (0.595)	0.606** (0.010)	-0.148 (0.442)	0.392** (0.035)	0.55*** (0.002)
SPIN OFF	-0.209 (0.277)	0.095 (0.0.62)	0.108 (0.578)	-0.471** (0.010)	0.157 (0.415)	0.021 (0.914)	-0.055 (0.779)
POP	0.039 (0.839)	0.272 (0.153)	0.174 (0.366)	0.433** (0.019)	0.300 (0.114)	-0.252 (0.187)	0.276 (0.147)
TYPE	-0.295 (0.121)	0.088 (0.648)	0.112 (0.564)	0.380** (0.042)	-0.343* (0.069)	-0.052 (0.788)	0.380** (0.042)

Results of the Spearman correlations between the existence of a local cluster and the value of local characteristics (p- value are given in the brackets and significance is highlighted by *(0.1), ** (0.05) and * (0.01).**

Table 11 shows that all the studied local industrial clusters (long and more recent existing); do not have any significant impact on economic performance. Local industrial clusters which are traditional and have existed for a long time, such as food, textile, and nonferrous metal industries do not have any significant impact on URIs in their respective regions. This ambiguous picture is confirmed by the results of our study. The highest absolute value of any of their correlations presented in table 15 is 0.343. Thus, none of the performance measures correlates strongly and significantly with the existence of long- existing industrial clusters.

Table 11, also shows that the furniture cluster has a positive and significant impact on URIs in its respective regions which was not found in Mann- Whitney U test table, this might be explained by the efforts made by the government which has selected the region of Damietta as a pilot project to establish the Damietta Eco- Industrial Park for the furniture industries (Rachid, M. 2005).

To sum up, we mainly find a positive and significant relationship between the existence of the more recent local clusters and URIs , and a mixed, and weak significance relationship between the existence of local clusters(old and more recent) and economic performance measured by unemployment rate, average income , and spin-off rate. Hence, we obtain a result that seems to be contradicting on a first sight because human capital and research is usually associated with economic strength.

However, this result seems to be well in line with the arguments in the literature that have been presented in Section 3, as universities and research institutes in Egypt have recently shown a lot of improvements because of the extended funded programs with WB, and EU. The Egyptian experience suggests that the most important contribution of clusters to URIS is one in which corporations contribute money to universities, or enter in to informal consulting arrangements with a professor, neither of which typically of professional patent applications or even through the mobility of university graduates.

Most of the local clusters that have a positive and significant impact on URIs , also have negative employment growth, which induce more university linkages, but lower economic performance.

NOTES:

1. There is an enormous literature on Silicon Valley and Boston. Some work compares the two regions (Fleming et al., 2004, Kenney& Von Burg, 1999; Saxenian, 1994), particularly in biotechnology (Powell, Koput, Bowie, &Smith-Doerr, 2002; Zhang&Patel, 2005).

2- For more details on innovation actors in Egypt, the acronyms, and the website see:

> ARTI (2008), The research and innovation system in Egypt. Scientific and technological cooperation opportunities with the Apulia innovation systems. PP.46-48.

3- An agreement for scientific and technological cooperation between the European Union and Egypt was signed in June 2005; one of the most hampering factors for this cooperation is to strength the direct links between research and industry.

4- For more information about the HEEP six priority projects see:

> Ministry of Higher Education. (2009). Evaluation of the first phase of HEEP. Projects Management Unit. PP: 14-20.

5- For more information about the HEEP performance indicators and evaluation see:

> Ministry of Higher Education. (2009). Evaluation of the first phase of HEEP. Projects Management Unit. PP: 42-45.

6- For a compete list of specialized research and graduate studies institutes see:

Ministry of Higher Education. (2007). Guide to Higher Education in Egypt. PP: 253-260.

7- The study uses the same analysis applied in Brenner, T. and Gildner, A.(2009) study which was applied on three long-existing clusters in Germany, but our study finds an opposite result, as the more recent and technical selected clusters in Egypt have a positive and significant on URIs and not on economic performance.

8- As proved by (Kodama, T.2008), that Small and Medium Size enterprises (SMEs) that have more absorptive capacity because of their small number of employment have more university linkages.

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