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EXPLORATORY STUDY ON THE EGYPTIAN INFORMATION TECHNOLOGY (IT) SECTOR AND THE ROLE OF INTELLECTUAL PROPERTY: ECONOMIC ASSESSMENT AND RECOMMENDATIONS

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1. The Annex to this document contains an Exploratory Study on the Egyptian Information Technology Sector (IT) and the Role of Intellectual Property: *Economic assessment and recommendations*, undertaken in the context of the project on IP and Socio-Economic Development (CDIP/5/7 Rev.).

2. The CDIP is invited to take note of the information contained in the Annex to this document.

[Annex follows]

EXECUTIVE SUMMARY

This Executive Summary presents the results of the study "Exploratory study on the Egyptian IT sector and the role of IP: *Economic assessment and recommendations*".

Objective of the study and project design

The Egyptian ICT sector is an important contributor to economic growth and employment. Having established itself as a leading supplier of ICT back office operation and services for multinational enterprises, the sector is now aiming to shift to the production and exports of higher value-added software and ICT services. Egypt's latest ICT strategy (2013-2017) indeed emphasizes the need to foster ICT innovation, entrepreneurship and advanced ICT skills. Inevitably, this will come from two mutually reinforcing streams, further attracting FDI and furthering domestic ICT entrepreneurship and innovation.

As part of the CDIP Project on IP and Socio-Economic Development (Recommendations 35 and 37), the Egyptian Government via the Ministry of Communication and Information Technology (MCIT), expressed interest for WIPO's Economics and Statistics Division to conduct studies on Intellectual property (IP), innovation, and economic development through the study of the uptake and the role of IP in the Egyptian ICT sector.

While the development of the Egyptian ICT sector has benefitted from multiple studies, statistical surveys and multiple policy initiatives, the uptake and role of IP in the context of the Egyptian ICT sector and associated policies have not received much attention.

Responding to the Egyptian request, the study offers insights on the following questions:

- What are the key characteristics of the Egyptian ICT sector?
- What is, broadly speaking, the role of IP in the ICT industry, both in the areas of ICT hardware as well as services and software?
- What is the current use of IP in Egypt's ICT sector? And more precisely: What are the links between IP, entrepreneurship and innovation in the ICT sector? What is the role of subsidiaries of foreign ICT firms and their IP in developing ICT capacity in Egypt?
- What IP-related policies could contribute to the ICT industry's development, promoting domestic innovation, employment and economic growth?

As many low- and middle-income countries strive to develop their capacity in the area of ICT services and back office operations, the results of this project should be helpful to these countries as well.

Egyptian ICT strategies and the ICT sector

For more than three decades, Egypt has put in place national ICT policy plans and the corresponding institutions and regional technology clusters to foster this sector's international competitiveness and ICT-related FDI inflows. This study finds that:

- The number of Egyptian ICT firms has been growing by a yearly rate of about 15 percent in 2011 and 2012 to a total number of more than 5,000 companies in 2012.

- ICT industry revenues amounted to EGP 65 billion in 2011/2012.

- ICT exports totaled EGP 1,442 million in 2012.

- The ICT sector contributed 3.3 percentage points to the Egyptian GDP in 2012/2013.

- The ICT sector employed 283,000 workers directly in 2012.

- Egypt has proven an attractive investment destination for foreign ICT firms for more than a decade. Companies such as Apple, Cisco, HP, Intel, Microsoft, Oracle, Teradata, Valeo, Vodafone, Yahoo! and others have subsidiaries in the country.

The majority of the Egyptian firms in the ICT sector are focused on delivering and hosting activities in the area of ICT services and related back office operations, also called business process outsourcing (BPO), or in the creation of software. Either it is local Egyptian firms providing their services to mostly foreign multinationals in high-income countries, or multinational firms have set up subsidiaries in Egypt to perform these tasks directly.

On the basis of available data, it is challenging to properly analyze the extent and nature of innovation in the Egyptian ICT sector, be it within local ICT firms or subsidiaries of MNEs. Relying on available ICT-specific data and anecdotal evidence gathered during the fact finding mission, it seemed as if only a minority of Egyptian ICT firms were engaged in R&D and innovative activities. Among the 400 software companies, for instance, the focus is on the production of custom-developed software for another end-user, as a service input to the finalization of a physical or intangible product. Activities are in traditional processes, testing, configuration and other basic activities rather than more advanced innovation.

In fact, the R&D capacity of Egypt was often not considered or considered of low importance in the investment decision by ICT-related MNEs. The majority of the MNE subsidiaries in the ICT sector of Egypt are concerned with marketing, sales, and potentially development activities or the adaptation of existing products to the local market or other Arab-speaking countries. The most important reason to invest in Egyptian for these firms is the well-qualified and specialized workforce.

Yet, demonstrating the shift of the Egyptian ICT sector in recent years and the success of existing policies, this work also highlights activities of MNE subsidiaries which were more innovative in nature and pursuing increasingly research- and potentially IP-intensive projects.

The role of intellectual property in the ICT sector

In the past two decades the ICT areas of digital communication, computer technology, semiconductors, and related areas such as medical technologies have experienced the fastest growth in patenting on a global level. The most advanced ICT firms – including companies in a few middle-income economies such as China, or Malaysia - nowadays hold significant IP portfolios.

Strong growth in ICT sector patenting is first and foremost a result of high R&D expenditures, significant venture capital investments and innovation. Additional drivers of the patenting surge in the ICT sector are (i) the interest in building of a domestic technology base avoiding paying royalties and license fees to other firms and instead licensing technologies out, (ii) strategies to take out patent thickets to block competitors, and (iii) the desire to ward off patent disputes.

ICT hardware: Firms in the telecommunications equipment or the broader ICT hardware sector regularly top the list of most active patent filers in high-income economies. These two ICT subsectors are characterized by complex patent landscapes with widespread patent ownership. Moreover, there is a high demand for interoperability requiring cooperative approaches with reference to existing IP rights. In order to ensure the compatibility of different technologies, standards are developed. Still, patent lawsuits among ICT hardware firms are frequent, entailing significant costs and legal uncertainty.

Software: The innovation process in the ICT sector and in other sectors as well is increasingly software-intensive. In terms of software innovation models, a co-existence of proprietary and Open Source Software (OSS) has come to the fore over the last decades. Both these models have spurred innovation in the software sector significantly.

The increased innovation activities in the software sector and a reliance on proprietary models have triggered the growth of software-related patents. In the past, the software sector relied much more on secrecy, copyright and technical measures rather than patent protection. Increasingly, however, firms engaged in software production and relying on proprietary models of software production have become more frequent users of patents. Interestingly, a large share of software-related patent applications is made by firms whose primary business activity is not software development, including firms in the ICT hardware sector but also firms producing services such as architects, business consultants of banks, or firms producing goods such as cars, domestic appliances and others.

The need to access prior knowledge, the issues of overlapping rights, the requirements of interoperability, patent portfolio races, patent thickets and litigation are particularly prominent in the area of software as well.

Whether in the area of ICT hardware or software, navigating the complex IP landscape in the ICT sector is challenging. Smaller enterprises or new firms from low- and middle-income economies with little resources might find it hard to penetrate this complex web of overlapping technologies and IP rights. That said, IP can play a positive role in facilitating market entry. Software-related patents, for instance, are useful for new entrants to convert tacit knowledge into a verifiable and transferable asset, to signal their expertise to third parties, to increase their value to potential buyers and to negotiate cross-licensing arrangements where needed and in particular with incumbents.

At the same time, non-proprietary software models in which the source code is made freely available for use, adaptation and further development have flourished, including in a number of low- and middle-income countries. The concrete interactions between proprietary and OSS models for software and the question which model is more adequate to spur software innovation is however very depending of companies' business models, products and their competitive environment. Indeed, IP plays an important role for both types of software business models.

ICT and BPO services: When it comes to ICT and BPO services as developed in Egypt, the role and uptake of IP has not been analyzed much. At the outset, it appears as if these ICT-related activities are less prone to the formal use of patents. In the past, the major operators in this field did not file a significant number of IP. Either the services at hand do not entail innovation protectable by patents, such as in the case of call centers or simple data-entry work. Alternatively, the work is conducted as service provision within a business outsourcing relationship in which case the IP belongs to the client firm and not to the ICT and/or BPO service provider itself.

Indeed, IP is not mentioned much in the context of the rise of existing ICT service and BPO providers. Several papers study the rise of Indian ICT services and software industry, yet IP ownership is not considered a key criterion in explaining the Indian success in this economic sector. That said, a fresher look at the most prominent Indian ICT and BPO service providers shows that they have significantly scaled up their IP filing activity with patenting by Indian BPO firms such as Infosys, Tata Consultancy Services and WIPRO increasing considerably in the past few years.

Finally, the role of other IP forms outside of patents, and in particular the role of trade secrets, strong brands and trademarks are undeniable in the ICT services and BPO field but are not well analyzed.

The uptake of intellectual property by the Egyptian ICT industry

Egypt has a well-developed institutional IP environment. The country has made significant progress in enhancing the legal protection of IP and in putting national and international legislations into practice.

However, this study finds that the uptake of IP in Egypt remains rather minor, both in general but also in particular in the ICT sector.

On the basis of existing data, the high-level findings of this investigation are the following:

Patents: First, Egyptian ICT firms, and in particular SMEs – which compose the majority of the ICT sector in Egypt – do not file a significant number of patents. In the cases that Egyptian inventors file for patent protection at home they do so at the national level while not protecting their invention abroad. Second, in Egypt, non-residents and in particular MNEs file the majority of local ICT patents. Few of these patents are original inventions; rather these are patents that foreign entities have previously filed elsewhere. Some ICT-related MNEs do not use the Egyptian patent system at all. Either the MNE subsidiaries are not engaged in any formal R&D yielding a potential patent, or when they are, the patent often gets filed abroad – either at headquarters or in another jurisdiction. Third, inventors with Egyptian nationality or residence appear in a relevant number of patent filings abroad. Most ICT-related patents of Egyptian assignees are filed in the US or in Europe.

Utility models: While Egypt has a utility model system, data is not available on its current uptake in the context of this study. Anecdotal evidence points to a low or absent use of the utility model system by Egyptian ICT firms or by Egyptian subsidiaries of ICT MNEs.

Trademarks: The Egyptian ICT sector is also not a heavy user of trademarks. Again, few registrations come from local Egyptian trademark holders, as opposed to the many international trademark holders which seek protection for their brand name in Egypt. The number of ICT-related trademarks is low in absolute terms and as share of all trademark applications. Few of the existing trademark registrations come from Egyptian residents. Finally, the uptake of trademarks in the ICT sector seems to stagnate.

Royalty and license fee payments and receipts: Unpredictably, the available data point to Egypt as an increasingly dynamic trader in IP – both as importer as well as exporter. The drivers of this uptake need more study.

Among the apparently most innovative Egyptian ICT firms, the level of IP awareness and its economic utility is low, and the uncertainty is high. IP issues are perceived as a complex and a purely legal issue. Despite the low IP uptake, entrepreneurs are afraid of having ideas stolen. Indeed potentially IP-relevant innovations seem not well-protected in initial entrepreneurship phases and in particular during innovation competitions and exhibitions, and different partnerships. Frequently the lack of knowledge, internal and external skills, time and monetary resources are cited as obstacles to accessing IP.

Students, young entrepreneurs and Egyptian ICT firms also expressed significant uncertainty as to the role of IP in their educational or collaborative activities, *e.g.* internships, co-operations or joint projects with other domestic or multinational enterprises. In general, there is a sense that some potentially IP-protectable matter or know-how diffuses to the public domain or to other firms, rather than triggering innovation in domestic firms.

In addition, there is a strong perceived lack of strategies by which domestic ICT firms can get their inventions and IP to market. Experience is also lacking concerning the role and actual importance of IP in financing innovation.

Suggestions for policy and future research

Egypt's policies aimed at supplying competitive ICT skills and in shaping specialized high-tech clusters attracting foreign firms are successful. Encouraging more advanced capacity in ICT services and software firms and fostering domestic innovation is now a priority.

For this to happen, a functioning ICT innovation ecosystem with substantial innovation investments such as R&D and linkages between universities, local firms and MNEs needs to be in place. Identifying how local firms can thrive from their own innovations and benefit more from their interactions with MNEs and associated spillovers is key. Retaining the most highly- skilled ICT personnel within the country, attracting them back to the country after stays abroad and putting these skills to work on local ICT innovation and entrepreneurship is of essence. The mobility of the ICT-skilled workforce between universities, multinational and domestic firms should be increased.

Furthermore, these supply-side approaches need to be complemented with demand-side policies such as the increase of domestic access and demand for innovative ICT products.

Tentative policy suggestions: ICT innovation and IP in Egypt

This study is first to explore the uptake of IP in the Egyptian ICT sector. Clearly, many questions remain open. Still, based on these insights, some tentative policy suggestions are formulated here for the consideration of Egyptian policymakers. These can be an input to more detailed proposals elaborated in the future at the national level.

Specifically, while Egyptian ICT policies and the corresponding institutions are sophisticated, in the area of entrepreneurship and IP a need for further fine-tuning and coordination has been identified which can be grouped into three broad tenets:

1. Undertaking a strategic policy shift towards domestic ICT innovation and entrepreneurship while ensuring improved coordination and evaluation of existing ICT supply-side policies: MCIT and its affiliates as well as relevant business associations focus on improving ICT supply-side capacities and attracting FDI. As also proposed in the new ICT Innovation Strategy, a shift towards policies promoting domestic innovation and entrepreneurship should now be operated in tandem with policies that ensure that Egypt stays an attractive investment location for foreign ICT-related enterprises. Developing a culture and reputation of research, innovation and IP is a critical component of this strategy. Importantly, policies aiming to promote ICT innovation and human capital, such as the fostering of ICT skills, the organization of awards and prizes, or activities facilitating the international exposure of ICT entrepreneurs need to be more carefully coordinated between existing policy bodies and MCIT-steered programs, avoiding duplication. Furthermore, existing ICT supply-side polices and the nascent entrepreneurship and ICT-related innovation programs need to be evaluated for impact.

2. Mainstreaming of practical training on IPR into coherent ICT entrepreneurship programs: While the existing ICT support programs are generally of high quality, IP does not feature prominently within them. In some cases the lack of an IP component can actually be harmful, as it diminishes the inventor's chances that he or she can actually appropriate and develop the invention further.

In line with the evolving needs of the Egyptian ICT sector, each ICT policy program relating to skills formation, innovation or ICT entrepreneurship could be complemented with a fitting IP component. IP should also be at the heart of policies fostering research collaborations and joint research projects with universities, MNEs or other actors. Applying particular care in protecting IP in early phases of entrepreneurship, and protecting inventors from losing their IP rights should be a priority. Importantly, building the case and awareness of IP has to start early with students, in universities, and at research centers.

Specifically, fostering the awareness about the use and economic utility of IP among Egyptian ICT firms will require training, awareness programs and workshops provided mainly through the Technology and Innovation Entrepreneurship Center (TIEC). Beyond awareness alone, IP-related knowledge and skills need to be present both within ICT policy actors as well as in the legal profession to advise domestic Egyptian firms and inventors as to the optimal use of IP.

Training and advice to entrepreneurs or domestic firms on filing for IP at home or abroad, but also potentially offering assistance for IP filings could be envisaged. The training should not only focus on the basic IPR elements and the technicalities of filing IP. Rather the training should also focus on maximizing the effective use and impact of IP on the business level. This entails capacity-building in the area of how to combine R&D project and IP management efforts, how to determine the value of IP assets, how to develop IP-related products and services, how to improve the companies' reputation via IP, and what complementary assets to IP are required. The following more advanced topics will also require consideration: using IP as collateral for finance and know-how as it relates to

IP-based transactions, *e.g.* buying or selling IP, licensing in and out, the cross-licensing of IP, and use and contributions to patent pools. Finally, training for cases of IP infringement and litigation is also important, as is the promotion of the required skills in the legal profession.

On the side of academics, IP should become more central in existing curricula and in the training of professors at technical faculties. Protecting IP emanating from graduation projects of students and academics at large is of the essence, potentially also by introducing mandatory IPR courses for students at engineering and computer science faculties.

The focus in promoting IP in the ICT sector should not be on patents alone but also on utility models, trademarks, industrial design filings and trade secrets. Indeed, this study finds that the use of utility models and trademarks is particularly low in the ICT sector, but potentially promising as an important first step to IP protection is in the face of incremental innovation.

More specifically, the use of IP in the case of ICT services and software is particularly complex. In Egypt, as in many other countries, there are various possibilities of IP protection for such ICT products such as patents, copyrights and the related ITIDA software registration process, trademarks, and others. The relative merits and demerits of these schemes and the legal certainty they provide should be assessed more clearly. Furthermore, the particular case of software and the interactions between proprietary and non-proprietary software innovation models need particular attention, in particular also considering the various impacts for the creation of Egyptian business ventures. Fostering the awareness about related open source business ventures, the required legal and business skills, and designing support measures within the context of IP-related policies is a priority.

In sum, IP-related programs and institutional support measures should be designed after a realistic assessment of the diverse roles IP can or cannot play in the specific case of the ICT and BPO services, the software and other ICT products produced in Egypt. Over focusing on IP-related programs and support measures where little potential for actual IP filings exists would not constitute progress.

3. Putting existing IP institutions to use for ICT firms and innovation: IP policies should not be discussed in isolation but rather as part of a broader range of policies. Egyptian ICT policy actors and the formal Egyptian IP institutions could work more closely. The awareness and accessibility of services of IP institutions seems low both for potential innovators as well as those that design ICT policies. Little formal contact seems to exist between local inventors, technology clusters, technical universities and IP institutions. IP institutions - outside of the ITIDA IP Office concerned solely with software registrations - are not physically present in ICT high-tech clusters or at universities. The coordination of ICT policies with IP policies and its actors might need attention. Information about all the different IP institutions and how they can help must be spread, especially among startups and SMEs. The presence of IP institutions in ICT clusters, *e.g.* in the Smart Village, could be increased.

Reviewing the services and help offered by the traditional IP institutions in the context of the ICT sector would be desirable, in particular also the efficiency of trademark registrations. Providing relevant advice as to the filing of IP rights and the protection of IP abroad, including potentially the use of the PCT or Madrid System, is the priority. Capacity building for judges, prosecutors, customs and police officers also is of significant importance.

In the context of all four policy objectives, the rather unique Egyptian National IP Coordination Committee has proven to be an important coordination vehicle. However, the body currently seems more geared towards the inter-ministerial coordination of external IP matters. In the future, it could well play an important role in above policy coordination matters at the cross-roads of IP and sectoral innovation policies as well.

Areas for future research: ICT and IP in Egypt and beyond

In addition to above tentative policy suggestions, this study has identified the need for more work in the following fields.

First, a number of general questions emerge which evolve around the role of IP in determining a developing country's potential in the global ICT value chain.

1. What is the role of IP in appropriating innovation in ICT and BPO services sector, and in the case of customized software often embedded in other products or systems?

2. What is the role of IP in fostering the rise of a strong domestic ICT and BPO services in low- and middle-income economies?

3. How open are today's ICT service and software markets for new market entrants from developed and developing countries alike, and in the face of proprietary software models, standards and issues of required interoperability? How do the large existing IP portfolios in high-income economies and patent thickets of incumbents influence the development of ICT service and software innovation and entrepreneurship in low- and middle-income economies? What is the role for non-proprietary open source software-based business models in these innovation eco-systems?

4. If access to IP is indeed a bottleneck for new ICT market entrants, which domestic policy approaches could be envisaged to establish a common level-playing field? Would the constitution of local patent pools or of joint licensing consortia be feasible and helpful?

5. How to maximize the positive spillovers from the local activities of ICT-related MNEs interested in tapping into local ICT skills and having access to a large domestic market? What in particular is the role of IP in structuring relationships between the domestic science system, domestic ICT firms and MNEs, and in the quest to maximize positive spillovers?

6. What lessons can be drawn from India or other countries with leading ICT service and BPO providers in regard of the five aforementioned points?

Second, the following more Egypt-specific questions emerge:

1. What is the nature of the Egyptian ICT sector and its current or potential activities in the field of innovation? More detailed work along these lines is required to better assess the true sectorial innovation potential and the role of IP therein.

2. The true characteristics of the Egyptian ICT innovation system need more precise study.

    a) What is the true extent of university and industry collaboration with respect to innovative activities, *e.g.* contract research, joint studies, and others? How does the current orientation of university ICT research and its legal IP environment support the goal of domestic ICT innovation and entrepreneurship?

    b) What are interactions and true impacts in terms of learning and technology transfer between the local innovation system and foreign ICT MNEs?

    c) More generally, what is the mobility of skilled personnel and inventors in the Egyptian ICT sector and how does it contribute to innovation?

Acquiring better knowledge on these points is an essential step to assessing the potential economic impact of an increased and more sophisticated IP use in the Egyptian ICT sector.

EXPLORATORY STUDY ON EGYPTIAN IT SECTOR AND THE ROLE OF IP: ECONOMIC ASSESSMENT AND POLICY RECOMMENDATIONS

Introduction and background

Fostering the information and communication technology (ICT) sector and its role in economic development have long been at the core of the Egyptian government policy.

This strategic support to the ICT sector has born fruits. The Egyptian ICT sector is an important contributor to economic growth and employment, with about 283,000 workers directly employed in the ICT sector, yearly revenues of about EGP 70 billion every year, and adding more than 3 percentage points to GDP in 2012.[1] On average, the Egyptian ICT sector attracts United States Dollars (USD) 1 billion foreign direct investment (FDI) annually. Leading multinational ICT companies have set up subsidiaries in Egypt, mainly to benefit from benefiting from the excellent domestic ICT skills and workforce and the region. Advantages of Egypt are skills, languages, and time zone.

Having established itself as a leading supplier of ICT back office operation and services for multinational enterprises, it is now the desire of Egypt to move up the value ladder towards the production and exports of higher value-added software and ICT services and the corresponding higher-wage employment.

