

# GIS Education in Egypt: The ITI Experience

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## SUMMARY

Since its establishment as a national institute in 1993, by the Information and Decision Support Center (IDSC), the Information Technology Institute (ITI) has established itself as one of the leading IT training institutes not just in Egypt but also across the Middle East. ITI mission is to create, shape, nurture and empower the Egyptian Information Technology community, by developing and disseminating state-of-the-art training processes on forefront applications and programs.

The most important ITI program is a 9-months program for universities fresh-graduates. It is designed mainly to build professional skills in the IT field and to provide training in state-of-the-art technologies. The course is being offered in different specializations, e.g. Software Engineering, GIS, Computer Networks, Multimedia, E-Commerce, VLSI, and Mechatronics. The main objective of this paper is to share the ITI experience in GIS Professional training.

This paper starts by a brief introduction to the ITI and its main programs; professional training, specialized tracks programs and research development unit. It mainly focuses on the GIS diploma offered by the ITI with its course structure and the main concepts introduced through its courses. Finally, it represents the main achievements of the ITI in the IT Egyptian and regional industry in addition to the future vision about the GIS professional training.

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## 1. INTRODUCTION

ITI is an organization that has contributed significantly to the development of the IT sector in Egypt. ITI aims to blend theoretical knowledge with professional experience and emphasizes personalized approach to training.

Information Technology Institute is considered a pioneer in the field of IT training, the internal structure of ITI is quite significant to suite its nature of IT training and to cope with the continuous change in the local and international IT market in Egypt, as it mainly contains three main programs; professional training specialized tracks and research & development Unit.

Professional training will be discussed in the following section as for the specialized tracks program is also one of the important programs in ITI as it works on spreading different training with various levels of course starting from basic courses to advanced one in addition to rewarding our students with ITI certificates. In addition to, research & development unit which mainly performs in-house development of software products that is to be used either domestically or by other business customers.

## 2. ITI PROFESSIONAL TRAINING PROGRAM

The professional training program was designed mainly for fresh graduates in different fields, especially IT, to provide them with training in state-of-the-art software technologies. The program offers advanced training for distinguished university graduates through nine platforms; System Engineering (System Development, UNIX, Java), GIS, Computer Networks, Multimedia, E-Commerce, VLSI and Mechatronics platforms.

Over the past 12 years, ITI has supplied the local, regional and international markets with more than 2500 highly-trained professionals in various IT domains, following a 9-months intensive training program. The institute is committed to maintain high quality IT training through encouraging students to strive for excellence in all activities. Those graduates make-up the backbone of the IT workforce in Egypt.

One major advantage is apparent in ITI, which is its flexibility in designing and implementing the content to meet the demands of the IT market and business community in the field.

### 2.1 Selection Process

ITI professional training candidates have to pass through a certain selection criteria, as only the best candidates we admitted to the ITI, to sustain the highest quality of ITI graduates. The process is mainly divided into three main Sections; the first section is concerned with

admission constraints, e.g. Having a minimum grade of good and to be a fresh graduate (doesn't exceed three years).

The second section is concerned with three written exams namely: IQ, aptitude and general knowledge that has to get minimum score 60% as for the last section, it mainly focuses on the English language (min TOEFL score: 500) and the personality.

## **2.2 Program Design**

The duration of the professional training is 9-months through which the trainee is involved with intensive courses to be provided with the state-of-the-art software technologies. The program design is illustrated in Figure 1 with its three modules namely;