Inevitably, this will come from two increasingly parallel and mutually reinforcing streams, further attracting FDI and furthering domestic ICT firms, entrepreneurship and innovation, and high value-added jobs. Egypt's latest ICT strategy (2012-2017) indeed emphasizes the need to move to ICT innovation, research and development (R&D), advanced ICT skills and entrepreneurship as the way forward.[2] It also calls on significant revenue to be generated from IP, up to an annual EGP 1 billion, by the Egyptian ICT sector.[3]

The project

In the above context and as part of the CDIP Project on IP and Socio-Economic Development (Recommendations 35 and 37), the Egyptian Government via the Ministry of Communication and Information Technology (MCIT), expressed interest for WIPO's Chief Economist to conduct studies on Intellectual property (IP), innovation, and economic development while studying the uptake and role of IPRs in the Egyptian ICT sector.[4]

While the development of the Egyptian ICT sector has benefitted from multiple studies, constantly improved statistical surveys and multiple policy initiatives, the uptake and role of IP in the context of the Egyptian ICT sector and associated policies have not received much attention.

[1] It is noted that, in addition to this figure, the ICT sector generates a significant amount of non-direct employment.
[2] Ministry of Communications and Information Technology (MCIT) (2013a).
[3] MCIT (2013a).
[4] To respond to the need for more empirical research, Members of the World Intellectual Property Organization (WIPO) Committee on Development and Intellectual Property (CDIP) have initiated a Project on Intellectual Property and Socio-Economic Development that consists of a series of economic studies seeking to narrow the knowledge gap facing policymakers in developing countries (CDIP project DA_35_37_01).

In particular, the Egyptian government is seeking to identify the current and potential role of IP on the Egyptian ICT sector - including its small and medium-sized enterprises (SMEs) -, and the links between IP and innovation and FDI. In particular, the role of IP on ICT firm creation and entrepreneurship is of interest, also building on the experience of other low- and middle-income countries that have managed to make a dent in the global ICT market. Moreover, the role of multinational ICT firms present in Egypt, the IP they hold and their potential knowledge spillovers to local ICT firms is of interest to the Egyptian government.

Based on a thorough analysis of these points, WIPO was also requested to supply IP-related recommendations contributing to the development of the Egyptian ICT sector and its innovation activities. The results of this project are meant to help refine both current ICT innovation and current IP policies.

As many low- and middle-income countries strive to develop their capacity in the area of ICT services and back office operations, the results of this project could be helpful to these countries as well.

Objective, structure of the study and analytical approaches

Responding to the Egyptian request, the study offers insights on the following questions:

- What are the key characteristics of the Egyptian ICT sector?
- What is, broadly speaking, the role of IP in the ICT industry, both in the areas of ICT hardware as well as services and software?
- What is the current use of IP in Egypt's ICT sector? And more precisely: What are the links between IP, entrepreneurship and innovation in the ICT sector?
- What is the role of subsidiaries of foreign ICT firms and their IP in developing ICT capacity in Egypt? What IP-related policies could contribute to the ICT industry's development, promoting domestic innovation, employment and economic growth?

The structure of this study follows above questions. Part 1 reviews Egyptian ICT policies and it assesses the economic characteristics of the Egyptian ICT Sector. Part 2 describes the role of IP in the ICT sector. Part 3 describes and analyzes the uptake of IP through the Egyptian ICT industry. Finally, part 4 offers suggestions for policy and research.

The project is based on several streams of work:

- **Data collection and statistics:** The data describing the Egyptian ICT sector are drawn from the MCIT ICT Indicators work and the corresponding ICT Indicators Portal in Egypt.[5] A preliminary database of IP-related data concerning the ICT Egyptian sector has been constructed while relying on the WIPO Statistics Database, and other Egyptian and international P databases such as EPO's Worldwide Patent Statistical Database (PATSTAT).
- **Firm questionnaire and survey:** Existing innovation or inventor surveys were not deemed appropriate to study the uptake and role of IP in the ICT sector of Egypt. Aforementioned surveys are often too general to cater to sectoral specificities as found in the ICT sector; they also often do not assess the role of IP in innovation. To address this problem, a new survey has been designed on the topic of innovation

[5] Besides the data portal at ww.egyptictindicators.gov.eg, MCIT makes available annual, quarterly and monthly statistical bulletins with ICT indicators, see *e.g.*, MCIT (2013b, 2014).

and IP in the ICT sector (see the Appendix 1). This model questionnaire could prove useful in future work of the MCIT, and in the context of other developing countries and/or sectors where the use and role of IP and linkages to innovation are being assessed. It has been subject to preliminary tests and discussions in Egypt. For this study, however, it was not possible to implement the questionnaire and to draw on the corresponding survey results. In addition, the existing Egyptian Innovation Survey which includes questions on IP was not drawn on for purposes of this initial examination.[6] However, this study does draw on the results of a survey conducted by the Egyptian Information Technology Industry Development Agency (ITIDA) in the context of another WIPO project relating to Egyptian SMEs in 2013.[7]

- **Fact-finding mission and structured interviews**: A mission was undertaken in February 2013 for the project team to consult with the relevant stakeholders (see Appendix 2 for an agenda). The objective was to gain a better understanding of the role of IP in the Egyptian ICT sector and related innovation. Rich meetings and structured interviews were conducted in the Smart Village in the west of Cairo or in Cairo itself with the lead ministry, MCIT, including its Minister, various other governmental entities in charge of the ICT sector and entrepreneurship, the Patent office, the Foreign Ministry in charge of the National IP Coordination Committee, Egyptian and multinational ICT firms, a few young Egyptian ICT entrepreneurs, and finally, ICT Research centers, professors and their engineering students.

- **Workshop with stakeholders:** In addition, a workshop on "The Role of IP in the ICT industry" was organized which informed the industry about the role of IP, and sought further inputs from the industry and the design of the firm questionnaire.

In the team of Prof. Blind, Dr. Tim Pohlmann, External Researcher for Centre d'économie industrielle (CERNA), Mines ParisTech, Paris, France, and Berlin University of Technology, Berlin, Germany and Mr. Florian Ramel, Researcher, Berlin University of Technology, Berlin (Germany) contributed to the study.

This study was prepared by WIPO in close coordination with MCIT. The support of Minister of Communications and Information Technology Eng. A. Helmy in this project is acknowledged. Dr. Nagwa El-Shinnawy, the head of the Egyptian team and Information Center of MCIT, is acknowledged for her extensive efforts done in this study in drafting its aim, proposing its methodology, setting and contributing in the interviews process and meetings with experts from academia & private sector, providing direction for this study, and drafting policies and exploratory areas to be working on as a step forward in the issue at hand. Maie Ashraf Hamdy and Ehab Awad Ali El-araby, Economic Researchers, Unit of analytical and economic studies, and Nahla Albaih, Follow-up Executive, all at the Information Center, MCIT contributed to the elaboration of the study.

Dr. Mokhtar Warida, Counselor, Permanent Mission of Egypt to the United Nations and other International Organizations in Geneva and Plenipotentiary Mohamed Gad, formerly Permanent Mission of Egypt to the United Nations and other International Organizations in Geneva supported the implementation of this project. Nagla Rizk, Professor of Economics, School of Business, The American University in Cairo and Ahmed Abdel-Latif, Senior Program Manager, International Centre for Trade and Sustainable Development also offered useful information on a number of questions raised in this report. Finally, the participants in WIPO Experts' Meeting on Intellectual Property and Socio-Economic Development, December 3 and 4, 2013 and Torbjorn Fredriksson, UNCTAD (in personal capacity) provided feedback on a previous draft of the study.

[6] Egypt - Egyptian National Innovation Survey 2008 and 2009, INV064 Ministry of Scientific Research.
[7] Hegazy and Gadallah (2013).

Part 1) Egyptian ICT policies and ICT Sector

Egyptian ICT Policy Developments

Egypt has long been aware of the strategic value of ICT in economic development, also aiming to establish the country as a major ICT hub in the region.

For more than three decades, Egypt has put in place national ICT policy plans and the corresponding institutions and regional technology clusters to foster this sector's international competitiveness, to attract multinationals enterprises (MNEs) and ICT-related FDI inflows.[8] Since the year 2000, Egypt progressively initiated reforms to liberalize the ICT sector. Programs were put in place to build the capacity of the ICT industry, and to promote FDI in the sector. The focus was on building technology zones, promoting ICT exports and supplying skilled labor.

Table 1 provides an overview of Egyptian government institutions fostering the Egyptian ICT sector, their tasks and strategic goals, the programs they offer and their IPR related work.

In particular, the objective of the MCIT is to foster the domestic ICT sector and its attractiveness to foreign ICT firms through various programs, affiliated centers and initiatives. Under the MCIT, actual training, consulting and business development programs are conducted by its executive arm, the IT Industry Development Agency (ITIDA). ITIDA also has an IP-related office offering software and database registration as explained later. A more academic approach is taken by the IT Institute (ITI) which collaborates with national and international IT researchers. One main goal of ITI is to further develop Egypt's academic landscape with regard to spreading IT across the country and with some focus on developing IP. In order to encourage more entrepreneurs to start their own ICT businesses, the Technology Innovation and Entrepreneurship Center (TIEC) promotes ICT innovation and its marketing. The Software Engineering Competence Center (SECC) in turn is mostly focused on furthering the competencies of software firms and programmers.

Building on these Egyptian ICT policy institutions, the new ICT strategy also places the development of ICT sector as the first priority, with efforts to support and promote Egyptian ICT companies, and in maintaining Egypt as an attractive outsourcing & offshoring destination.[9] In addition, important efforts are made to develop a domestic software sector. As part of this effort, in March 2014, the Minister of Communications and Information Technology announced the activation of the national strategy to support the development of Free and Open Source Software (FOSS) uses in Egypt (see Box 1).

[8] MCIT (2003, 2005, 2006, 2013a) and UNCTAD (2011).
[9] MCIT (2013a).

Table 1: Institutions promoting ICT sector in Egypt

ICT Institution	Tasks	Programs	IP Angle
Ministry of Communications and IT (MCIT)	- Development of the national ICT Development Strategy - Support of ICT training - Attraction of investors	- ICT Development (Access to ICT for Egyptians, Access to ICT for Learning, Health, Government, Green ICT) - ICT training (courses)	- Fosters ICT development and has an interest to protect IP as an asset of the Egyptian economy
IT Industry Development Agency (ITIDA)	- Executive arm of MCIT - Attracting FDI - Offering tools for companies seeking to export ICT - Positioning Egypt as a leading outsourcing location - Runs ITIDA IP Office offering software registration and training of IP officials	- Access to Finance (local IT industry support) - Industry Support (Growth and HR projects, build-up of international relations) - Capacity building (HR training) - Research & Innovation (collaboration with research and academia, *e.g.* ITAC, the Information Technology Academia Collaboration) - Infrastructure (Provision of technology parks)	- Develops the ICT sector actively in collaboration with others and thereby has an interest to protect resulting IP as an asset of the Egyptian economy
Information Technology Institute (ITI)	- Affiliated with MCIT - Providing specialized software development programs to fresh graduates - Foster relationships with corporations, foundations, governmental organizations, and other partners to advance education, research, and ICT innovation and encouraging technology transfer	- Train the trainers in IT - Education development for universities in Egypt - National and international collaboration with academia - IT research - Consulting services	- Fosters ICT development on a basic level and has a special interest in protecting the IP of innovators
Technology Innovation and Entrepreneurship Center (TIEC)	- Affiliated with MCIT - Stimulating an innovation-based economy through strategizing, facilitating, and promoting innovation, entrepreneurship, and the creation of IP in ICT and its applications	- IP Development Program - Collaborative Innovation Network	- IPCD program aims to raise awareness in ICT companies regarding IPR and to help them use IP for their business
Software Engineering Competence Center (SECC)	- Affiliated with MCIT - Goal to enhance the quality, efficiency, and level of innovation of the Egyptian software companies to improve their global competitiveness - focus on enhancing technical competence and internal capabilities, including via software certification	- Facilitating programs aimed at software training, assessment, consultation and certification (local and international) Examples: - Capability Maturity Model Integration (CMMI®) - Management Accreditation Program - Six Sigma for IT and Software Engineering - Software Testing - Embedded Software Development	- n.a.

Source: Egyptian government information, interviews, and publicly available information.

Box 1: Egyptian national strategy for Free and Open Source Software

In March 2014, the Minister of Communications and Information Technology announced the activation of the national strategy to support the Free and Open Source Software (FOSS) uses in Egypt, in parallel to efforts in promoting the proprietary software innovation models.

In coordination with the committee formulating the strategy consisting of specialists and consultants of MCIT and its affiliates as well as a number of governmental entities and civil society organizations representing the private sector, MCIT relied on the SECC as the focal point to coordinate efforts of all stakeholders to activate the FOSS strategy.

The actions made to activate the strategy include the representation of FOSS experts in SECC Board of Trustees, forming a working group of specialists to design and follow-up on applying related initiatives and programs in coordination with the participating bodies.

The Center has already started to design and implement FOSS training programs in the field of cloud computing and mobile applications in cooperation with TIEC.

The strategy works on achieving eight main objectives which are considered the effective value of this kind of software: delivering knowledge to citizens at the lowest cost, improving transparency and effectiveness of the governmental sector, support the development of the ICT sector and maximize competitiveness for the benefit of the user, support the rational budgeting and reduce unexplained cost on technology solutions, achieve the technological independence, build the sustainable knowledge-society including users and developers, boosting micro and small companies, raising society awareness about the available solutions and promote the culture of FOSS in the different sectors of the society.

This is why, the strategy works on several pillars: proper coordination and management of the strategy and its plans on the highest level, through finding a mechanism with focus on ICT, issuing policies supporting the use and development of FOSS and integrate them to the general strategy for the sector and the development strategy of the State, support the FOSS uses in government, expansion in education and training activities to qualify calibers, develop the infrastructure to adopt FOSS, provide the funds, support micro and small enterprises and cooperation with civil society.

While the strategy provides performance standards to ensure accomplishment, it is engaged to undertake a number of preliminary projects and initiatives, for example multiplying FOSS in Egypt during the coming five years through increasing the number of companies providing its services, training curricula and certified training centers by launching three public tenders annually in the government sector for projects to spread the culture of FOSS usage, in addition to training one thousand specialized trainee in OSS annually. All of the above come through an action plan supporting the larger adoption of FOSS in Egypt

Source: Press release, Minister, MCIT, http://mcit.gov.eg/Media_Center/Press_Room/Press_Releases/2967.

1.1 Size and development of Egypt's ICT Market

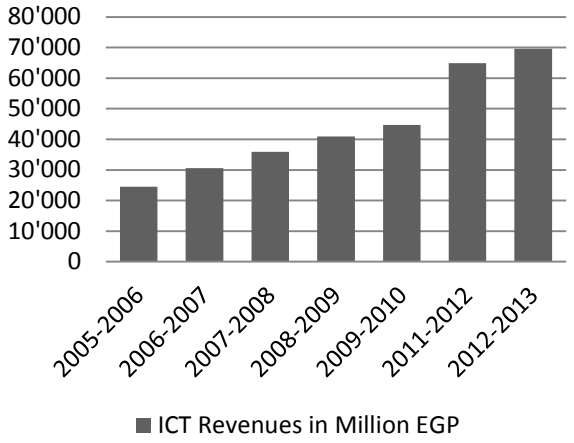
Also as a result of the past policy focus, the Egyptian ICT sector - now a major industrial sector for the Egyptian economy and an attractive destination for ICT-related FDI - is particularly well-developed and dynamic. The following points assess the general economic characteristics of this sector:

- The number of Egyptian ICT firms has been growing by a yearly rate of about 15 percent in 2011 and 2012 to a total number of more than 5,000 companies in 2012. Compared to 2000, the number of Egyptian ICT firms has been multiplied by ten.

- The ICT industry generated revenues of about EGP 65 billion in 2011/2012, an increase of 55 percent as compared to 2005.

- While in the mid-nineties Egypt was hardly active in exporting ICT products, exports of ICT services in particular increased rapidly for the last years (see Figure 1). While in 2005 ICT exports made up for EGP 1,442 million, in 2012 ICT exports reached EGP 7,891 million in 2012, a multiplication by more than five in this time span.

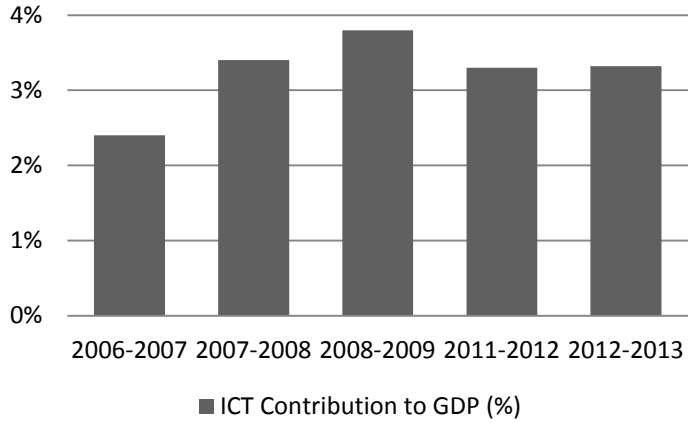
Figure 1: ICT services exports (2005-2013)



Source: MCIT, Information and Communications Technology Indicators.

The ICT sector contributed 3.3 percentage points to the Egyptian GDP in 2012/2013, about the same as the previous year, but a substantial increase as compared to the early 2000s (see Figure 2).

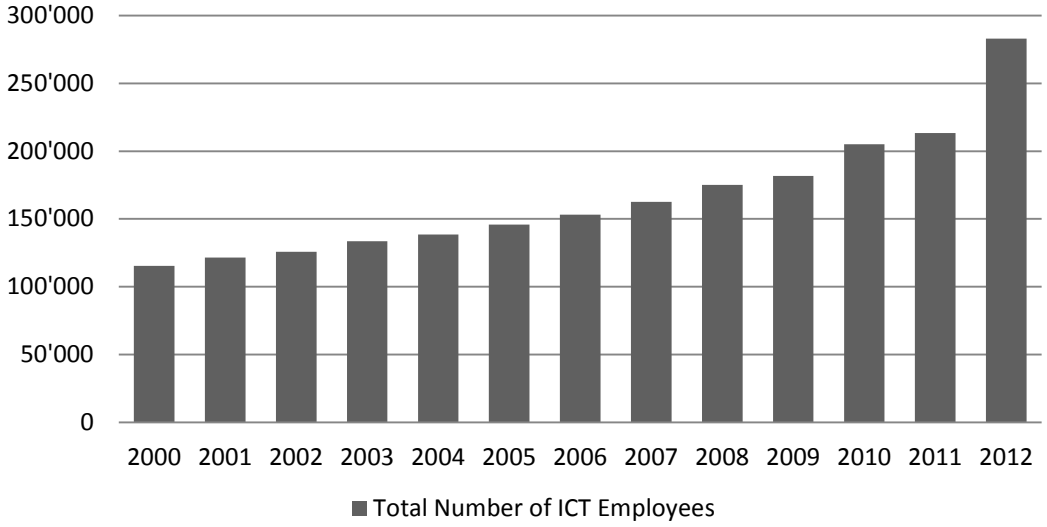
Figure 2: ICT contribution to GDP in percent (2006-2013)



Source: MCIT 2013, Information and Communications Technology Indicators.

- While in 2000 approximately 115,000 people were employed in the ICT sector, the number had more than doubled in 2012 to around 283,000 employees (see Figure 3) – and this only includes the ICT sector employment itself. The importance of ICT software and services firms is reflected in the employment data as well. About 160,000, and slightly more than half of all Egyptian ICT workers, are active in the ICT software and services companies of local and foreign origin.

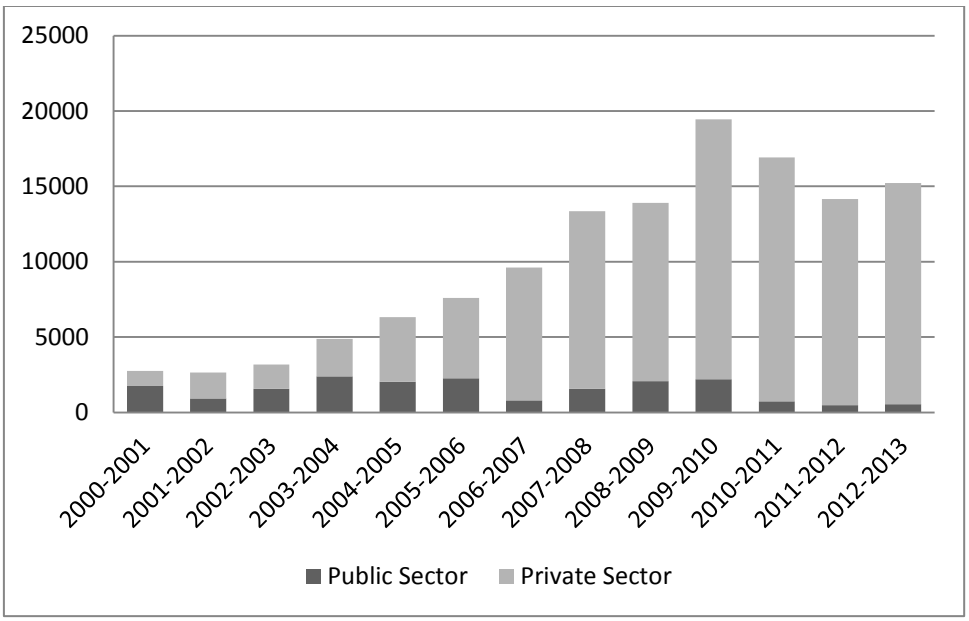
Figure 3: Total number of ICT Employees (2000-2012)



Source: MCIT 2013, Information and Communications Technology Indicators.

- The private sector has been the major driver for the continual growth in ICT investments over the last ten years (see Figure 4). While in 2001/02 private investments in the ICT sector had a share of 65 percent, they made up 96 percent of total investments in 2012/13. In this time period, total ICT investments increased more than five times with a peak in 2009/2010.

Figure 4: Private and public investments in the Egyptian ICT market, in million EGP (2001-2013)



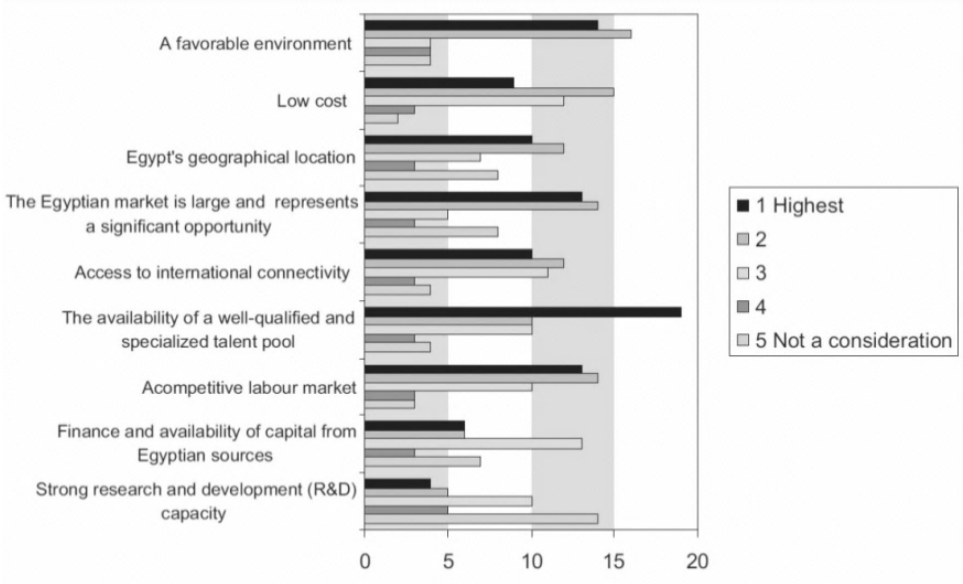
Source: Ministry of State for Economic Development, follow-up report for 2007/08; MCIT 2013, Information and Communications Technology Indicator.

- Egypt has proven an attractive investment destination for foreign ICT firms for more than a decade. Companies such as Apple, Cisco, HP, Intel, Microsoft, Oracle, Teradata, Valeo, Vodafone, Yahoo! and others have subsidiaries in the country. The most important reason to invest in Egyptian for these firms is the availability of a well-qualified and specialized workforce (see Figure 5).[10] Market opportunities and a favorable environment are the second and third most important reasons. In interviews for this project the favorable time zone of Egypt in relation to Europe, and the eminent position of Egypt in the Arab region and its language were mentioned as other favorable factors.

  Providing detailed ICT-specific FDI figures is harder however. The only available figures show that ICT-related FDI in turn has been increasing from 2006 until 2007, reaching approximately USD 1.9 billion.[11] Inward FDI into all Egyptian sectors, in turn, reached an annual USD 9 billion for the years 2005, 2006 and 2007. The financial crisis led to a decline of FDI inflows to about USD 6.5 billion per year in 2009 and 2010.[12] Subsequently, the political changes in Egypt first led to an outflow of general FDI in 2011 but a recovery was soon on its way with about USD 3 billion FDI inflows in 2012. In sum, FDI stocks are also still five times greater in 2012 than they were in the mid-1990s. Investors from EU countries are the number one investors in Egypt with about 80 percent of all FDI inflows in 2011/2012.[13]

[10] Survey results of the UNCTAD ICT Policy Review Egypt in UNCTAD (2011).
[11] World Bank (2010). According to national sources, the ICT-related FDI stock amounted to EGP 16,236.3 million in 2006/2007 and EGP 17,042.43 Million in 2007/2008.
[12] This data is available on the UNCTAD FDI Statistics Portals, see http://unctad.org/sections/dite_dir/docs/wir2013/wir13_fs_eg_en.pdf and at http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx.
[13] European Commisssion data at http://eeas.europa.eu/delegations/egypt/eu_egypt/trade_relation/investment/index_en.htm.

Figure 5: Reasons for investing in the ICT sector in Egypt



Source: UNCTAD ICT Policy Review Egypt, UNCTAD (2011).

While the above data portrays the economic characteristics of the Egyptian ICT sector, concerns about the instability in Egypt since the Revolution in 2011 might have impacted the ICT industry revenues and related FDI negatively. Yet, this is not assessed in this study.

1.2 Sectoral ICT market composition in Egypt

In terms of sectoral composition and as alluded to in the introduction, the majority of Egyptian firms in the ICT sector are focused on delivering and hosting activities in the field of ICT services and back office operations, also called business process outsourcing (BPO).

Figure 6 provides a snapshot of the number of local and foreign firms engaged in these ICT sectors. Either it is local Egyptian firms providing their services to mostly foreign multinationals in high-income countries, or multinational firms have set up subsidiaries in Egypt to perform these tasks directly. The list of foreign firms includes Microsoft, and similarly well-known ICT service and software firms as well as specialized BPO service providers such as Teleperformance, Sykes, and Stream Global Service.

Figure 6: Local and foreign ICT service and BPO firms in Egypt

Source: Presentation of Minister Helmy, Digital Socio-Economic Development - The Way Forward To Prosperity Freedom. Social Equity, Presentation of the Minister of Egypt's ICT Strategy 2013 - 2017.

In terms of ICT and BPO services, Gartner identified Egypt among the top 30 locations for offshore services in 2010-2011, emphasizing the excellent government support and the financial incentives to this sector.[14] In a study by A.T. Kearney in 2011 rating financial attractiveness, people skills availability and business environment, Egypt is qualified as the fourth most-attractive location worldwide for service offshoring after India, China and Malaysia. Egypt performs relatively well in business processes and IT but has only limited activity in the area of call-center business (so-called "voice work"). Due to the recently more unstable environment, a more recent study by Gartner in 2013 does not rank Egypt among the top 30 locations for offshore services any longer. Egypt is however still qualified as an important country with a "home to external service providers that are beginning to sell services abroad" (see Table 2).[15]

Table 2: Gartner's top 30 locations for offshore services, 2013

Top 30		
Americas: Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru and Uruguay	**Asia/Pacific**: Bangladesh, China, India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand and Vietnam	**Europe, the Middle East and Africa (EMEA):** Belarus, Bulgaria, the Czech Republic, Hungary, Mauritius, Morocco, Poland, Romania, Russia, Slovakia, South Africa, Turkey and Ukraine
Additional locations with potential for offshore services		
Americas: Canada, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua, Panama and Puerto Rico	Asia/Pacific: Australia, New Zealand, Pakistan, Singapore	**EMEA**: Algeria, Armenia, Bahrain, Croatia, Cyprus, Dubai, Egypt, Estonia, Ghana, Ireland, Isle of Man, Israel, Kenya, Kosovo, Latvia, Lithuania, Macedonia, Madagascar, Malta, Moldova, Nigeria, Northern Ireland, Portugal, Saudi Arabia, Scotland, Senegal, Serbia, Slovenia, Spain, Tunisia, Uganda and Wales

Source: Gartner (2013). This table uses the names of the geographic locations as provided by Gartner. They do not necessarily correspond to official country geographies or their official title.

Another strand of related and often inextricable activities is in the field of software. The scope for an expansion of the software industry in Egypt is confirmed in multiple studies.[16] In particular, the access to the Middle East market and the increasing interest in Arabic language-content are the main drivers.[17] Egypt has also implemented a number of efforts via the SECC training and testing individual specialists, uses certification CMMO (see Table 1)[18]

[14] That same year, the Ovum CRM Outsourcing Business Trends survey considered Egypt well arguing that political instability will be a test case for the sector. See also http://ovum.com/2011/02/01/unrest-puts-egypts-outsourcing-credentials-at-risk/ and http://ovum.com/2012/02/20/one-year-on-questions-remain-over-outsourcing-to-egypt/.
[15] Gartner (2013).
[16] American Chamber of Commerce in Cairo (2007) and UNCTAD (2012).
[17] Rizk and El-Kassas (2010).
[18] Interview with Dr. Hossam Osman, Chairman, Software Engineering Competence Center, and Acting Manager, TIEC. See also (UNCTAD, 2011).

1.3 Innovation in the ICT services and software sector in Egypt

Assessing the broader Egyptian national innovation system, and how it facilitates or hinders ICT innovation, is beyond the scope of this study.

On a general level and based on the Global Innovation Index 2013 however one can say that Egypt currently ranks 108 among 142 countries assessed in the GII, based on its innovation inputs and outputs. Table 3 compares this ranking to neighboring countries.

Table 3: Global Innovation Index: 2013 Rankings

Rank	Country
14	Israel
27	Cyprus
38	United Arab Emirates
42	Saudi Arabia
43	Qatar
59	Armenia
61	Jordan
67	Bahrain
68	Turkey
70	Tunisia
73	Georgia
75	Lebanon
80	Oman
92	Morocco
105	Azerbaijan
108	**Egypt**
134	Syrian Arab Republic
138	Algeria
142	Yemen

Source: Global Innovation Index 2013 as in Cornell University, INSEAD and WIPO (2013).

This overall ranking of Egypt conceals the country's strengths in the field of human capital and in its infrastructure. The country's ICT infrastructure, its researcher headcount per population, the performance of its universities, and its employment in knowledge-intensive services, including ICT services fare positively in the GII. In particular, the citation record of Egyptian scientific publications (H-index) stands out as major output strengths. In addition, Egypt's high-tech and medium-high-tech output as a percentage of total manufactures is greater than that of its neighboring country peers.

Overall Egypt scores less well on many variables that relate to knowledge and technology outputs, and in particular on productivity, entrepreneurship, and domestic software spending. The extent to which business and universities collaborate on R&D in Egypt is low when compared to its neighboring country peers.[19]

[19] Official figures to compare the Egyptian expenditures on education and other human capital dimensions such as the number of graduates in science and engineering to other countries are currently unavailable for Egypt.

More specifically, in the context of this study, one of the primary questions to ask then is how innovative the Egyptian ICT services and software industry actually is?
On the basis of available data, it is challenging to properly analyze the extent and nature of innovation in the Egyptian ICT sector, be it within local ICT firms or subsidiaries of MNEs. While the project conducted detailed interviews, the sample size is too small to make across-the-board assessments. Also, as stated at the outset, the planned survey of ICT firms via the means of an innovation and IP questionnaire has not materialized. Moreover, the existing innovation surveys available in Egypt could not be used in this analysis.[20]

Relying on available ICT-specific data and anecdotal evidence gathered during the fact finding mission, it seemed as if only a minority of Egyptian ICT firms were engaged in R&D and innovative activities. In discussions with ITI, it was mentioned that few Egyptian ICT firms, about five percent, actually produce R&D-based innovations.

Among the close to 400 software companies, for instance, the focus is on the production of custom-developed software for another end-user, as a service input to the finalization of a physical or an intangible end product. Many of the related activities are more in the area of traditional processes, testing, configuration and other more basic activities rather than true software innovation. The software programming and skills level in Egypt is constantly improving, but as judged by CMII certifications provided by the Software Institute, most Egyptian companies and software developers have medium-level software programming skills (CMMI level 3, but not beyond).[21]

Also, according to available academic sources, the open source software sector is nascent at best, but with important potential for further development.[22] Accordingly, an Egyptian strategy to support open source software was recently adopted (see Box 1).

Domestic software spending does not yet seem a driver of software innovation and entrepreneurship as Egypt ranks low in the region in terms of software spending, including in the Global Innovation Index (GII), see Table 4.

In fact, the R&D capacity of Egypt was indeed often not considered or considered of low importance in the investment decision by MNEs in the UNCTAD ICT Policy Review for Egypt (see Figure 5). The majority of the MNE subsidiaries in the ICT sector of Egypt are concerned with marketing, sales, and potentially development activities or the adaptation of existing products to the local market or other Arab-speaking countries.

[20] One the one hand, it is questionable whether these generic questionnaires covering all industries at once would be helpful in better understanding the nature of innovation. On the other hand, good start and includes detailed questions on the use of IP which could prove useful IPR: During the three years 2006 to 2008, did your enterprise: Secure a patent in Egypt?/Apply for a patent outside of Egypt?/ Register an industrial design?/ Register a trademark?/Claim copyright?/Grant a license on any intellectual property rights resulting from innovation?
[21] According to the Software Engineering Competence Center 49 companies were assessed and certified on CMII level 1-3.
[22] Rizk (2012).

Table 4: Egypt's rank and scores in computer and software spending (2013)

Global Innovation Index: Computer and Software Spending		
Rank	**Country**	**Score**
7	Turkey	62.4
22	Bahrain	29.5
23	Kuwait	26.3
32	Jordan	18.3
38	Israel	16.7
47	Saudi Arabia	14.6
50	Tunisia	13.2
54	Morocco	12
61	United Arab Emirates	10.5
62	Qatar	9.9
67	**Egypt**	8.1

Source: Authors' calculations based on Global Innovation Index 2013 values taken from IHS Global Insight ICT Database

Yet, demonstrating the shift of the Egyptian ICT sector in recent years and the success of existing policies, this work also highlights activities of MNE subsidiaries which were more innovative in nature and pursing increasingly research- and potentially IP-intensive projects. Firms such as Valeo, for instance, operate in Egypt while producing software for products which are later integrated in cars by auto manufacturers (see Box 2). Other firms are said to use Egyptian software skills to translate and adapt existing software packages from English or other languages into Arabic, including interfaces. This involves simple translation activities but can also be an asset in more advanced project. Microsoft for instance, is hosting a project on Natural Language Processing (NLP) for Arabic – a software programming tool enabling developers around the world to build applications - in its R&D Center in Egypt.[23] Other software initiatives at Microsoft R&D Cairo aim to simplify the Internet use in Arabic, *e.g.* to facilitate typing on an English keyboard via a tool that automatically completes words in Arabic.

[23] See Microsoft R&D Cairo at http://research.microsoft.com/en-us/projects/atks/.

Box 2: FDI example – Valeo

Valeo is a multinational supplier to the automotive sector. Relying on the available pool of talented, technologically skilled, and multilingual university graduates of Egypt, Valeo employed 440 newly graduated Egyptian engineers in 2012, up from 260 in 2010. The young and qualified labor force, the fact that there is less competition for these talents on the Egyptian market and the comparatively low wages for software programmers – even when compared to China and India – are attractive to Valeo.

In meetings it was emphasized that the Egyptian subsidiary of Valeo has become a main branch for R&D and innovation in automotive software with no activity in the area of hardware or mechanical design. The focus is on the development of software rather than pure research, or any commercial or marketing activities. Once the software has reached a certain degree of maturity, it is integrated with hardware in other countries such as France, the United States of America (US) or India.

In particular, the company's R&D activities are focused on new fields such as software for hybrid cars, piloting cameras inside cars and remote satellite applications.

While Valeo files 600 patents every year, and while development takes place in the Cairo subsidiary of Valeo, no patents are filed by Valeo's Egyptian subsidiary. If new inventions are generated in Cairo, patents are filed by Valeo's business entities outside of Egypt that requested the R&D.

Valeo employees gain useful skills within the enterprise. Some make a career in the company often also rotating to its other non-Egyptian locations. Indeed, young graduates and software programmers see it as an essential boost to their professional development when they can work abroad. Some employees are later hired by competitors or car manufacturers. Based on our interviews, only few Valeo software programmers have left Valeo to create successful own businesses in Egypt.

To further its domestic research, Valeo is starting to cooperate with universities, and the Egyptian educational system for joint projects, Valeo collaborates closely with TIEC and ITIDA training programs.

Source: Interview with Wael Abouelmaaty, General Manager, Valeo.

Egypt's latest ICT strategy (2013-2017) emphasizes the need to move to ICT innovation, entrepreneurship and advanced ICT skills. This shall be facilitated by two increasingly parallel and mutually reinforcing streams, that of attracting further foreign investment to boost innovation and entrepreneurship in the ICT sector but also that of establishing fostering domestic, innovative ICT companies. Creating the requisite innovation system linkages at home and abroad are core to this concern, as are the collaboration and spillovers between MNEs and local actors. Related to the theme of this study, the new ICT strategy also spells out that the Egyptian ICT sector is to increase the IP revenue it generates. The next sections deal with the role of IP in the ICT sector.

Part 2) The role of IP in the ICT Sector

Before analyzing the role of IP in the Egyptian ICT market, this section first assesses the general and more ICT-specific role of IP.

To begin with, a functioning and actively used IP system is one of the ingredients to an environment fostering R&D and innovation. IPRs enable individuals and organizations to obtain exclusive rights to their inventions; an IP system hence provides incentives stimulating creative and innovative activity.

In addition to this incentive effect, the following benefits may emerge from an IP system:

- **Disclosure of information:** The IP system promotes timely disclosure of new technological knowledge. Thus it plays an important role in the process of cumulative innovation, whereby researchers build on existing knowledge to develop new technologies or products.

- **Facilitator of specialization:** The IP system can facilitate specialization in different stages of the innovation process. Specialization allows firms to maximize an inherent advantage, ultimately enhancing the economy-wide productivity of the innovation process.

- **Enabler of collaboration:** IP can be a tool for collaboration as IP rights convey important information that can facilitate the drawing up of contracts and reduce the uncertainty of contracting parties as to the commercial value of the licensed assets.

- **Access to finance and spurring entrepreneurship:** IP can improve the functioning of financial markets in mobilizing resources for risky innovation and hence foster start-ups.[24]

Depending on its use, the granting of exclusive IP rights might however also pose a number of challenges. Exclusive IP rights created can be used to block potential entrants, and pose a barrier for follow-on innovators. Right holders might refuse to license their technologies or may demand royalties that render the innovation unprofitable – leading to a so-called *holdup problem*.

Even where right holders are willing to license technologies, securing IP rights to implement a follow-on innovation might entail prohibitive coordination and negotiation costs slowing technological progress. This problem is particularly acute in cases where the commercialization of an invention requires use of third-party proprietary technology and where access to various overlapping set of patent rights from multiple patentees and hence so-called patent thickets is required.

Another area of emerging concern also particularly relevant to the ICT sector relates to the activities of so-called non-practicing entities (NPEs).[25] These entities are either individuals or firms that build up portfolios of patent rights, but do not seek to develop or commercialize any products based on technologies they own. Instead, they monitor markets for potentially infringing products and then enforce their patent rights by approaching firms to negotiate licenses or by initiating litigation.

[24] See WIPO (2011), Chapter 2 where these points are discussed in more detail.
[25] *Idem*.

As a result, patents are increasingly used for strategic purposes by firms. One motivation for such portfolios is to ensure a firm's freedom to operate in its innovation space. In addition, a firm owning many patents in a crowded technology space is in a better position to negotiate favorable cross-licensing arrangements. It can also more easily preempt litigation by threatening to countersue competitors.

The above benefits and risks of an IP system are particularly relevant and pronounced in the case of the ICT sector. Indeed, in the past two decades the areas of digital communication, computer technology, semiconductors, and related areas such as medical technologies have experienced the fastest growth in patenting on a global level.[26] The most advanced ICT firms – increasingly including those in middle-income economies - nowadays hold significant IP portfolios.

Strong growth in ICT sector patenting is first and foremost a result of high R&D expenditures, significant venture capital investments and the innovative nature of the ICT sector.[27] Beyond a general rise in patenting intensity in the ICT sector, the patenting surge in the ICT industry also reflects the trend towards the rise of new ICT sub-sectors and the rise of new forms of patenting, *e.g.* of software or business methods in certain countries. Moreover, the ICT sector has also played a leading role in university-industry research projects, post-R&D alliances, product innovation and other innovation-driven collaborations in which IP plays a critical role. Additional drivers of the patenting surge in the ICT sector are strategies to take out patent thickets; interest in licensing technologies, including by firms specializing in patenting such as NPEs; the desire to ward off patent disputes; and the interest in building of a domestic technology base to avoid paying royalties and license fees to other firm.

Firms in the ICT industry facing this surge in IP-intensity are increasingly engaged in strategies involving, for example, technology cross-licensing including to competitors, the creation of patent pools, *e.g.* the MPEG-2 patent pool, patent clearinghouses, and others, to overcome scattered IP rights. These commercial exchanges of IP allow for combining patented technologies from various sources into new products, for potentially avoiding patent disputes, and for facilitating product innovation at lower costs.

ICT hardware: The strong and increasing use and relevance of IP is particularly true in the area of telecommunications equipment and ICT hardware. Firms in the telecommunications equipment or the ICT hardware sector regularly top the list of most important patent filers in most high-income economies. Examples are Fujitsu, Huawei, IBM, LG Electronics, NEC, Nokia, Qualcomm, Samsung, Sharp, Sony, Toshiba, and ZTE, to name just a few.

As alluded to earlier, the telecommunications and ICT hardware sector are characterized by complex patent landscapes with widespread patent ownership.

Moreover, there is a high demand for interoperability in the ICT sector requiring flexible and cooperative approaches with reference to existing IP rights. In order to ensure the compatibility of different technologies, standards are developed which often rest on existing patented technologies, so-called "standard essential"-patents.[28]

Patent lawsuits among ICT hardware firms are frequent, entailing significant costs. Even ICT service firms such as Google who did not used to file for IP rights, have purchased large patent portfolios for ICT hardware technologies for strategic reasons.

[26] *Idem*. and Fink *et al* (2013).
[27] See Vickery and Wunsch-Vincent (2008) for a discussion of the role of IP in the ICT industry.
[28] Standards such as LTE, WiFi or MPEG technologies are heavily patented by MNEs.

Software: There is also compelling evidence that the IT innovation process is increasingly software-intensive, be it in the IT hardware, IT services or other non-IT products or services in which software is increasingly "embedded".[29]

In terms of software innovation models, a co-existence of proprietary and Open Source Software (OSS) has come to the fore over the last decades.[30] Both these models have significantly contributed to innovation in the software sector.