### **The Foundation Module – Fundamentals**

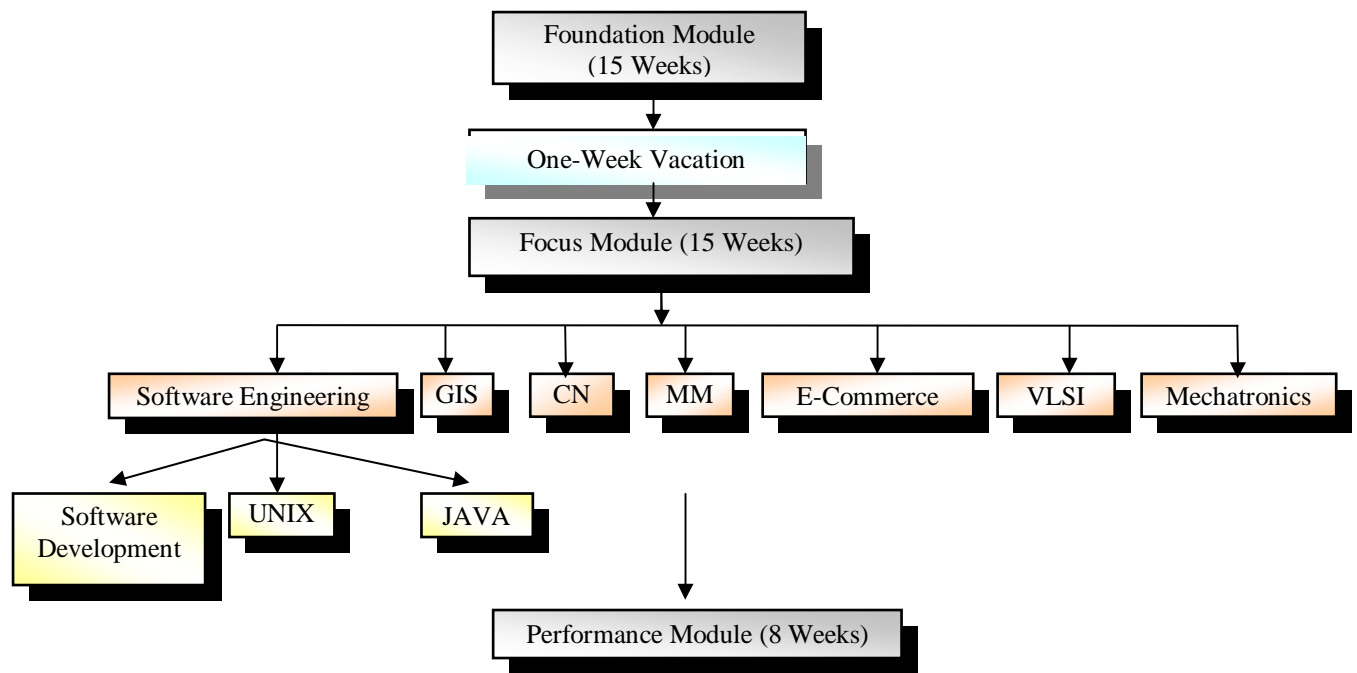
In the foundation module, students are taught theoretical courses to help them gain a solid background that will help him to jump into a further stage in the 9-months program. It introduces several courses concerning main concepts of fundamental computer skills such as; Data structures and algorithms, Fundamentals of database, object oriented programming, Computer networks, Operating systems, Software engineering, Problem solving techniques and Technical writing and presentation skills.

### **The Focus Module – Specialization**

The Focus Module branches into 9 distinct platforms, each with a unique set of training applications. Each platform has a few numbers of students to sustain the quality of the trainee and offer efficient training quality, the focus module in every platform is mainly composed of theoretical courses to introduce the concepts behind the technology in addition to some practical courses attached with their assignments.

### **The Performance Module – Project:**

Practical application of the information learnt through the focus module is achieved through supervised applied projects in selected areas of interest. The trainees develop a real case project (duration: 8 weeks) with a prospective client. In many cases, these projects were made use of their potential customers -government or private sector- and the projects were turned into full-scale commercial ones.



**Fig. 1** The Professional Training Program

### 3 GIS PLATFORM

Even though GIS has been introduced to the Arab world recently, the GIS industry is tremendously growing and is currently considered as one of the most potential fields from business perspective. This was the reason behind the growing need for professional GIS application developers and workers who can contribute positively and quickly to the demanding and emerging markets. To satisfy this need; ITI has introduced the GIS professional training since 1993.

Since then it had supplied the local, regional, and the international market with nearly 200 top quality GIS specialists over the past 12 years. The GIS curriculum (theoretical courses and S/W packages) is being updated periodically to meet the changing demands of the GIS market in addition to cope with the GIS tracks in international universities to be able to maintain the international quality.

To get the best out of the 9-months program, the GIS department accepts candidates of engineering backgrounds preferably from civil, urban planning and architecture as they have a suitable geographic and logical background in addition to their technical skills.

The design of the GIS platform has passed through several stages of enhancement and modification through the past twelve years; concerning the theoretical courses it has been modified from two main courses; GIS & Remote Sensing Basics to several theoretical courses

e.g. (GIS Basics, Spatial Data Modeling, Digital Photogrammetry, Remote Sensing and Surveying Techniques and mapping) spreading along the focus Module in order to implement GIS tools in parallel with the GIS Science.

As for the GIS Packages, they are updated annually with the latest version in addition to introducing new GIS packages according to the market needs. Some of the GIS packages introduced along the twelve years are; ArcGIS, ERDAS IMAGINE, Geomedia Professional, AutoDesk and Small world.

Moreover, several supporting courses have been introduced to the GIS Platform as complementary elements to GIS technology such as; web technologies, .Net, JAVA and Database.

The GIS Focus module introduces GIS theories and practical tools through six tracks shown in figure 2, each track introduces several course to provide the trainee with GIS concepts and technologies in organized steps, these sequential tracks are;

1. **GIS / Remote Sensing Fundamentals:** Introduces some theoretical courses such as GIS and remote sensing basics in addition to data modeling.
2. **Digital Mapping:** Covers surveying techniques and tools in addition to digital mapping cartography.
3. **Database & Programming Languages:** Provide the students with technical skills in using database tool and some programming languages specially Visual basic and Java programming basics.
4. **GIS Tools:** This track handles some GIS packages which deal with both Raster and Vector data through three main packages namely; Arc INFO, Geomedia Professional and ERDAS Imagine with their customization languages.
5. **GIS Web & Advanced Tools:** This track supplies the students with some complementary course to the GIS mainly; web package and XML. It also introduces some GIS extensions and in addition to GIS tools over the web.
6. **GIS Projects Management:** This track makes the student acquainted with some theoretical concepts about handling GIS projects in addition to some GIS applications. It also provides them with a tool that can easily present GIS output in an attractive way.