In terms of the proprietary model, copyright protection is generally afforded to software innovators, as is some form of patent protection for software-implemented inventions. Software firms also rely on secrecy, technical measures and the protection of know-how, their brand and trademark or trade secrets.

In countries such as the US where software is part of patentable subject matter, the growth in software patent filings has been significant.[31] Increasingly, also, software-related firms – mostly in high-income economies - have become more frequent users of patents. Classic software firms such as Microsoft are today some of the most important patent filers. Firms active in the ICT hardware sector also increasingly file for software IP protection as software is "embedded" in tangible products.

Interestingly, a large share of software-related patent applications is made by firms whose primary business activity is not software development. A significant share of the software patents stock has been filed by companies in the ICT hardware sector, or broader electrical engineering or manufacturing firms. Yet, in addition, other non-ICT firms such as banks in financial software, automotive equipment manufacturers for embedded systems and others are investing in software innovation and often seeking patent protection.

As a result, the stock of software-related patents has been growing. The share of software-related patents has increased as a share of ICT patents and of total patents.

The need to access prior knowledge, the issues of overlapping rights, the requirements of interoperability, patent portfolio races, patent thickets and associated litigation are particularly prominent in the area of software as well.[32]

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[29] Blind *et al* (2004), Vickery & Wunsch-Vincent (2008) and Arora *et al*. (2012).

[30] Generally speaking, open-source software refers to software for which the source code (underlying programming code) is made freely available for use, reading the code, changing it or developing further versions of the software, including adding amendments to it. Open source software is often used as a general expression for many forms of non-proprietary software, which differ principally in respect of the licensing terms under which changed versions of the source code may be further distributed. Proprietary software, on the other hand, is usually understood to be software in respect of which exclusive rights are maintained, such as those flowing from copyright or patents. These rights allow to refuse access to the source code by third parties for the purpose of copying or modifying the software, or at least to control the use of the source code. Without going into the details here, there is a difference between open source software and free software, on which more details can be found through some of the hyperlinks below. See http://www.wipo.int/patent-law/en/developments/open_source.html.

[31] It can be noted in countries that are members of the European Patent Convention, for instance, a number of policy change have moved away from the granting software patents.

[32] UK IPO (2010), Blind (2007) and Blind *et al* (2004). Many of the computer programs currently in use depends on algorithms or concepts developed before computer program patents were available. See Bessen and Hunt (2010 and 2012) and Eberhardt *et al* (2013) on the IP-related characteristics of the software sector.

Whether in the area of ICT hardware or software, navigating the complex IP landscape in the ICT sector is complex and challenging, in particular for new entrants. A limited number of MNEs own large IP portfolios, and have many years of experience in IP filing strategies and associated litigation. Smaller enterprises or new firms from low- and middle-income economies with little financial resources and only few employees might find it hard to penetrate this complex web of overlapping technologies and IP rights. The costs of patent clearance work, both financially and in terms of time, are seen as disincentives to innovate and could be detrimental to competition and market entry.[33]

That said, IP has a positive role to play in the context of new and smaller market entrants. In the ICT sector the latter are often particularly research-intensive and innovative. The ownership of IP might confer them bargaining and market power in the face of large MNEs which they would otherwise not have. Software-related patents, for instance, are known be useful for new entrants to signal their expertise to third parties, to negotiate cross-licensing arrangements, to increase their value to potential buyers and to convert tacit knowledge into a verifiable and transferable form.[34] This positive effect emanating from IP could work well for firms in countries with an emerging ICT sector as well.

At the same time, non-proprietary software models in which the source code is made freely available for use, adaptation and further development have flourished.

Finding an unambiguous answer to which model works best in terms of spurring software innovation has been challenging and arguments in favor of each approach have been put forward.[35] A thorough debate on the relative costs and benefits of these two software innovation models and their interactions is indeed beyond the scope of this study. The role of OSS for the development the software sector of low- and middle-income economies has to be considered in any comprehensive policy geared to stimulate entrepreneurship and innovation in the ICT software sector.

ICT and BPO services: When it comes to ICT and BPO services as developed in Egypt, the role and uptake of IP has not been analyzed much.

At the outset, it appears as if these ICT-related activities are less prone to the formal use of patents. In the past, the major operators in this commercial field were not known to be large patent filers. Either the services at hand do not entail innovation protectable by patents, such as in the case of call centers or simple data-entry work. Alternatively, the work is conducted as service provision – i.e. "work for hire" – within a business outsourcing relationship in which case the IP belongs to the client firm and not to the ICT and BPO service provider itself.[36]

Indeed IP is not mentioned much in the context of the rise of known ICT outsourcing providers worldwide. Several papers study the rise of Indian ICT services and software industry, arguably the leading providers operating out of a low- or middle-income economy.[37] IP is hardly mentioned, however, when the Indian success in this economic activity is explained.[38] To the contrary, the existing literature on India's rise in this area underlines the fact that poor IP protection and enforcement – and the absence of software patents in particular - may have exerted significant influence on the business models chosen by Indian technology entrepreneurs, thus leading them to focus on ICT and BPO services rather than

[33] UK IPO (2010).
[34] Mann (2004).
[35] See UK IPO (2010) for a recent review of the matter.
[36] Athreye (2010).
[37] Arora *et al* (2001), Arora & Athreye (2002), Athreye (2010) and Athreye & Hobday (2010).
[38] *Idem.*

patentable software or ICT hardware.[39] In addition, this literature suggests that the lack of experience in design and marketing of Indian ICT firms has been at least as important, if not more, than lacking IP rights, in leading Indian software firms to the outsourcing business rather than to conducting original development work.[40]

That said, a fresher look at the most prominent Indian ICT and BPO service providers shows that more recently they have significantly scaled up their IP filing activity with patenting by Indian BPO firms such as Infosys, Tata Consultancy Services and WIPRO increasing considerably in the past few years.[41]

Definitely the current 2013 annual reports of Indian ICT and BPO service providers reveal a stronger patent filing activity, mostly in India and the US.

- Infosys states that it creates IP leveraging technologies in the areas of cloud computing, analytics, mobility and social media.

- TCS files patents resulting from research in three areas, notable software engineering, software systems and software applications. The focus is on innovation in application design and development, software assurance, application support and maintenance, performance testing and monitoring, test data management and enterprise data management.

- WIPRO in turn highlights its patent in the area of workflow management, software testing systems, authentication and interception of data, circuit characterization and others.[42]

In addition all three firms mention future research and potentially areas of patenting in new fields such as robotic surveillance, machine learning applications, and other new technologies.

The exact economic impact of these new patenting strategies of Indian ICT and BPO service providers will need more study however. It is also fair to say that Egypt does not so far have ICT service and BPO providers with similar capabilities.

Finally, the role of other IP forms outside of patents, and in particular the role of trade secrets, strong brands and trademarks are undeniable in the ICT services and BPO field as well but are not well analyzed.

[39] *Idem* and Eberhardt *et al* (2013).
[40] Arora *et al* (2001).
[41] Eberhardt *et al* (2013).
[42] http://www.tcs.com/investors/Pages/default.aspx, http://www.wipro.com/annualreport/2012-13/, and http://www.infosys.com/investors/reports-filings/annual-report/annual/Documents/Infosys-AR-13.pdf.

Part 3) The uptake of IP by the Egyptian ICT Industry

Egypt has a well-developed institutional IP environment.[43] Table 5 provides an overview of the different Egyptian IP-related institutions. They include the three official IP offices reporting to different ministries, i.e. the National Patent Office, the Trademarks and Industrial Designs Office and the Permanent Office for the Protection of Copyright. In addition, they include ITIDA's IP Office (see Table 1) and the Egyptian Center of IP and Information Technology (ECIPIT). Finally, the IP Coordination Committee in Egypt coordinates the activities of various Ministries in the field of IP, with a particular focus on international affairs such as activities of WIPO or the WTO.

Table 5: IP Institutions

Name of IP Institution	Ministry	Tasks
National Patent Office	Academy of Scientific Research and Technology (ASRT) Ministry of Scientific Research	- Register patent applications for local & foreign inventions - Grant and issue patents - Provide technological information from patents
Trademarks and Industrial Designs Office	Ministry of Trade and Industry	- Register trademark applications for local & foreign applicants - Grant and issue trademarks registrations
Permanent Office for the Protection of Copyright	Ministry of Culture	- Oversee the development and implementation of copyright
IP Coordination Committee	Led by the Ministry of Foreign Affairs and involving different Ministries and IP Offices	- Coordinate various IP matters across ministries, with a particular view on international matters including at WIPO
ITIDA IP Office	MCIT	- Register software inventions - Raise awareness of IPR and offers training of IPR officials - Raise awareness of the negative consequences of piracy and hacking - Conduct seminars, workshops, and training sessions
Egyptian Center of IP and Information Technology (ECIPIT)	independent non-profit organization	- Spread and develop awareness of IP - Offers IPR training - Acts as an official commissioner for ITIDA to register software and databases

Source: Interviews, visits, and publicly available information. WIPO Egypt country profile, at http://www.wipo.int/directory/en/details.jsp?country_code=EG.

In a nutshell, Egypt has made significant progress in enhancing the legal protection of IP and in putting national and international legislations into practice. The uptake of IP in Egypt however remains rather minor, both in general and but also in particular in the ICT sector.

[43] See also Abdel-Latif (2014) on the recent integration of IPRs and the knowledge economy in the new Egyptian constitution.

On the basis of existing data, the high-level findings of this exploration are the following:

- **Patents:** First, Egyptian ICT firms, and in particular SMEs – which compose the majority of the ICT sector in Egypt – do not file a significant number of patents. In the cases that Egyptian inventors file for patent protection at home they do so at the national level while not protecting their invention abroad. Second, in Egypt, non-residents and in particular MNEs file the majority of local ICT patents. Few of these patents are original inventions; rather these are patents that foreign entities have previously filed elsewhere. Some ICT-related MNEs do not use the Egyptian patent system at all. Either the MNE subsidiaries are not engaged in any formal R&D yielding a potential patent, or when they are the patent often gets filed abroad – either at headquarters or in another jurisdiction. Third, inventors with Egyptian nationality or residence appear in patent filings abroad – for instance at the USPTO – while not filing in Egypt.

- **Utility models:** While Egypt has a utility model system, data is not available on its current uptake in the context of this study. Anecdotal evidence points to a low or absent use of the utility model system by Egyptian ICT firms or by Egyptian subsidiaries of ICT MNEs.

- **Trademarks:** The Egyptian ICT sector does not seem to be a heavy user of trademarks. Again, few registrations come from local Egyptian trademark holders, as opposed to the many foreign trademark holders which essentially seek protection for their international brand name on Egyptian soil. When it comes to trademarks, the number of ICT-related trademarks is low in absolute terms and as share of all trademark applications. Also the uptake of trademarks in the ICT sector seems to stagnate. Few of the existing trademark registrations come from Egyptian residents.

- **Royalty and license fee payments and receipts:** Unpredictably, the available data point to Egypt as an increasingly dynamic trader in IP – both as importer as well as exporter. The drivers of this uptake need more study.

This statistical analysis is complemented by the following findings based on the mission, interviews and the workshop conducted:

Among the apparently most innovative Egyptian ICT firms, the level of awareness on IP and its economic utility is low, and the related uncertainty is high. IP issues are perceived as complex and legal. Despite the low IP uptake, entrepreneurs are afraid of having ideas stolen. Indeed potentially IP-relevant innovations seem not well protected in initial entrepreneurship phases and in particular during national and international innovation competitions and exhibitions, and before IP protection is secured. Frequently the lack of knowledge, internal and external skills, time and monetary resources are cited as obstacles to accessing IP.

Interviews with one prominent Egyptian ICT start-up company confirm a general unease with IP matters and their potential relevance to their business project (see Box 3).

Box 3: Bey2ollak, an Egyptian ICT start-up and IP

Bey2ollak is an Egyptian start-up from Cairo that has developed an application providing information on traffic jams in Cairo and Alexandria.[44] Bey2ollak's crowd sourcing application draws on a user community that reports traffic developments on Egyptian streets. The user of the application can adjust her/his travel according to reported traffic bottlenecks.

Bey2ollak was co-founded by a team of five students in 2010 and had attracted over 1,000,000 users by 2012. First revenue streams were generated in 2012, mainly with advertising and selling value-added services in partnership with Vodafone.

Bey2ollak took part in the TIEC Technology Incubation Program (TIP) that provides facilities, equipment, mentorship and consultancy services to incubate start-ups. Bey2ollak has also received the Google competition prize of USD 200,000. It is is currently working towards expanding to foreign markets.

From the very beginning Bey2ollak's founders registered their trademark at the Egyptian Trademarks and Industrial Designs Office. The underlying software has however not been registered at the ITIDA IP office. In general, the developer team of Bey2ollak feels uncertain about the applicability of IP to their products, and has called for improved access to IP training. In terms of IP and the protection of their intangible assets, the Bey2ollak founders do not feel secure and competent enough in how to use IPRs in their favor.

Source: Interview with Eng. Mohamed Rafee Founder and Business Developer of By2olak.

These existing findings of low IP uptake and awareness are corroborated by an ITIDA survey conducted for WIPO in 2013.[45] In this survey, 95 percent of the participating SMEs in the ICT sector claim that they produced IP assets that should be protected. Among these companies about 49 percent claim to spend more than 5 percent of their revenues on R&D. However, according to this survey only 25 percent actually did legally protect their IP by proactive steps. The majority of responding firms, namely 82 percent, claim little or no knowledge of IP. The largest bottleneck besides awareness and knowledge mentioned was the cost of legal IP protection, with 57 percent of Egyptian ICT SMEs stating that they were not able to afford the legal costs of IP protection. Simplifying the IP legal procedures, launching specialized training programs to develop human calibers in the field of IP, and building awareness seem the greatest priorities. In addition, there is a strong perceived lack of institutional mechanisms by which Egyptian ICT firms can get their inventions to market, i.e. to commercialize them.

To better assess the uptake of IP in Egypt, the next sections present available IP data.

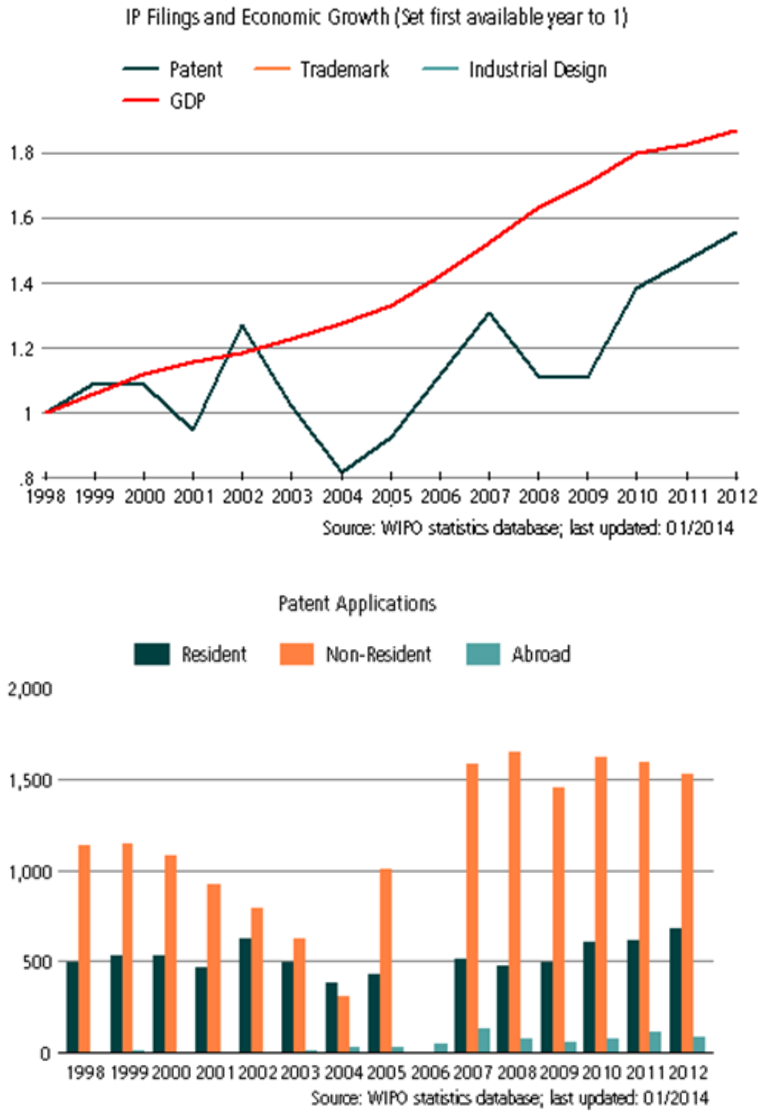
[44] http://www.bey2ollak.com/desktop.html
[45] Hegazy and Gadallah (2013).

3.1 Patents in Egypt

Patent uptake in Egypt across all sectors

In Egypt, national patent filings have been growing between 1998 and 2012, albeit at a slower pace than economic growth (see Figure 7).[46] Non-resident patent filings make up for the large majority of patent filings at the Egyptian national patent office.[47] In 2012 more than 1,500 patents and about 70 percent of all patents were filed by non-residents. When comparing to 1994 this share of non-resident patent filings has remained unchanged. In 2012, 87 patents have been filed abroad by Egyptian residents, an increase since 1994.

Figure 7: Patent applications at the Egyptian IP Office and GDP (1998-2012)
top: growth rate of patent filings versus GDP, 1=1998
bottom: number of patent applications by residents versus non-residents, and patent applications abroad

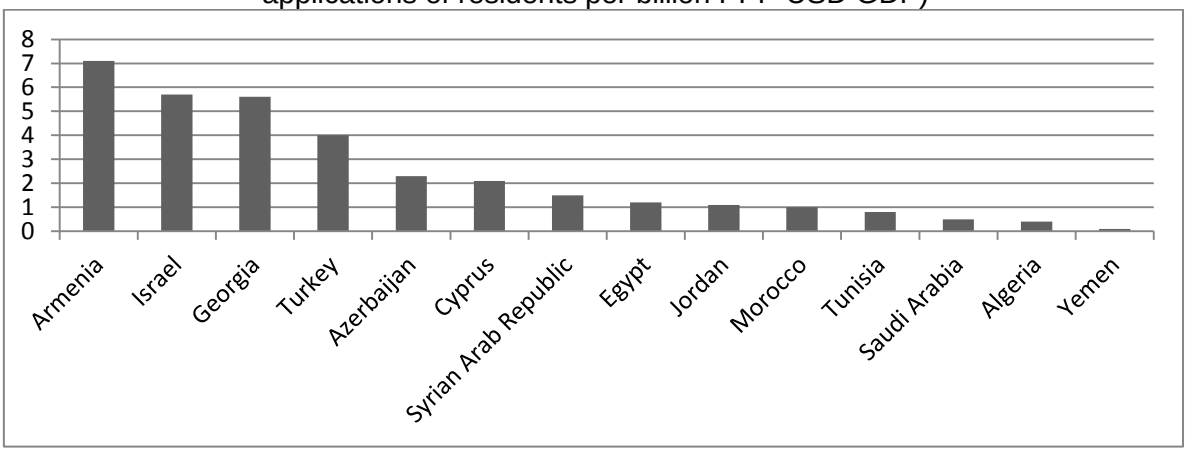


Source: WIPO IP Statistics Database. Note that for the upper figure no trademark or industrial design data is available for Egypt via WIPO's annual statistical survey.

[46] Analysis based on data extracted from the WIPO IP Statistics Database and the WIPO Egyptian Statistical Profile, both at http://www.wipo.int/ipstats/en/.
[47] A resident filing refers to an application filed in the country by its own resident; whereas a non-resident filing refers to the one filed by a foreign applicant. An abroad filing refers to an application filed by this country's resident at a foreign office.

Scaled by GDP and relying on the values in the latest edition of the Global Innovation Index 2013 (GII), Egypt shows a medium performance in terms of national office patent applications by its residents as compared to neighboring countries (see Figure 8).[48]

Figure 8: Resident patent applications at the Egyptian IP Office compared to other countries in the region (2011) (values indicate the number of national office patent applications of residents per billion PPP USD GDP)

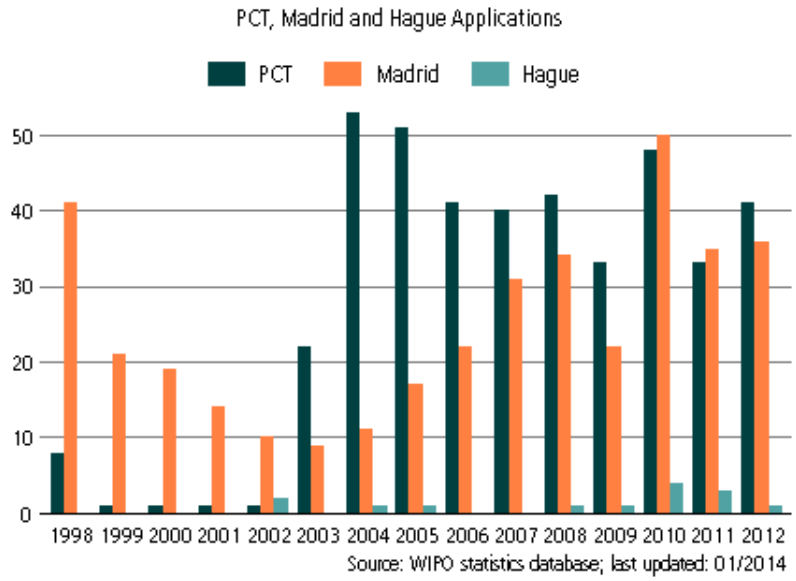


Source: Global Innovation Index (GII) 2013 based on WIPO IP Statistics Database and International Monetary Fund (IMF) World Economic Outlook 2012 database for GDP.

Another indicator for Egypt's competitive position in technology innovation and the uptake of IP is the number of its applications via WIPO's Patent Cooperation Treaty (PCT) (see Figure 9). In 2012, Egyptian residents filed 41 PCT applications, up from 8 in 1998. Some entities qualified as residents are foreign subsidiaries or foreign-owned universities, however, with top applicants in 2012 being the American University in Cairo and Engineering for Industry, a subsidiary of a US company[49]. Among the top PCT filers, Si-Ware Systems, InC, features as an independent Egyptian fabless semiconductor company.[50] Each of these top applicants only has one PCT application in 2012 however.

[48] Cornell University, INSEAD and WIPO (2013). Data available at www.globalinnovationindex.org.
[49] http://www.evapco.eu/company.
[50] http://www.si-ware.com/who-we-are/.

Figure 9: International applications via WIPO-administered Treaties at the Egyptian IP Office (1998-2012), in number of applications

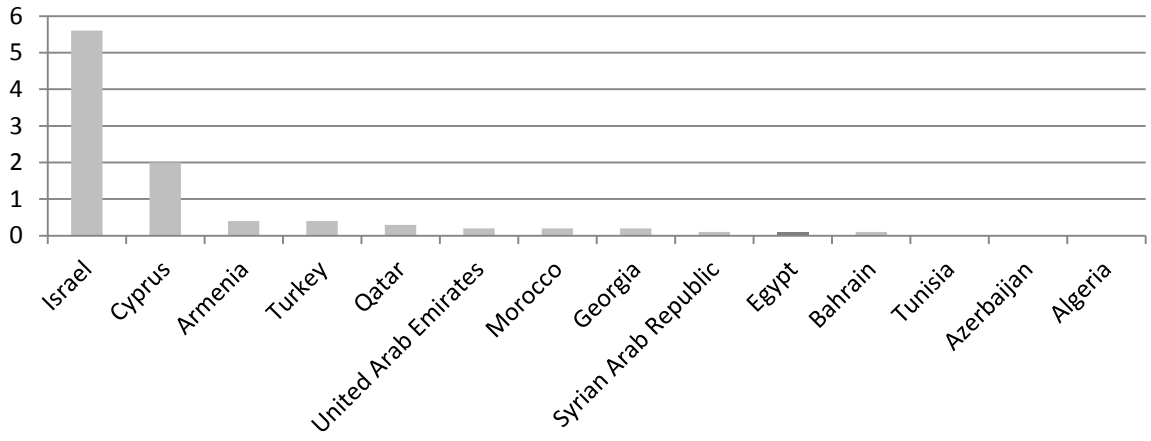


Source: WIPO IP Statistics Database.

Relative to GDP, other offices in the region receive more PCT applications (see Figure 10).

Figure 10: Egypt's resident applications via the PCT compared to other countries in the region (2012)

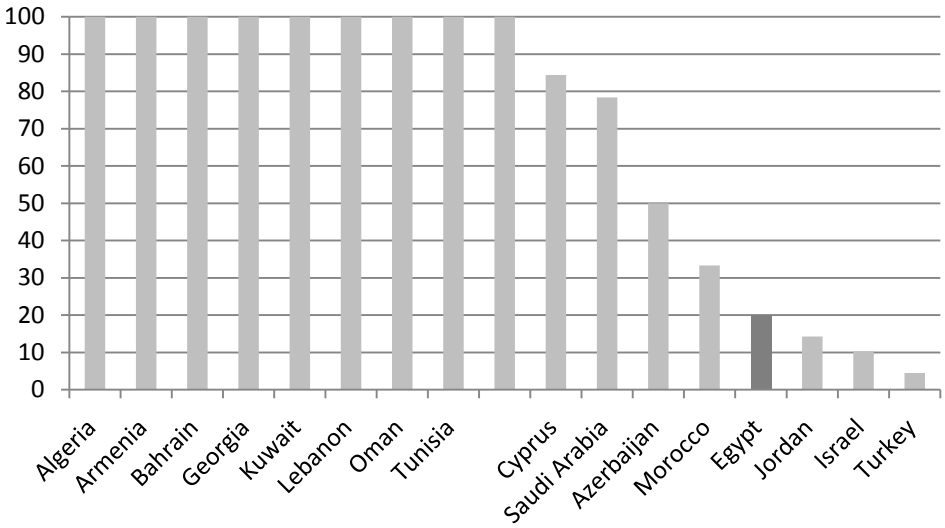
values indicate the number of PCT resident applications per billion PPP USD GDP



Source: GII 2013 based on WIPO IP Statistics Database and IMF World Economic Outlook 2012 database for GDP.

The GII also provides information about the share of PCT patents that were filed with at least one foreign inventor (see Figure 11). Many countries in the Middle East or North Africa seem to have at least one foreign inventor involved in all of their patent filings. Egypt in comparison has a lower share of patents where foreign investors were involved, about 20 percent.

Figure 11: Egypt's share of PCT patent applications with at least one foreign inventor, compared to other countries in the region (2011), in percent of total PCT applications



Source: GII 2013 based on the WIPO IP Statistics Database.

Patent uptake in Egypt's ICT sector

Patents are classified by field of technology and not by the industry sector filing the patent. The WIPO IPC-technology concordance table can be used however to convert IPC symbols into corresponding fields of technology.[51] According to this methodology, the following sectors make up for the largest share of patents at the Egyptian IP office: pharmaceuticals (10.6 percent), medical technology (10.6 percent), computer technology (6.5) and transport (5.2 percent).

Using the above concordance table, the classes "Electrical Engineering" and – depending on the ICT sector definition "Instruments" can be related to ICT (see Box 4 for the components of these classes).[52] For each of these two classes between 200-300 patents have been filed between 2000 and 2008, and thus 21 percent of total applications. Patents filed in chemistry, mechanical or other industries are far more numerous (see Figure 12).

[51] See the concordance table at http://www.wipo.int/ipstats/en/statistics/technology_concordance.html and Schmoch (2008).

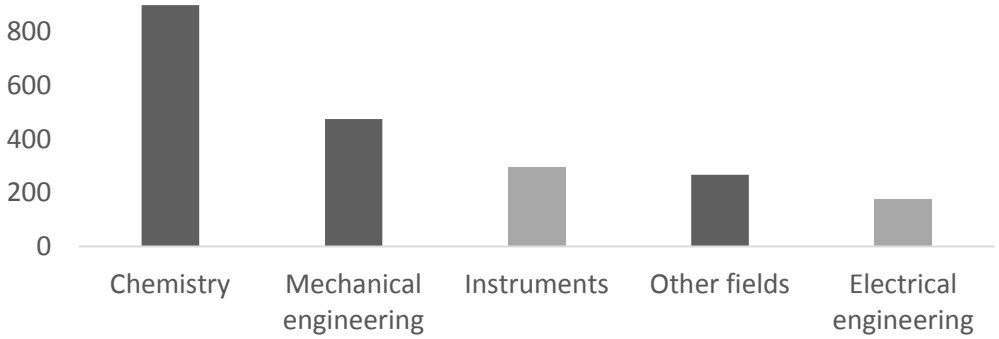
[52] OECD (2002 and 2007). The 2007 definition of the ICT sector is "The production (goods and services) of a candidate industry must primarily be intended to fulfill or enable the function of information processing and communication by electronic means, including transmission and display." It comprises (i) ICT manufacturing industries (2610 Manufacture of electronic components and boards, 2620 Manufacture of computers and peripheral equipment, 2630 Manufacture of communication equipment, 2640 Manufacture of consumer electronics, an 2680 Manufacture of magnetic and optical media) and (ii) ICT service industries (4651 Wholesale of computers, computer peripheral equipment and software, 4652 Wholesale of electronic and telecommunications equipment and parts, 5820 Software publishing, 61 Telecommunications, 62 Computer programming, consultancy and related activities, 631 Data processing, hosting and related activities; Web portals, and 951 Repair of computers and communication equipment). The 2007 definition differs from that of 2002 as products which "use electronic processing to detect, measure and/or record physical phenomena or control a physical process" are excluded.

Box 4: ICT-related sectors in the WIPO technology concordance table

Area, field	
I Electrical engineering	**II Instruments**
1 Electrical machinery, apparatus, energy	9 Optics
2 Audio-visual technology	10 Measurement
3 Telecommunications	11 Analysis of biological materials
4 Digital communication	12 Control
5 Basic communication processes	13 Medical technology
6 Computer technology	
7 IT methods for management	
8 Semiconductors	

Source: WIPO, see http://www.wipo.int/ipstats/en/statistics/technology_concordance.html.

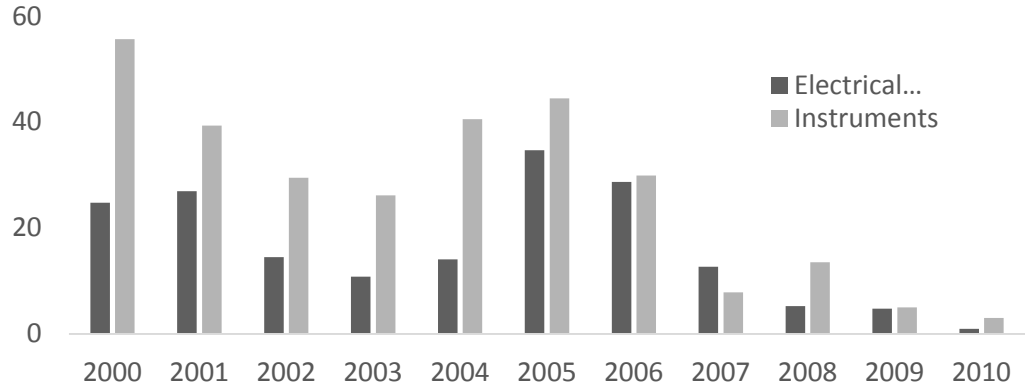
Figure 12: Patent applications at the Egyptian patent office, by major classes, in number of total patent applications, 2000-2008



Source: Authors' calculations based on PatStat, 2012.

ICT-related patent applications in Egypt – as defined here - show no constant upward or downward trend (see Figure 13). While the number of patents decreased until 2003, it increased again until 2005-2006, to then decrease again. Decreases of patent applications after 2008 are related to truncation effects in the data and potentially to the economic crisis.

Figure 13: Patent applications at the Egyptian national office, by major classes (2000-2008), in number of patent applications



Source: Authors' calculations based on PatStat, 2012.

Note: Considering lags in patenting, decreasing registrations towards the end of the period are influenced by truncation of the data.

If one studies these technology classes in more details for 2012, the low number of yearly patent publications in these categories is evident, as well as the low share of resident to non-resident filings. The majority of ICT patents filed by Egyptian residents in the time period 2009-2012 and in the narrower definition of "Electrical engineering" is in the sub-categories of "Electrical machinery, apparatus, energy", "Computer technology" and "Telecommunications" (in the order of importance). Box 5 provides information on if and how software appears in Egyptian IP statistics.

Table 6: Patent publications by technology, resident & non-resident count for the Egyptian patent office (2012)

	Resident 2012	Non-resident 2012
Electrical engineering		
1 - Electrical machinery, apparatus, energy	5	21
2 - Audio-visual technology	1	3
3 - Telecommunications		5
4 - Digital communication		
5 - Basic communication processes		
6 - Computer technology	5	4
7 - IT methods for management	2	3
8 - Semiconductors	1	3
Instruments		
9 - Optics		1
10 - Measurement	2	10
11 - Analysis of biological materials	1	
12 - Control	2	3
13 - Medical technology	3	21

Source: Authors' calculations based on WIPO's IP Statistics Database.

Table 7: Patent publications by technology, Resident & non-resident count by filing office (2009-2012), in absolute numbers and share of resident in total ICT

	total 2009-2012	total resident 2009-2012	share of resident in total ICT
1 - Electrical machinery, apparatus, energy	79	13	16.5 percent
2 - Audio-visual technology	14	3	21.4 percent
3 - Telecommunications	20	6	30.0 percent
4 - Digital communication	15	2	13.3 percent
5 - Basic communication processes	3	1	33.3 percent
6 - Computer technology	25	9	36.0 percent
7 - IT methods for management	13	5	38.5 percent
8 - Semiconductors	7	1	14.3 percent
Total ICT	**176**	**40**	**22.7 percent**
9 - Optics	5	0	0.0 percent
10 - Measurement	60	10	16.7 percent
11 - Analysis of biological materials	5	3	60.0 percent
12 - Control	14	10	71.4 percent
13 - Medical technology	95	30	31.6 percent
Total Electrical engineering Plus Measurement	**355**	**93**	**26.2 percent**

Source: Authors' calculations based on WIPO's IP Statistics Database.

Box 5: Egyptian software inventions and where to find them in IP statistics

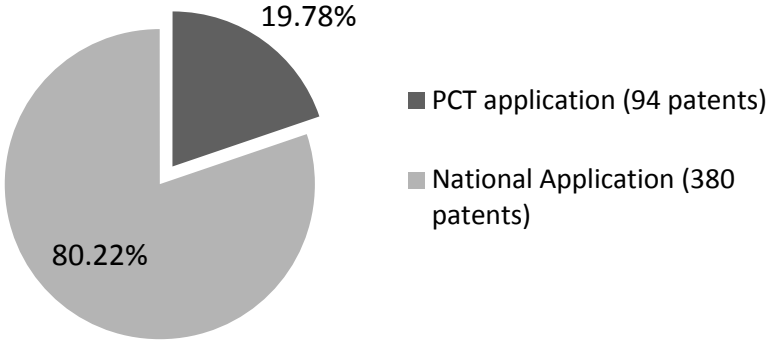
According to the SECC, Egypt has about 400 software companies. Addressing the question how many of these firms file for patents relating to software is thorny.

Software does not fall under the subject matter of patent protection in Egypt. Similar to many other countries computer software is rather protected under Egyptian copyright law. In this light, and independently from other official IP institutions, the MCIT has established a particular entity within ITIDA to allow for the registration of software (see Table 1). While the registration of software at the ITIDA IP Office is not mandatory, this entity suggests that registration is positive for a successful enforcement of rights as registration is a good mean to document the date of authorship. The latter is an advantage in the case of a legal dispute and when the first composer of software has to be identified. According to its own statistics, the ITIDA IP Office has registered 233 applications for software inventions, issued 322 licenses for enterprises and issued 200 licenses for copying, selling and trading as of 2012.

Also, tables 6 and 7 shows that a small number of IT methods for management are filed by Egyptian residents and non-residents, a technology field sometimes used as a proxy for software-related inventions covered by patents.

When looking at the patent applications at the Egyptian National Patent Office of the last years, about one fifth of the ICT (Electrical Engineering or Instruments) patents were PCT applications (see Figure 14).

Figure 14: Share of ICT patent filed via PCT as opposed to a national application (2000-2008), as share of total ICT patents filed



Source: Authors' calculations based on PatStat, 2012.

Another method to analyze the origin of a patent application is to identify the patent authority of a patent's priority patent. A patent that is registered at the Egyptian IP office may belong to a patent family where the first filed patent, the priority patent, may have been registered at a foreign IP office before.[53]

For the following extractions another proxy for ICT-related patents is used, namely the IPC codes G for Physics and H for Electricity (see Box 6 for all IPC categories and the ICT selection). This mapping is less precise than the previously selected technological concordances. The results thus capture areas beyond the ICT sector alone.

[53] Often, but not necessarily, these priority patents are filed in the country where the invention was made or where the protected technology or product was firstly launched to the market.

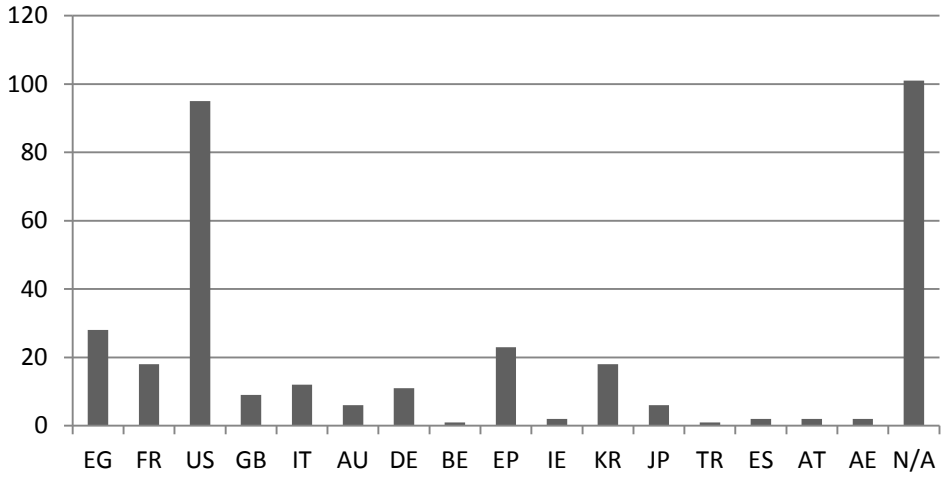
Box 6: Identifying the ICT sector in the International Patent Classification

A Human necessities
B Performing operations and Transporting
C Chemistry and Metallurgy
D Textiles and Paper
E Fixed constructions
F Mechanical engineering, Lighting, Heating, Weapons, and Blasting
G Physics
H Electricity

Source: International Patent Classification Categories (Version 2013)

Figure 15 shows that – following this broader definition - ICT-related patents at the Egyptian patent office were filed in the US first in 95 cases and in 22 cases at the European Patent Office (EPO). Only 28 patents registered at the national IP office were also priority patents at the Egyptian authority. However, due to data constraints for many patents the priority authorities could not be identified which is reflected in the sizeable "not available, n.a."-category in Figure 15.

Figure 15: Authority of priority application of IPC patent filed at the Egyptian IP office (1990-2011), IPC codes G for Physics and H for Electricity



Source: Authors' calculations based on PatStat, 2012.

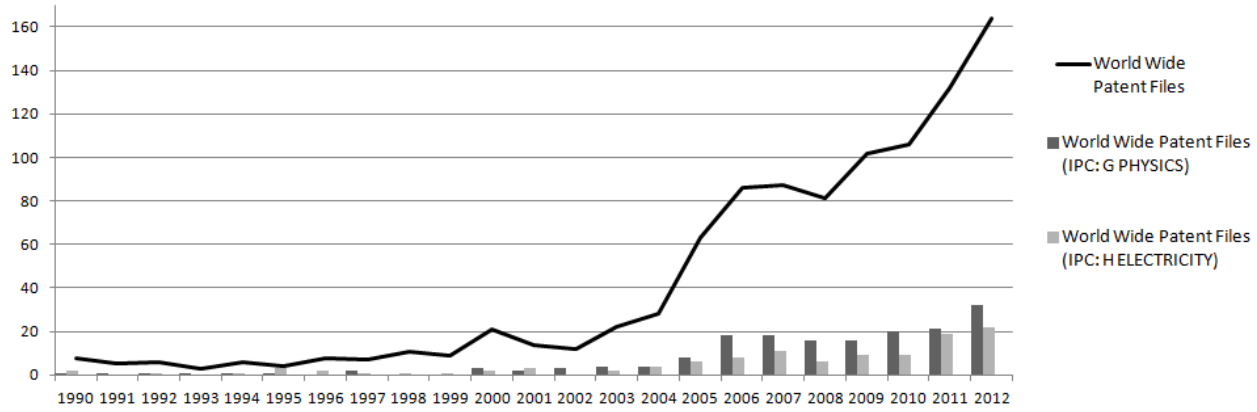
When it comes to ICT MNEs operating in the Egypt, the interviews confirmed that few are actually engaged in research, and that the majority do not file patents in Egypt but via their headquarters in other countries (see Part 1).

To better account for the innovation activities of Egyptian firms, all worldwide patent applications with Egyptian assignees are collected. Again the analysis differentiates between IPC classes using the broader classes G and H, while comparing developments in these classes to total patent applications.

Figure 16 shows that worldwide patent applications by all Egyptian firms irrespective of sector have constantly been increasing from eight patents filed in 1990 to 164 patents filed in 2012. Patent applications in the field of ICT only emerged in the years of the early 2000s with five applications in 2000, increasing to 54 applications in 2012. While total patent applications increased, except in the year 2008, ICT patent applications were stable and with almost no growth between 2006 (26 G and H applications) and 2010 (29 G and H applications), and more recent increases again in 2011 (40 G and H applications) (see

Figure 16). The share of ICT patents related to the overall patent filings by Egyptian firms thus decreased from about 35 percent before the turn of the century to an average of 28 percent between 2000 and 2012.

Figure 16: Worldwide patent filings of Egyptian assignees as to total patents (all IPCs) and ICT over time (1990-2012), IPC codes G for Physics and H for Electricity

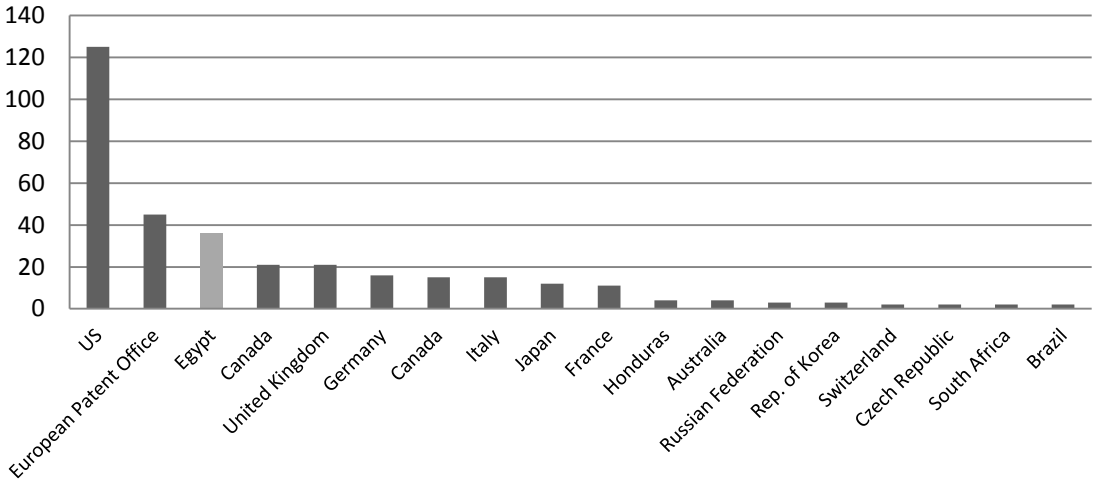


Source: Authors' calculations based on EPO Espacenet 2012.

Note: Considering lags in patenting, decreasing registrations towards the end of the period are influenced by truncation of the data.

Furthermore all patents filed by Egyptian assignees per patent office are analyzed to document in which countries Egyptian inventors file for patents. Figure 17 shows that most patents of Egyptian assignees are filed in the US (125 patents) or in Europe (45 patents). The Egyptian office has only 36 patents which accounts for only 10 percent of patents by Egyptian origin.

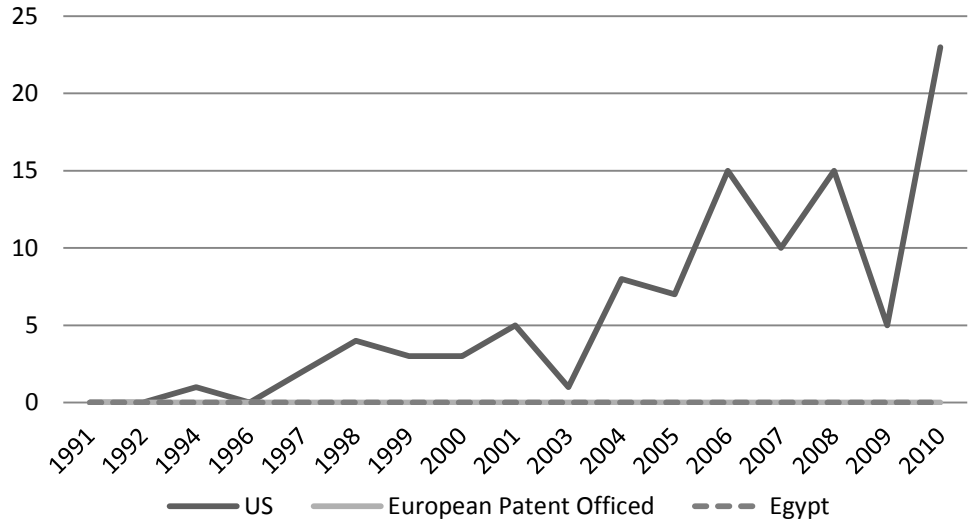
Figure 17: Patents filed of Egyptian assignees by IP Office (1991-2010)



Source: Authors' calculations based on Patstat 2012.

When looking at patents filed by Egyptian assignees over time, more and more patents are filed at the Egyptian office since the early 2000s (see Figure 18). Indeed, in 2003 Egyptian assignees filed more patents at the local office than abroad. However, the highest share of patents filed by Egyptian assignees is found in the US.

Figure 18: Patents filed by Egyptian assignees at the IP offices of the US, Europe and Egypt, 1991-2010



Source: Authors' calculations Patstat 2012.
Note: EP stands for European Patent Office and EG for the Egyptian IP Office. Decreasing registrations towards the end of the period are influenced by truncation of the data.

3.2 Utility models in Egypt

A number of academic and policy publications have highlighted the role of utility model (UM) system for low- and middle-income economies as they evolve from basic to more mature technology centers.[54]

Under the Egyptian IPR Law and its Article 29, UM patents shall be available for "any new technical addition in the structure or composition of devices, tools, equipment or their components, or products, processes or means of manufacturing the above, and the like that is current use". The law provides a non-renewable term of UM protection of seven years from the filing date.

Yet little to no information is available as to the uptake of the UM in Egypt in general or by the Egyptian ICT sector in particular.[55]

3.3 Trademarks in Egypt

Egypt does not report its trademark statistics to WIPO via its Annual IP Statistics Survey. Consequently, the WIPO IP Statistics Database only yields the number of non-resident trademark registrations in Egypt which has been growing between 1998 and 2012, from more than 2,800 to more than 4,100 annual registrations.

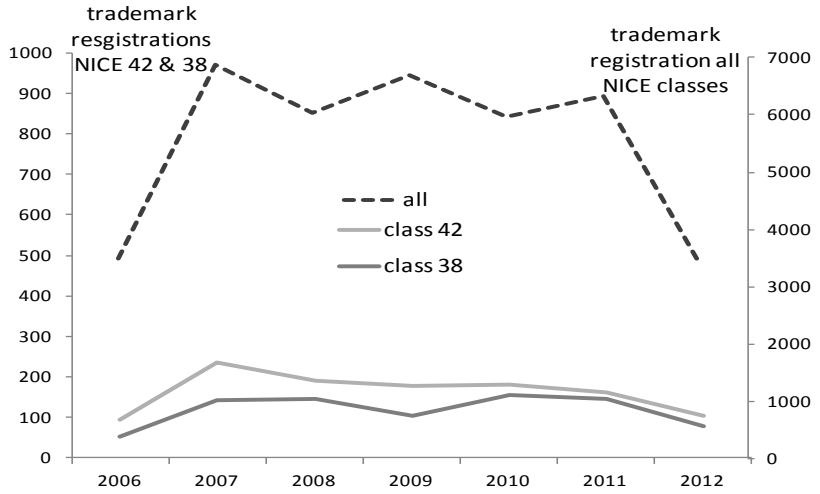
The full data collections of the Egyptian national trademark registry is however available via WIPO's Global Brands Database since 2013.[56] It allows searching for trademarks as to office of registration and as to Nice industry class.[57]

[54] Suthersanen (2006) and Kim *et al* (2012).
[55] No Egyptian data on the uptake of the UM is submitted to WIPO's Annual IP Statistics Survey.
[56] WIPO's Global Brands Database, at http://www.wipo.int/global_ip/en/activities/branddb.html. It containts national data collections made available by the IP offices of Algeria, Australia, Canada, Egypt, Estonia, Morocco, Switzerland, the United Arab Emirates and the US.
[57] The Nice Classification (NCL), established by the Nice Agreement (1957), is an international classification of goods and services applied for the registration of marks. See http://www.wipo.int/classifications/nice/en/.

Figure 19 shows that all trademark registrations in Egypt have doubled from 2006 to 2007 to 7,000 registrations per year. After that registrations oscillate between 6,000-7,000 annual registrations. Again the decreasing registrations as to 2012 can be explained with the fact that registrations lags lead to a truncation of the data.

Out of the 45 Nice classes, "38 Telecommunications" as well as class "42 Hardware and Software" can be related to the ICT sector. Egypt has more trademark registrations in "42 Hardware and Software" compared to "38 Telecommunications". A strong increase in 2007 up to 247 registrations is occurring for the hardware and software segment and an increase to 143 registrations in telecommunications. While registrations decrease in the hardware and software classes, registrations in the telecommunications class increase from 2009 onwards to be almost on par with trademarks registrations in the hardware and software classes.

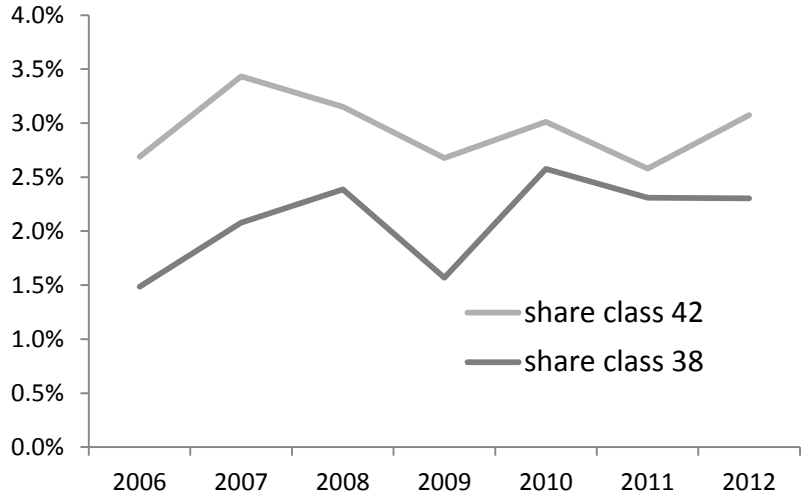
Figure 19: Trademark registrations at the Egyptian office in Nice "Telecommunications" and "Hardware and software" (2006-2012)



Source: Authors' calculations based on WIPO's Global Brands Database 2013.
Note: Considering a registration lag of one year, decreasing registrations as to 2012 are subject to truncation.

To better estimate how the ICT sector has developed in terms of trademark registrations the share of registrations for both classes as share of total trademarks is calculated. Figure 20 shows that around 2-4 percent of all trademarks registered at the Egyptian office can be assigned to the ICT sector by the methodology in use.

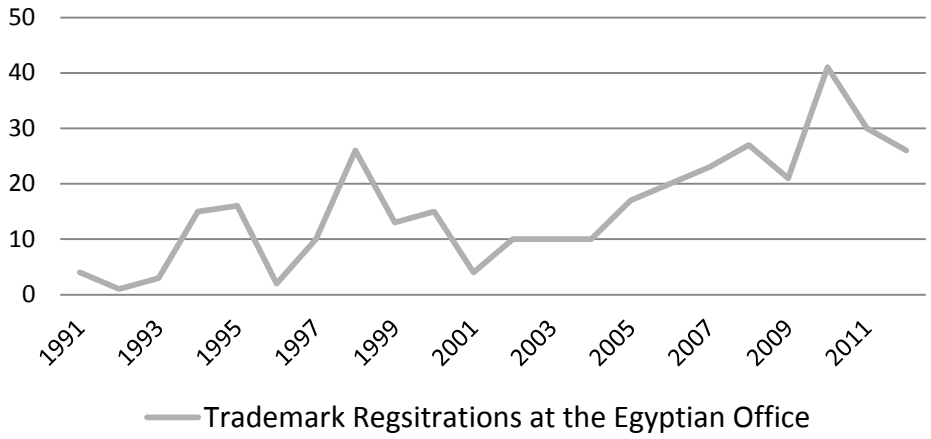
Figure 20: Share of ICT trademark registrations in total trademark registrations at the Egyptian IP office (2006-2012)



Source: Authors' calculations based on WIPO's Global Brands Database 2013.

One can also use the data provided for international registrations via WIPO's Madrid System to assess trademark activity in or out of Egypt.[58] Figure 21 shows that the international registration of trademarks under the Madrid system at the Egyptian office has been increasing since 2000. However, the total number of registrations with a high of 41 registrations in 2010 is modest. Again the decrease of registrations in the last two years may be subject to truncation effects of the grant lag.[59]

Figure 21: Trademark registrations at the Egyptian IP office under the Madrid system (1991-2010)



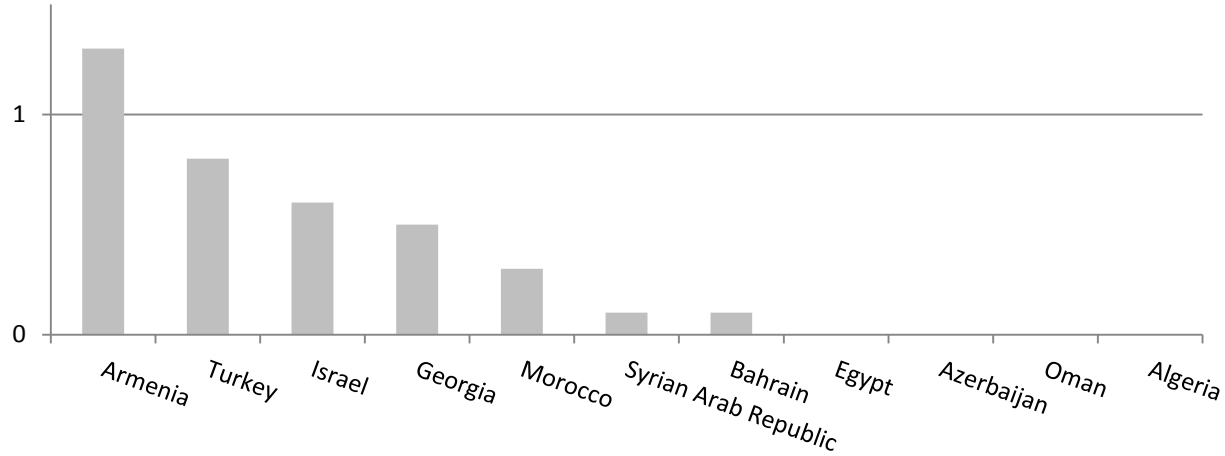
Source: Authors' calculations based on WIPO-ROMARIN 2013.

[58] The Madrid system provides a centrally administrated procedure to internationally register trademarks under different jurisdictions. In comparison to the European Community Trade Mark, the Madrid system does not register one central trademark but a bundle of national trademark registrations in different countries. Use is made of the WIPO ROMARIN (Read-Only-Memory of Madrid Active Registry Information) database to search for trademark registrations at the Egyptian office that were filed under the Madrid system. The database includes all international registered trademarks that are in force or that have expired no longer than six months ago.

[59] According to interviews during the company visits, it was mentioned that in the Egyptian trademark registrations the grant lag (time from registration until grant) is on average two years. This point needs more systematic study however.

Egypt also has few internationally filed trademark registrations relative to GDP and when compared to other countries in the region (Figure 22).

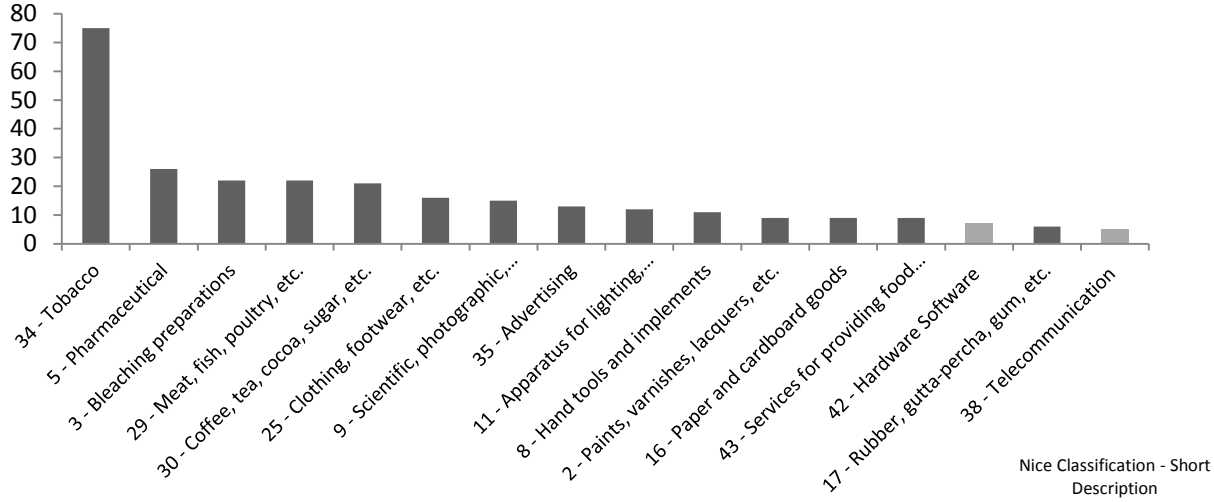
Figure 22: Egypt's number of Madrid agreement trademark registrations, compared to other countries in the region, 2012, value of registrations per billion PPP USD GDP



Source: Authors' calculations based WIPO IP Statistics Database; compiled in the GII 2013.
Note: The value one on the y-axis stands for one trademark registration per one billion PPP USD GDP (PPP = purchasing power parities).

Figure 23 shows that most Egyptian trademarks under the Madrid system are filed for tobacco, pharmaceutical products or groceries. Since the early nineties only 7 trademarks can be connected to Hardware and Software and only 5 can be connected to Telecommunications. In addition, the number of trademark registrations on the national level has stagnated over the past years, while the number of registrations under the Madrid system has only risen slightly.

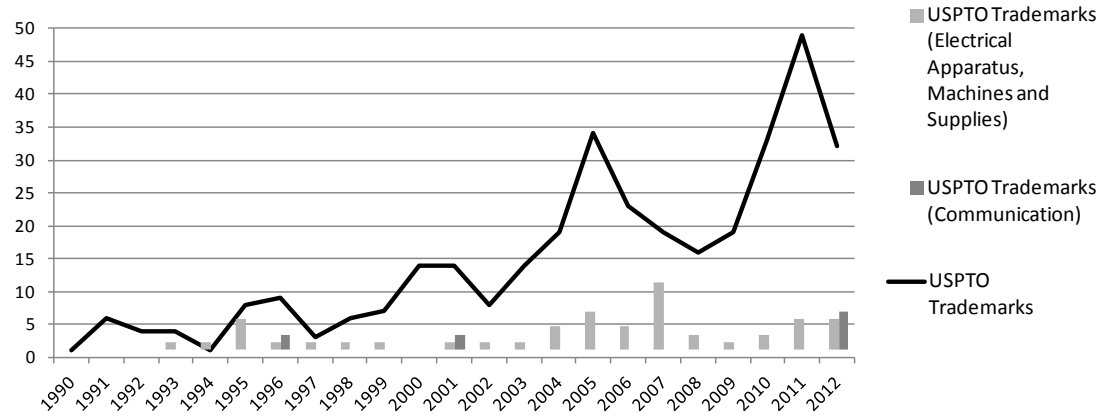
Figure 23: Trademark registrations at the Egyptian office under the Madrid system by Nice industry classification (1991-2010)



Source: Authors' calculations based on WIPO-ROMARIN 2013.

One can also restrict the analysis of Egyptian enterprises to trademarks registered at the United States Patent and Trademark Office (USPTO).[60] Trademark registrations of Egyptian firms in the US are volatile, small but increasing. Trademarks for ICT products or firms - as defined here - however are scarce. While trademarks of Egyptian residents in communication are almost non-existent; trademarks registrations for electric machinery seem to be more frequent in the 2000s but do not follow a clear upward or downward trend.

Figure 24: Registered USPTO trademarks by Egyptian firms, total and by industry (1990-2012)



Source: Authors' calculations based on the Trademark Electronic Search System (TESS) USPTO 2012.

3.5 Trade in IP in Egypt: Royalty and license payments and receipts

The most widely used statistics to measure disembodied technology trade relates to cross-border payment of royalties and license fees (RLF).

The use of RLF data as an approximate measure of the international trade in knowledge is not without problems. One key issue is how to isolate disembodied technology trade from transfer pricing issues (see Box 1.7 in the World Intellectual Property Report 2011).[61] In addition, it is hardly possible to clearly associate the existing RLF flows to the ICT sector or to a particular form of IP. Nonetheless, RLF data are the most pertinent proxy for assessing the international trade in disembodied knowledge.

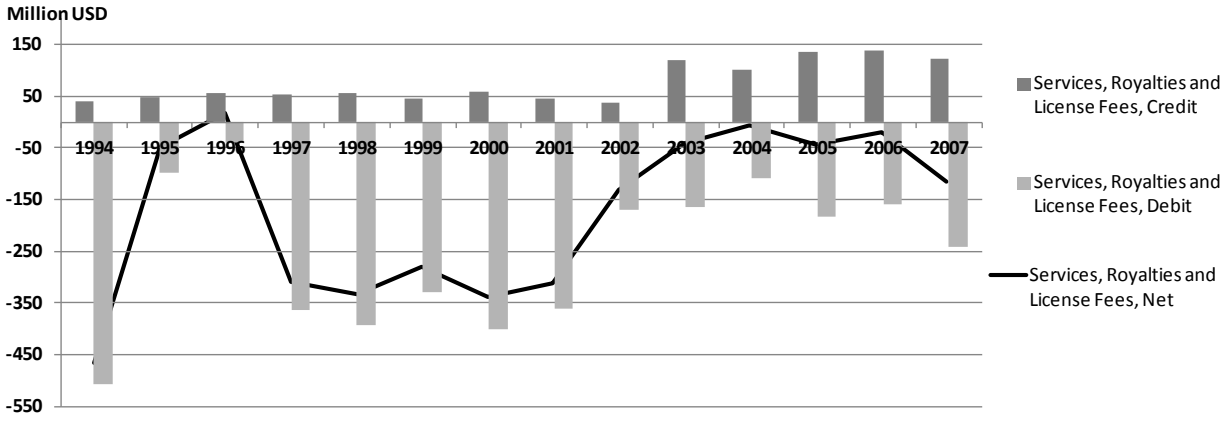
Unexpectedly, the available RLF data point to Egypt as an increasingly dynamic trader in IP, both as importer as well as exporter. The drivers of this uptake – also in the context of low patent filings at home – need more study, also to ensure that statistical issues do not put into question the validity of these data.

Figure 25 compares the amount of RLF receipts and payments in Egypt between 1994 and 2007. While Egypt has a net deficit in international IP-related payments, Egypt's RLF receipts are increasing, while spending decreased until 2004 and then slightly increased again.

[60] In order to identify trademarks registered by Egyptian firms, the US Trademark Electronic Search System (TESS) is used. TESS allows restricting data searches to year, to industry class and to country of origin of the registering company. Industry classes related to ICT are the communication industry as well as the industry for electrical apparatus, machines and supplies.

[61] Given the intangible and fungible nature of IP assets between a company's headquarters and various subsidiaries, these data are subject to transfer pricing problems and related tax considerations that might be unrelated to international technology transfer between countries. See chapter 1 in WIPO (2011).

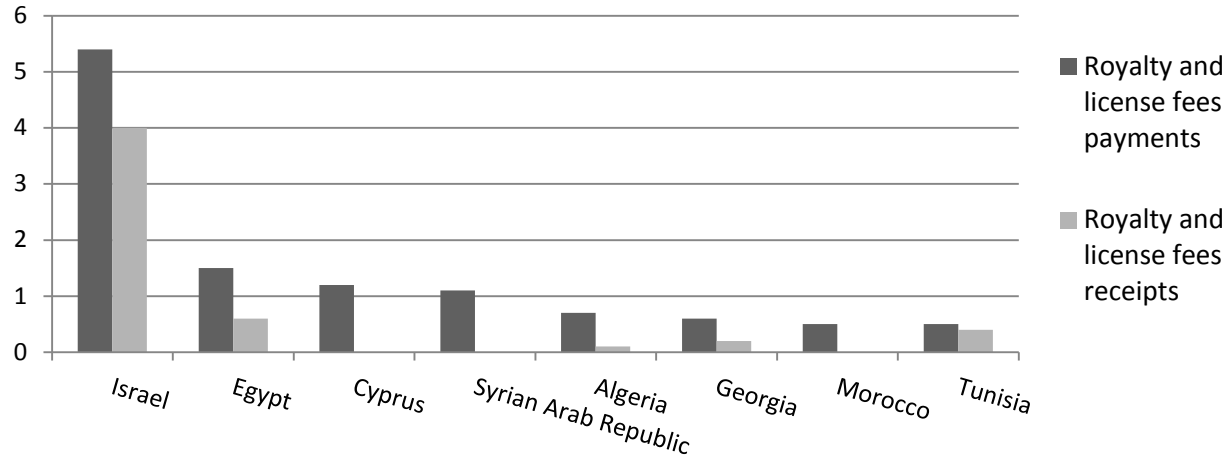
Figure 25: Egyptian royalties and licensing fees payments and receipts (1994-2007), all sectors, in USD million



Source: Authors' calculations based on IMF Balance of Payments 2012.

Compared to other countries in the region, Egypt has a relatively high share of RLF receipts and payments as share of total services trade (see Figure 26). The RLF receipts are actually considered a key strength within the Egyptian GII country profile.

Figure 26: Egypt's RLF payments and receipts compared to other countries in the region (2011), in percent of total service imports and exports



Source: Authors' calculation based on data in the GII 2013 taken from the IMF.

All in all, understanding the drivers of RLF receipts and payments in Egypt, and relating them to the ICT sector needs more study however.

Part 4) Summary and suggestions for policy and future research

Egypt's policies aimed at supplying competitive ICT skills and in shaping specialized high-tech clusters attracting foreign firms are successful.

There is consensus however that domestic innovation and entrepreneurship need to be taken to the next level. Encouraging more advanced capacity in ICT services and software firms and creating local innovative firms is now a priority.

For this to happen, a functioning ICT innovation ecosystem with more R&D and better linkages between universities, local firms and MNEs needs to be in place. Identifying how local firms can thrive from their own innovations and benefit more from their interactions with MNEs and associated spillovers is a priority. Retaining some of the skilled ICT personnel within the country and ensuring that some of these skills are dedicated to local ICT innovation and entrepreneurship, and fostering the mobility of the ICT-skilled workforce between universities, multinational and domestic firms is also of essence.

These supply-side approaches need to be complemented with demand-side policies such as the increase of domestic access and demand for innovative ICT products as indicated earlier and as described in the *UNCTAD ICT Policy Review of Egypt in 2011*.[62] Rightly so, the National ICT Strategy for 2013-2017 focuses not only on the ICT supply side, but also on promoting ICT use and utilizing ICTs as tools to find solutions to issues of concern to the community.[63] Public procurement can evidently play an important role in this field as well. It is beyond the scope of this study to propose detailed recommendations aimed at improving the overall Egyptian ICT innovation system. Still, the following tentative observations and recommendations are proposed concerning the use, relevance and protection of IP in the Egyptian context.

4.1 Summary of the status quo

In summary, while Egypt has already made significant progress in enhancing the legal protection of IP, the uptake of IP in general, and among Egyptian ICT firms in particular, remains rather insignificant. First, Egyptian ICT firms, and in particular SMEs – which compose the majority of the ICT sector in Egypt – do not file a significant number of patents. Second, in Egypt, non-residents, and in particular MNEs file the majority of local ICT patents. Few of these patents are original inventions. Third, while Egypt has a utility model system, it does not seem to attract many filings by local ICT firms. Fourth, the domestic ICT sector is not an active user of trademarks.

Among the apparently most innovative Egyptian ICT firms, the level of awareness on IP and its economic utility is low and the uncertainty as to IP are high. Frequently the lack of knowledge, internal and external skills, time and monetary resources are cited as obstacles to accessing IP. In addition, there is a strong perceived lack of strategies by which domestic ICT firms can get their inventions and IP to market. Experience is also lacking concerning the role and actual importance of IP in financing innovation.

Finally, students, young entrepreneurs and Egyptian ICT firms also expressed significant uncertainty as to the role of IP in their co-operations or joint projects, either in the course of their education or in projects, or in the case of internships or joint projects with multinational enterprises. In general, there is a sense that some potentially IP-protectable matter or know-how diffuses to the public domain or to foreign firms, rather than triggering innovation in domestic firms.

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[62] Rizk (2012) and UNCTAD (2011).
[63] http://www.mcit.gov.eg/Upcont/Documents/MCITstrategy2013_en.pdf.

4.2 Tentative policy suggestions: ICT innovation and IP in Egypt

This study is first to explore the uptake of IP in the Egyptian ICT sector. Clearly, many questions remain open. Still, based on these insights, some tentative policy suggestions are formulated here for the consideration of Egyptian policymakers. These can be an input to more detailed proposals elaborated in the future at the national level.

Specifically, while Egyptian ICT policies and the corresponding institutions are sophisticated, in the area of entrepreneurship and IP a need for further fine-tuning and coordination has been identified which can be grouped into three broad tenets:

1. Undertaking a strategic policy shift towards domestic ICT innovation and entrepreneurship while ensuring improved coordination and evaluation of existing ICT supply-side policies: MCIT and its affiliates as well as relevant business associations focus on improving ICT supply-side capacities and attracting FDI. As also proposed in the new ICT Innovation Strategy, a shift towards policies promoting domestic innovation and entrepreneurship should now be operated in tandem with policies that ensure that Egypt stays an attractive investment location for foreign ICT-related enterprises. Developing a culture and reputation of research, innovation and IP is a critical component of this strategy. Importantly, policies aiming to promote ICT innovation and human capital, such as the fostering of ICT skills, the organization of awards and prizes, or activities facilitating the international exposure of ICT entrepreneurs need to be more carefully coordinated between existing policy bodies and MCIT-steered programs, avoiding duplication. Furthermore, existing ICT supply-side polices and the nascent entrepreneurship and ICT-related innovation programs need to be evaluated for impact.

2. Mainstreaming of practical training on IPR into coherent ICT entrepreneurship programs: While the existing ICT support programs are generally of high quality, IP does not feature prominently within them. In some cases the lack of an IP component can actually be harmful, as it diminishes the inventor's chances that he or she can actually appropriate and develop the invention further.

In line with the evolving needs of the Egyptian ICT sector, each ICT policy program relating to skills formation, innovation or ICT entrepreneurship could be complemented with a fitting IP component. IP should also be at the heart of policies fostering research collaborations and joint research projects with universities, MNEs or other actors. Applying particular care in protecting IP in early phases of entrepreneurship, and protecting inventors from losing their IP rights should be a priority. Importantly, building the case and awareness of IP has to start early with students, in universities, and at research centers.

Specifically, fostering the awareness about the use and economic utility of IP among Egyptian ICT firms will require training, awareness programs and workshops provided mainly through the Technology and Innovation Entrepreneurship Center (TIEC). Beyond awareness alone, IP-related knowledge and skills need to be present both within ICT policy actors as well as in the legal profession to advise domestic inventors as to the optimal use of IP.

Training and advice to entrepreneurs or domestic firms on filing for IP at home or abroad, but also potentially offering assistance for IP filings could be envisaged. The training should not only focus on the basic IPR elements and the technicalities of filing IP. Rather the training should also focus on maximizing the effective use and impact of IP on the business level. This entails capacity-building in the area of how to combine R&D project and IP management efforts, how to determine the value of IP assets, how to develop IP-related products and services, how to improve the companies' reputation via IP, and what complementary assets to IP are required. The following more advanced topics will also require consideration: using IP as collateral for finance and know-how as it relates to

IP-based transactions, *e.g.* buying or selling IP, licensing in and out, the cross-licensing of IP, and use and contributions to patent pools. Finally, training for cases of IP infringement and litigation is also important, as is the promotion of the required skills in the legal profession.

On the side of academics, IP should become more central in existing curricula and in the training of professors at technical faculties. Protecting IP emanating from graduation projects of students and academics at large is of the essence, potentially also by introducing mandatory IPR courses for students at engineering and computer science faculties.

The focus in promoting IP in the ICT sector should not be on patents alone but also on utility models, trademarks, industrial design filings and trade secrets. Indeed, this study finds that the use of utility models and trademarks is particularly low in the ICT sector, but potentially promising as an important first step to IP protection is in the face of incremental innovation.

More specifically, the use of IP in the case of ICT services and software is particularly complex and not always well-understood. In Egypt, as in many other countries, there are various possibilities of IP protection for such ICT products such as patents, copyrights and the related ITIDA software registration process, trademarks, and others. The relative merits and demerits of these schemes and the legal certainty they provide should be assessed more clearly. Furthermore, the particular case of software and the interactions between proprietary and non-proprietary software innovation models need particular attention, in particular also considering the various impacts for the creation of Egyptian business ventures. Fostering the awareness about related open source business ventures, the required legal and business skills, and designing support measures within the context of IP-related policies is a priority.

In sum, IP-related programs and institutional support measures should be designed after a realistic assessment of the diverse roles IP can or cannot play in the specific case of the ICT and BPO services, the software and other ICT products produced in Egypt. Over focusing on IP-related programs and support measures where little potential for actual IP filings exists would not constitute progress.

3. Putting existing IP institutions to use for ICT firms and innovation: IP policies should not be discussed in isolation but rather as part of a broader range of policies. Egyptian ICT policy actors and the formal Egyptian IP institutions could work more closely. The awareness and accessibility of services of IP institutions seems low both for potential innovators as well as those that design ICT policies. Little formal contact seems to exist between local inventors, technology clusters, technical universities and IP institutions. IP institutions - outside of the ITIDA IP Office concerned solely with software registrations - are not physically present in ICT high-tech clusters or at universities. The coordination of ICT policies with IP policies and its actors might need attention. Information about all the different IP institutions and how they can help must be spread, especially among startups and SMEs. The presence of IP institutions in ICT clusters, *e.g.* in the Smart Village, could be increased.

Reviewing the services and help offered by the traditional IP institutions in the context of the ICT sector would be desirable, in particular also the efficiency of trademark registrations. Providing relevant advice as to the filing of IP rights and the protection of IP abroad, including potentially the use of the PCT or Madrid System, is the priority. Capacity building for judges, prosecutors, customs and police officers also is of significant importance.

In the context of all four policy objectives, the rather unique Egyptian National IP Coordination Committee has proven to be an important coordination vehicle. However, the body currently seems more geared towards the inter-ministerial coordination of external IP

matters. In the future, it could well play an important role in above policy coordination matters at the cross-roads of IP and sectoral innovation policies as well.

Areas for future research: ICT and IP in Egypt and beyond

In addition to above tentative policy suggestions, this study has identified the need for more work in the following fields.

First, a number of general questions emerge which evolve around the role of IP in determining a developing country's potential in the global ICT value chain.

1. What is the role of IP in appropriating innovation in ICT and BPO services sector, and in the case of customized software often embedded in other products or systems?

2. What is the role of IP in fostering the rise of a strong domestic ICT and BPO services in low- and middle-income economies?

3. How open are today's ICT service and software markets for new market entrants from developed and developing countries alike, and in the face of proprietary software models, standards and issues of required interoperability? How do the large existing IP portfolios in high-income economies and patent thickets of incumbents influence the development of ICT service and software innovation and entrepreneurship in low- and middle-income economies? What is the role for non-proprietary open source software-based business models in these innovation eco-systems?

4. If access to IP is indeed a bottleneck for new ICT market entrants, which domestic policy approaches could be envisaged to establish a common level-playing field? Would the constitution of local patent pools or of joint licensing consortia be feasible and helpful?

5. How to maximize the positive spillovers from the local activities of ICT-related MNEs interested in tapping into local ICT skills and having access to a large domestic market? What in particular is the role of IP in structuring relationships between the domestic science system, domestic ICT firms and MNEs, and in the quest to maximize positive spillovers?

6. What lessons can be drawn from India or other countries with leading ICT service and BPO providers in regard of the five aforementioned points?

Second, the following more Egypt-specific questions emerge:

1. What is the nature of the Egyptian ICT sector and its current or potential activities in the field of innovation? More detailed work along these lines is required to better assess the true sectorial innovation potential and the role of IP therein.

2. The true characteristics of the Egyptian ICT innovation system need more precise study.
   a) What is the true extent of university and industry collaboration with respect to innovative activities, *e.g.* contract research, joint studies, and others? How does the current orientation of university ICT research and its legal IP environment support the goal of domestic ICT innovation and entrepreneurship?

   b) What are interactions and true impacts in terms of learning and technology transfer between the local innovation system and foreign ICT MNEs?

   c) More generally, what is the mobility of skilled personnel and inventors in the Egyptian ICT sector and how does it contribute to innovation?

Acquiring better knowledge on these points is an essential step to assessing the potential economic impact of an increased and more sophisticated IP use in the Egyptian ICT sector.

APPENDIX

APPENDIX 1: Model questionnaire on IP and Innovation

QUESTIONNAIRE ON IP FOR THE ICT SECTOR IN EGYPT

Thank you in advance for responding to this questionnaire.

PART I: PROFILE OF THE ENTERPRISE

1. Name of the enterprise:	
Name of the Company:	Postal Address:
Phone:	E-Mail:
Website:	Year of establishment of the enterprise:
1.1 Name of the authorized person	
Name:	Position/ Title:
Mobile:	E-Mail:
Phone1:	Phone2:
Other (please specify) ……	
1.2 General company facts:	
a. **Enterpriserevenue**2012:_____*EGP* 2011:_____*EGP* 2010:_____*EGP*	
b. **Number of employees** 2012:_____ 2011:_____2010:_____	
c. **Number of scientists and engineers employed** 2012:_____ 2011:_____2010:_____	
d. **R&D expenditures** 2012: _____*EGP*2011: _____*EGP*2010: _____*EGP*	
d. **Please estimate the amount of your enterprise's expenditures in 2012 for innovation activities A. to D** **A.** Internal R&D within the company_____*EGP* **B.** External R&D (R&D contracted out to third parties)_____*EGP* **C.** Acquisition of machinery/software_____*EGP* **D.** Acquisition of other external knowledge (licensing in technology, know-how, etc.)_____*EGP*	
2. Is your enterprise part of an enterprise group?	
☐ Yes☐ No	If **YES**, Country of Location of Head Office ……..

3. Please list goods produced and/or service provided by your enterprise by decreasing importance on total sales. Please also indicate the proportion (in percent) over total revenues.	1. ……. ___percent 2. ……. ___percent 3. ……. ___percent 4. ……. ___percent 5. ……. ___percent
4. Please indicate in which categories you would identify your products. Please also indicate – if possible – the proportion (in percent) over total turnover. (Tick all that apply)	☐ – [1] International Applications/Products Services percent ☐ – [2] Local Applications/Products Services _____percent ☐ – [3] Solutions and System Integration_____percent ☐ – [4] Business and Knowledge Process Outsourcing Services_____percent ☐ – [5] Modeling, Design and Engineering Services percent ☐ – [6] Hosted Services_____percent ☐ – [7] Content_____percent ☐ – [8] Software Products Development _____percent ☐ – [9] Contact Services_____percent ☐ – [10] Software products (Sales and Distribution) percent ☐ – [11] Hardware (Sales and Distribution)_____percent ☐ – [12] Assembly Manufacturing_____percent ☐ – [13] Telecommunications_____percent ☐ – [14] Security_____percent ☐ – [15] Consulting_____percent ☐ – [16] Regional and Global Centers_____percent ☐ – [17] Training Services_____percent

Innovation Activities

A. PRODUCT INNOVATION

Product innovation describes a product (incl. services) whose components or basic characteristics (technical features, components, integrated software, applications, user friendliness, availability) are either new or significantly improved.
The innovation must be new to your enterprise, but it does not need to be new to your sector or market. The sole significant factor is your evaluation of it. It does not matter if the innovation was developed by your enterprise alone or in collaboration with other enterprises. Purely visual modifications of products (*e.g.* coloring, styling) are not regarded as product innovations. Selling alone of innovations that have been developed and produced entirely by other enterprises, also does not count as product innovation in this sense.

1. During the years 2010 to 2012, did your enterprise introduce new or significantly improved products/services?

Yes ☐ No ☐

2. If yes, do these product innovations relate to (multiple responses possible)

- ➔ goods (= physical products) ☐
- ➔ software ☐
- ➔ services ☐

3. Who developed the product innovation(s)?

- ➔ Primarily your enterprise or enterprise group ☐
- ➔ Primarily your enterprise in cooperation with other local ☐ or foreign ☐ enterprises/institutions
- ➔ Primarily other local ☐ or foreign ☐ enterprises/institutions

4. How does your enterprise's turnover (incl. exports) break down among the following types of products in 2012?

- ➔ Newly introduced or significantly improved products/services during 2010-2012 in local market.....(approx percent)
- ➔ Unchanged or slightly changed products/services (also include products/services developed and produced entirely by other enterprises) .....approx. percent

5. Were any of the product innovations introduced during 2010 to 2012 new to the national market, *i.e.* your enterprise was the first one to market these products/services?

- ➔ Yes ☐
- ➔ What was the share of sales of these innovations in 2012? …....ca. percent
- ➔ No ☐

B. PROCESS INNOVATION

A process innovation is the implementation of a new or significantly improved manufacturing/production process, distribution method, or support activity for goods or services. It should have a noticeable impact on the level of productivity, the quality of your product/service or the cost of production/distribution. Newly introduced procedures that enabled the introduction of product innovations, also count as process innovations.
The innovation must be new to your enterprise, but your enterprise does not need to be the first to introduce it. The significant factor is your enterprise's evaluation of it. It does not matter if the innovation was developed by your enterprise alone or in collaboration with other enterprises. Purely organizational changes such as the introduction of new management practices are not process innovations.

1. During the years 2010 to 2012, did your enterprise introduce new or significantly improved internal processes (incl. processes for service performance and product delivery)?

Yes ☐ No ☐

2. If yes, do these process innovations relate to (multiple responses possible)

- ➔ a manufacturing process physical goods ☐
- ➔ a developing process for software ☐
- ➔ a procedure for service delivery ☐
- ➔ logistics procedures, delivery/distribution methods ☐
- ➔ supporting activities for your processes (*e.g.* maintenance, accounting) ☐

3. Did the process innovations introduced by your enterprise during 2010-2012 reduce the average cost (per unit/operation)?

Yes ☐ What was the reduction in average unit cost due to process innovations in 2012? __ percent
No ☐

4. Were any of your process innovations introduced between 2010 and 2012 new to your national market, *i.e.* no other enterprise in your market has applied these process innovations yet (that is your enterprise is the first innovator)?

Yes ☐
No ☐
Not known ☐

C. CO-OPERATION EFFECTS

We define innovation and research cooperation as active participation in joint innovation or research projects with other enterprises and/or with non-commercial organizations such as universities or research institutes.

1. Did your enterprise co-operate on any of your innovation activities with other enterprises or institutions?

Yes ☐ No ☐

2. If yes, please indicate the type of innovation co-operation and partner's country of origin and to which extent the cooperation was successful (1= highly successful, 4=failure)

(Tick all that apply)

	Local (Egyptian)	Foreign	Success
Other enterprises within your enterprise group	☐	☐	1☐ 2☐ 3☐ 4☐
Clients or costumers	☐	☐	1☐ 2☐ 3☐ 4☐
Suppliers of equipment, components, or software	☐	☐	1☐ 2☐ 3☐ 4☐
Competitors or other enterprises in your sector	☐	☐	1☐ 2☐ 3☐ 4☐

Consultants, commercial labs, or private R&D institutes ☐ ☐ 1☐ 2☐ 3☐ 4☐
Universities or other higher education institutions ☐ ☐ 1☐ 2☐ 3☐ 4☐
Government research institutes ☐ ☐ 1☐ 2☐ 3☐ 4☐

3. How important were each of the following objectives for your cooperation activities?

(Relevance of the objective, 1= high relevance, 4 no relevance)

Increase range of goods or services	1☐	2☐	3☐	4☐	
Replace outdated products or processes		1☐	2☐	3☐	4☐
Enter new markets	1☐	2☐	3☐	4☐	
Increase market share		1☐	2☐	3☐	4☐
Improve quality of goods and services		1☐	2☐	3☐	4☐
Improve flexibility for producing goods or services		1☐	2☐	3☐	4☐
Increase capacity for producing goods and services		1☐	2☐	3☐	4☐
Decrease labor costs per unit output	1☐	2☐	3☐	4☐	
Decrease material or energy cost per unit/operation			1☐	2☐	3☐ 4☐
Reduction in environmental damage	1☐	2☐	3☐	4☐	
Improvement of health and safety		1☐	2☐	3☐	4☐
Compliance with laws and regulations		1☐	2☐	3☐	4☐
Compliance with norms and standards		1☐	2☐	3☐	4☐

4. Please indicate reasons hampering collaboration or influencing negatively the results.

☐Lack of appropriate partners nearby
☐Insufficient information of partners
☐Technological gap with (potential) partner was too high
☐Fear of imitation by partner
☐Negative experience from former collaborations
☐No accurate projects that needed partners
☐Uncertainty regarding IP ownership resulting from collaboration
☐Potential partner imposed license purchase for Intellectual Property

5. Has working with MNCs (Multinational Companies) led to new knowledge or learnings for your enterprise?

Yes ☐ No ☐

6. If yes, through which channels did these spillovers accrue?

Please specify by checking from the list below. (you may give multiple answers)

Demonstration effects (observe technologies and products of the MNCs) ☐
Labor mobility (between MNCs and local companies) ☐
Linkages to suppliers ☐
Linkages to customers ☐
Linkages to competitors ☐

Please describe:

7. If any of the above apply, how was knowledge transfer realized?

Please specify by checking from the list below (you may give multiple answers)
Mutual sharing of undisclosed information (not open to the public) on product innovations
☐
Mutual sharing of undisclosed information (not open to the public) on process innovations
☐
Formal training session (*e.g.* training specific business skills to employees)
☐
Informal exchange of knowledge and ideas (*e.g.* in common research centers)
☐

PART II: IPAND COMPETITVE STRATEGY

D. IP ASSETS

1 Does your business have a written policy that regulates the creation, acquisition, protection and exploitation of your IP?	☐ Yes	☐ No	☐ Not applicable
2 Does your enterprise consider IP as an integral part of its business strategy	☐ Yes	☐ No	☐ Not applicable
3 Does anyone have the overall responsibility for protecting and managing the IP assets of your business?	☐ Yes	☐ No	☐ Not applicable

4 Please indicate the importance of the following tangible and intangible assets for the <u>market success</u> of your enterprise:(Importance of the objective, 1= high importance, 4= no importance, trend of the objective importance either increasing ↑ or decreasing↓)

importance of the following assets *trend of importance*

a. Tangible property (plant and equipment) 1☐ 2☐3☐4☐☐↑ ☐↓

b. Human capital (qualification of employees) 1☐ 2☐3☐4☐☐↑ ☐↓

c. Organizational and structural strength 1☐ 2☐3☐4☐☐↑ ☐↓

d. Relationships to customers and partners 1☐ 2☐3☐4☐☐↑ ☐↓

e. IP 1☐ 2☐3☐4☐☐↑ ☐↓

5 Please indicate the importance of IP for the promotion of <u>revenue generation</u> in your enterprise?(Importance of the objective, 1= high importance, 4 no importance, trend of the objective importance either increasing ↑ or decreasing↓)

importance of IP for revenue generation *trend of importance*

1☐2☐3☐4☐☐↑ ☐↓

6 Do you rely on one or more of the following identifiers (listed below) to be recognized by the customer? If yes also indicate the marketing budget as percent of sales

Please specify by checking from the list below. (you may give multiple answers)

Distinctive logo	☐ Yes	☐ No	☐ Not applicable
Word	☐ Yes	☐ No	☐ Not applicable
Letters	☐ Yes	☐ No	☐ Not applicable
Numbers	☐ Yes	☐ No	☐ Not applicable
Drawing	☐ Yes	☐ No	☐ Not applicable
Picture	☐ Yes	☐ No	☐ Not applicable
Shape	☐ Yes	☐ No	☐ Not applicable
Part of your trade name	☐ Yes	☐ No	☐ Not applicable
A catchy slogan	☐ Yes	☐ No	☐ Not applicable
A distinctive color or combination of colors	☐ Yes	☐ No	☐ Not applicable
7 Does your business have confidential information that gives it a distinct competitive advantage?	☐ Yes	☐ No	☐ Not available

If yes, is it based on information contained in (if no please continue with next section: (please specify by checking from the list below you may give multiple answers)

a) ☐market research or competitive intelligence reports;
b) ☐business, marketing or advertising plans, advertising rates, new product names, designs or artwork for packaging, that are still confidential;
c) ☐agreements with employees, consultants, suppliers, vendors, service providers, and partners in the distribution/marketing channels;
d) ☐prototypes, production techniques, technological know-how and proprietary recipes, compounds, formulas, algorithms, methods or processes;
e) ☐test data, R&D information, invention disclosure reports;
f) ☐blue prints, technical drawings and engineering specifications;
g) ☐pending utility model/patent applications;
h) ☐non-published source code and object code of software;
i) ☐databases and electronic data compilations;
j) ☐business methods or business management routines
k) ☐cost/pricing information, financial and accounting information;
l) ☐recruiting/employee information, including salary structure, compensation packages, terms and conditions of employee's contracts;
m) ☐ investment strategies;
n) ☐ risk management strategies.

E. IP ASSETS– PROTECTION AND OWNERSHIP

1 Did you apply for the following IPRs?	☐ Yes	☐ No	☐ Not available	☐ Not applicable

If the answer is **YES,** please indicate the total numbers of IPRs that your company filed in Egypt (local) or internationally! Also please indicate IP budget, *i.e.* cost for applying and enforcing IP; as percent of revenues!

If the answer is **NO**, directly continue with **question 2**!

a. Trademarks ____ percent	___Filed (local)	___ Filed (international)	☐ None	☐ Not applicable
b. Patents____ percent	___Filed (local)	___ Filed (international)	☐ None	☐ Not applicable
c. Industrial Designs____ percent	___Filed (local)	___ Filed (international)	☐ None	☐ Not applicable
d. Utility Models____ percent	___Filed (local)	___ Filed (international)	☐ None	☐ Not applicable
e. Registration of copyright (*e.g.* via ITIDA software registration, notary)	___Filed		☐ None	☐ Not applicable

2 If you have not sought protection for your IP assets, which of the following is/are the key reason(s) for it:

Issues relating to awareness and obstacles faced

☐ We do not have enough awareness on the value and relevance of IP to our activities
☐ Our enterprise has no funds for the filing or enforcement of IP rights
☐ We lack the skills to implement an IP strategy for our company
☐ No one has been given the responsibility to protect and/or manage IP assets in our business

Strategic and technical reasons

☐ IP is not relevant for the success of our business strategy or our type of business
☐ Secrecy as an alternative IP protection is preferred
☐ Other means to protect our ideas are preferred, please elaborate:
☐ Our innovations are not easily protected by formal IPRs (*e.g.* in the case of patents our inventions are not advanced enough)
☐ Our software is not a patentable subject matter (or prior art documents)
☐ The extent to which a patent or another form of IP discloses information on our inventions is too high
☐ An IP registration is too time consuming

☐ An IP registration is too costly (*e.g.* registration fees, fees for patent attorneys, etc.)
☐ Collaboration with domestic partners hinder us to register our IP
☐ Collaboration with MNC hinder us to register our IP
☐ Enforcement by the IP related institutions (IP office, IP courts, laws, etc.) is insufficient
☐ Others; please specify_____

3 Alternatively to formal IP protection such as patents, utility models, trademarks etc., have you pursued any other strategies to protect your know-how and IP?
Please specify by checking from the list below. (you may give multiple answers)

a. ☐ Secrecy (incl. non-disclosure agreements)
b. ☐ Technical solutions, incl. complexity of the product
c. ☐ Use lead time on market, *i.e.* being faster than the competitors

F. IP ASSETS– Utilization

1 Do you utilize your IP assets or would in case of actually not owning IP in other ways than protecting your technologies, products and services such as:	☐ Yes	☐ No	☐ Not available	☐ Not applicable

If the answer is **YES**, please specify by checking from the list below. (you may give multiple answers)

If the answer is **NO**, please continue with the questions in **section G**

a. ☐ Selling the IP asset
b. ☐ Giving others the right to use it while paying you an agreed sum (*e.g.* licensing technology, or franchising trademarks)
c. ☐ Cross-licensing your IPRs (*i.e.* giving other enterprises the right to use your IP in return for using their IP)
d. ☐ Using it as collateral for obtaining finance
e. ☐ Increasing the market value of your enterprise
f. ☐ Improve your enterprise's image
g. ☐ Offensive blocking (blocking competitors from entering the market)
h. ☐ Defensive blocking (retaining freedom to operate in your technologies and markets)
i. ☐ Motivation for employees (*e.g.* receiving bonuses)
j. ☐ Using IPRs as enterprise internal mechanism to allocate R&D budgets
k. ☐ Integrating IPRs in standard setting activities in the industry

	l. ☐ Others; please specify ……..			
	2 If the answer of question (F-1) is YES, are you generating an income through selling, licensing, franchising and merchandising?	☐ Yes ____ percent of turnover	☐ Not available	☐ Not applicable

G. IP ASSETS– Entering new markets

1 Did IP rights of third parties ever hinder you from starting new projects, such as launching new products, new processes, etc.?

☐ Yes ☐ No

If **YES**, please specify if any of the following reactions: (You may give multiple answers)
If **NO**, please continue with **question 2**

a. ☐Abandonment of new innovation project
b. ☐Abandonment of already started innovation project
c. ☐ Invent around activities
d. ☐ Realization of new innovation projects even though there was no access to necessary third party IPR
e. ☐ Acquisition of relevant IPRs
f. ☐ Exchange or cross licensing of relevant IPRs
g. ☐Taking legal action

2 If your company applied for IP protection in other countries, what are the reasons for the registration(You may give multiple answers)

a. ☐ exporting
b. ☐ investing abroad (foreign affiliate)
c. ☐ licensing abroad
d. ☐software is patentable subject matter in that country
e. ☐others, Please specify

3 Do you know if your technologies or products infringe IPRs of other enterprises (including IPRs in other countries)?	Yes, very often☐	Yes, but not often☐	No, never ☐
4 Do you protect your IP before participating in competitions or in trade fairs/exhibitions in other countries?	Yes, very often☐	Yes, but not often☐	No, never ☐

IP Enforcement

1 Does your business take measures to prevent copying or counterfeiting or piracy?	☐ Yes	☐ No	☐ Not available	☐ Not applicable
If **YES** please specify?	☐Means/techniques which enable your goods to be distinguished from counterfeit goods		☐Means/techniques which make it difficult to counterfeit/pirate your goods	
2 Does your business monitor the market to ensure that your IP assets are not been misused by others?	☐ Yes	☐ No	☐ Not available	☐ Not applicable

If the answer is **YES**, What does your company do to detect such misuse (you may give multiple answers)

a. ☐ Monitor trademarks in the market
b. ☐ Monitor trademark filings by competitors
c. ☐ Monitor designs used by competitors
d. ☐ Monitor design applications filed by competitors
e. ☐ Search trademark, patent and/or design databases?
f. ☐ Monitor the Internet
g. ☐ Monitor the relevant distribution channels
1. ☐ Monitor the relevant retail outlets
2. ☐ Use the services of a consultant or expert service

3 Was your IP misused by third enterprises in the following ways:	i. Please specify by checking from the list below. (you may give multiple answers)			ii. Was your IP legally protected (*e.g.* by patents or trademarks, etc.)	
a. Use of inventions of your enterprise	☐ Yes (local market)	☐ Yes (international market)	☐ No	☐ Yes	☐ No
b. Adoption of products or business models of your enterprise	☐ Yes (local market)	☐ Yes (international market)	☐ No	☐ Yes	☐ No
c. Use of names or identifiers of your enterprise	☐ Yes (local market)	☐ Yes (international market)	☐ No	☐ Yes	☐ No

d. Use of designs of your enterprise	☐ Yes (local market)	☐ Yes (international market)	☐ No	☐ Yes	☐ No

4 If you find that your IP assets are being misused do you?
(You may give multiple answers)

a. ☐ Never ignore the misuse
b. ☐ Always ignore the misuse
c. ☐ Generally ignore the misuse
d. ☐ Discuss with the one who is misusing
e. ☐ Seek the help of an attorney or IP expert
f. ☐ Write cease and desist letters (injunctive relief)
g. ☐ Explore the possibility of mediation and/or arbitration before thinking of going to court
h. ☐ Straight away go to court
i. ☐ Never go to court
j. ☐ Seek the help of custom authorities to enforce your IP rights?
k. ☐ Others; please specify…….

H. IP ASSETS– Raising Finance

1 Has your business ever relied on finance/investments from others to create/support/develop your business?	☐ Yes	☐ No	☐ Not available	☐ Not applicable

If **YES**, What was the importance of IP assets in accessing finance/investment?

a. ☐ Critical
b. ☐ Very important
c. ☐ Important
d. ☐ Indirect relevance
e. ☐ Irrelevant

2 Did you rely on the IP assets of your Business to access finance/investment/funds from:	☐ Yes	☐ No	☐ Not available	☐ Not applicable

If **YES**, please specify. (You may give multiple answers)

a. ☐ Banks
b. ☐ Private equity
c. ☐ venture capital
d. ☐ Stock market
e. ☐ Government grants/subsidies
f. ☐ Others; please specify

If **NO**, why? (You may give multiple answers)

b. ☐ Did not know it was possible to raise capital by using IP assets
c. ☐ Did not know how to value IP assets
d. ☐ Your company is new, and doesn't follow a systematic approach for IP valuation
e. ☐ Financial institutions not willing to consider IP assets as collateral
f. ☐ Others; please specify
……

I. IP ASSETS– Policy initiatives

1. How often has your enterprise made use of support services provided by the following institutions? (multiple answers possible)

Support of a national support agency or bank
Support of a regional support agency or bank
Attorneys, *e.g.* specialized in patents, trademarks or copyrights
National patent office
International patent office, *e.g.* WIPO or EPO
Patent information centers
Others:
Please specify the programs or institutions:

2. In which phases of using IPRs did you make use of these services?
(multiple answers possible)

To learn more about the value of IPR and how it can benefit me (awareness)
To improve my technical IPR skills
Search of IPRs or technologies, *e.g.* to define prior art
For the registration of IPRs
For negotiations of existing IPRs, *e.g.* buying or selling IPRs or licensing contracts
For fighting against infringements of IPRs and product piracy
In case of other problems related to IPRs, please specify:

3. Which barriers do you face related to using these public support services for IPR?
(multiple answers possible)

No adequate support program / institution available
Lack of quality of the support program / institution
Too little information about support program / institution
Too high administrative burden, *e.g.* for applications
Too little financial support
Too little support related to specific problems
Too time consuming procedures, *e.g.* between application and approval of support
No necessity to use public support measures
Other barriers

4. Which kind of support related to IPRs would you expect from public programs/institutions?

Thank you for responding to this questionnaire.

Appendix 2: Mission schedule

Schedule of WIPO Experts' Visit 18-20 Feb 2013

Day 1: 18th Feb 2013	
9:30	Meeting with Dr. Nagwa Elshinawy, Director and the Information Center team at Ministry of Communications and Information Technology (**MCIT)**
11:00	Dr. Olfat Abdel-Monsef, Advisor to the Executive President, Policies & R&D, **National Telecom. Regulatory Authority** (NTRA) Dr. Sherif Hashem Meeting and Wesam M. Sekik, Regulatory Policies Director, **NTRA**
13:00	Walid Abd El Kader, IPR Specialist, IP Office in **MCIT ITIDA, (**Office of Mr. Hegazy responsible for software registrations**)**
Lunch	
15:30	Ambassador Mohamed Abu Bakr Fattah – Director, International Specialized Agencies Affairs, Amr Ramadan, Deputy Assistant Minister for NAM, OIC& Specialised Agencies, **Ministry of Foreign Affairs**
17:00	Meeting with H.E. **Minister of Communication** Atef Helmy – MCIT
Day 2: 19th Feb 2013	
9:30	Meeting with **Technology Innovation and Entrepreneurship Center (TIEC)**, Sally Metwally, Vice President, Entrepreneurship and Innovation Support
10:30	Meeting with the **Adel E Ewida, President National Patent office, Academy of Scientific Research and Technology** – Walid Nabil Taha, General Department for Legislation, **Ministry of Justice**
11:00	***Two-hour workshop on the role of IP in the ICT Industry with Questions and Answers with the ICT Industry Representatives***
13:00	**Eng. Mohamed Rafee** Founder and Business Developer of By2olak Lunch Break (Visit of the **CULTNAT**, Center for Documentation of Cultural and Natural Heritage, Dr. Yasser Elshayeb, Director)
14:00	**IT Incubators**
15:00	Wael Abouelmaaty, General Manager, **Valeo**
Day 3: 20th Feb 2013	
10:00	**Faculty of Engineering –** Ein Shams University **Meeting with various faculty members, the Vice Dean and discussion with students on entrepreneurship and IP**
13:00	Lunch Break

14:00	Mohamed Saied, Operations Manager**, Information Technology Academia Collaboration (ITAC)** **Information Technology Industry Development Agency**
14:30	Walaa El Din Mostafa Abd Alllah, Legal Manager and Moataz El Shafie, Head of Legal, **Vodafone Egypt**
15:30	Dr. Hossam Osman, Chairman, **Software Engineering Competence Center,** and Acting Manager**, TIEC**
16:30	Dr. Heba Saleh and Eng. Iman Raslan, Deputy for Business Development, **MCIT Information Technology Institute (ITI)**
18:00	Concluding Meeting with the Team for Future Steps

Appendix 3: Egypt ICT industry fact sheet

Indicator	Years	
	2011	**2012**
Number of ICT Companies	4'428	5'083
IT Share of companies	78.1 percent	78.3 percent
IT services Share of companies	14.0 percent	13.9 percent
Communications Share of companies	7.9 percent	7.8 percent
total number of workers in ICT sector	213'330	283'000
ICT Real GDP 2011/2012 (thousand EGP)	48'627'004	49'354'227
ICT contribution to GDP 2011/2012	3.30 percent	3.32 percent
ICT revenues 2011/2012 (thousand EGP)	64'922'064	69'553'257
Exports of ICT services (Outsourcing) ($ Billion) **	1'200	1'300
Public ICT investments, in million EGP	479.1	550.6
Private ICT investments, in million EGP	13'678	14'670
percent Egyptian Enterprises using computers	69 percent	72 percent
percent Egyptian Enterprises using internet	46 percent	50 percent
percent Enterprises using fixed broadband	42.20 percent	45.30 percent
percent Companies using mobile broadband	7.50 percent	9.10 percent
percentage of internet users	35.72 percent	39.41 percent
percentage of fixed broadband subscribers	2.31 percent	2.8 percent
percentage of mobile subscribers	102.76 percent	116.94 percent

* Both figures of GDP of the years 2006/2007 and 2011/2012 are hard to compare as data of 2006/2007 represent the base year of a 5-year plan and 2011/2012 is the base year of a nother 5-year plan time series, with different methodologies of calculations

** Egypt has no ICT goods exports only ICT services exports in the form of Outsourcing

Appendix 4: Global Innovation Index Scores in Major categories

Global Innovation Index: Tertiary Education

Rank	Country	Score
30	Israel	62.5
38	Lebanon	57.7
43	Turkey	55.4
48	Armenia	48.9
50	Cyprus	48.3
60	Saudi Arabia	41.2
67	Jordan	37.8
68	Tunisia	37.1
73	**Egypt**	**32.4**
74	Algeria	32.1
75	Georgia	30.0
76	Bahrain	29.8
77	Oman	28.7
91	Azerbaijan	19.6
98	Morocco	13.2
102	Qatar	11.6
110	Yemen	10.2
n/a	United Arab Emirates	n/a
n/a	Syrian Arab Republic	n/a

Missing country data: n/a

2.3.1 Researchers

Global Innovation Index: Researchers

Rank	Country	Score
27	Tunisia	3'239.8
37	Jordan	1'933.7
39	Georgia	1'811.9
40	Armenia	1'796.4
41	Turkey	1'715.4
43	Cyprus	1'555.3
48	Azerbaijan	1'217.8
51	**Egypt**	**1'017.5**
54	Morocco	934.7
70	Algeria	419.8
107	Saudi Arabia	47.4

2.3.2 Gross expenditure on R&D

Global Innovation Index: Gross Expenditure on R&D

Rank	Country	Score
1	Israel	4.4
34	Tunisia	1.1
38	Turkey	0.8
48	Morocco	0.6
59	Cyprus	0.5
62	Jordan	0.4
71	Armenia	0.3
73	Azerbaijan	0.2
82	**Egypt**	**0.2**
86	Georgia	0.2
97	Saudi Arabia	0.1

n/a	Israel	n/a
n/a	Bahrain	n/a
n/a	Qatar	n/a
n/a	United Arab Emirates	n/a
n/a	Oman	n/a
n/a	Lebanon	n/a
n/a	Syrian Arab Republic	n/a
n/a	Yemen	n/a

Missing country data: n/a

100	Algeria	0.1
n/a	Bahrain	n/a
n/a	Qatar	n/a
n/a	United Arab Emirates	n/a
n/a	Oman	n/a
n/a	Lebanon	n/a
n/a	Syrian Arab Republic	n/a
n/a	Yemen	n/a

Missing country data: n/a

6.1.4 Scientific and technical publications

Global Innovation Index: Scientific and Technical Publications

Rank	Country	Score
10	Israel	46.6
17	Armenia	40.7
21	Cyprus	36.6
35	Jordan	26.5
36	Tunisia	26.5
42	Georgia	21.8
46	Turkey	20.9
64	Lebanon	12.9
66	**Egypt**	**12.5**
77	Saudi Arabia	9.3
80	Morocco	8.7
87	Algeria	6.7
104	Azerbaijan	5.1
106	Oman	5.0
112	United Arab Emirates	4.3
118	Bahrain	3.5
124	Qatar	2.9
126	Yemen	2.8
127	Syrian Arab Republic	2.8

Missing country data: n/a

6.1.5 Citable documents H index

Global Innovation Index: Citable Documents H Index

Rank	Country	Score
15	Israel	393.0
36	Turkey	193.0
48	**Egypt**	**122.0**
53	Saudi Arabia	114.0
61	Armenia	98.0
65	Lebanon	91.0
66	Morocco	90.0
71	United Arab Emirates	81.0
72	Tunisia	80.0
73	Cyprus	79.0
80	Algeria	74.0
82	Jordan	72.0
83	Georgia	71.0
92	Oman	58.0
103	Syrian Arab Republic	53.0
116	Qatar	44.0
120	Azerbaijan	41.0
126	Bahrain	36.0
128	Yemen	34.0

Missing country data: n/a

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[End of Annex and of document]