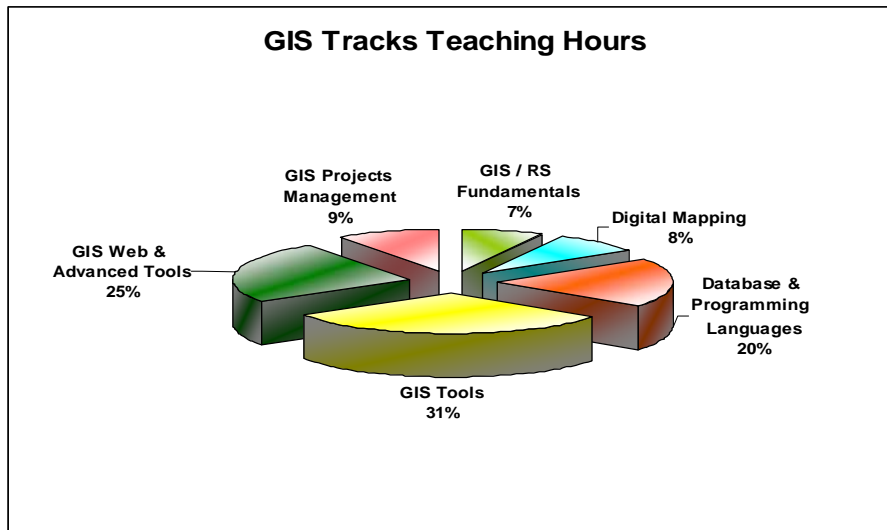


Fig. 2 the Distribution of the courses within the GIS platform

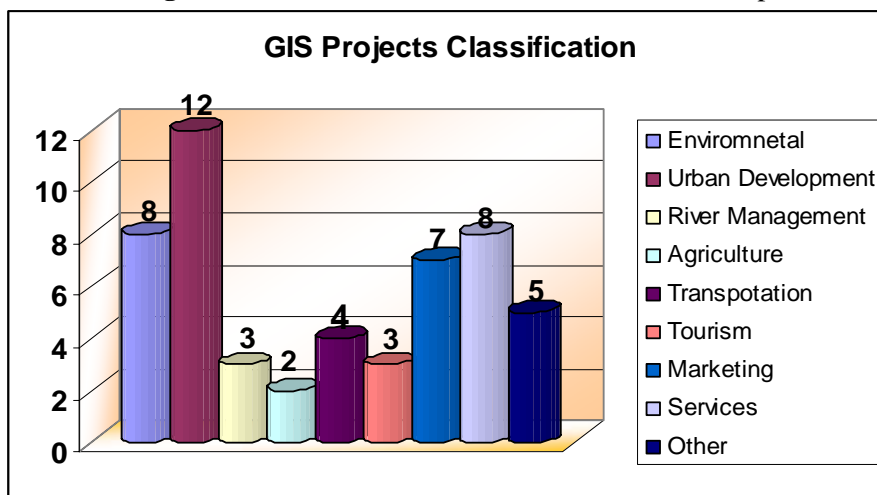


Fig. 3 the classification of GIS graduation projects in ITI.

After studying the GIS courses, the trainees develop a real case project, duration of eight weeks for a prospective client. In many cases, these projects were made use of their potential customers -government or private sector (e.g. Giza Atlas System, for the Giza Governorate).The GIS projects target several fields as urban development, management systems, environmental and agricultural applications, marketing and several other fields as illustrated in the figure 3 with their total numbers.

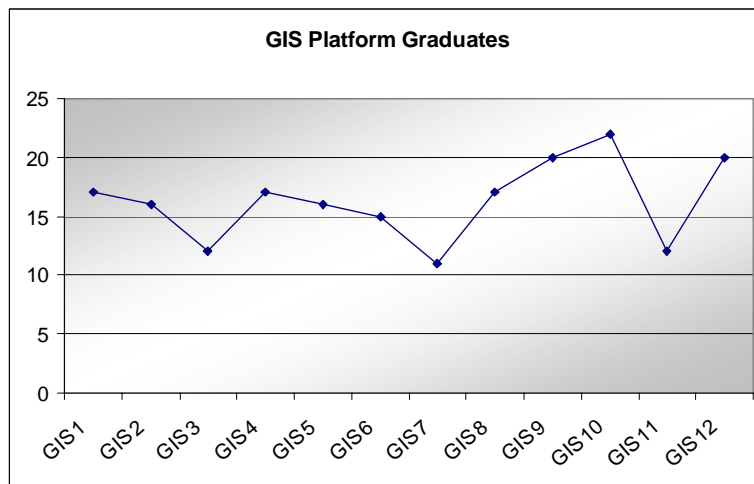
### Online GIS Courses

Beside the Instructor Led Training, ITI has published some tracks online to satisfy the applicants beyond the Institute's available resources; one of these programs was the GIS. Currently, the online GIS program consists of 4 main tracks to meet the needs of different levels of GIS domain contributors. These tracks are; GIS Fundamentals, Spatial Data Acquisition, GIS Analysis & Design, and GIS Applications.

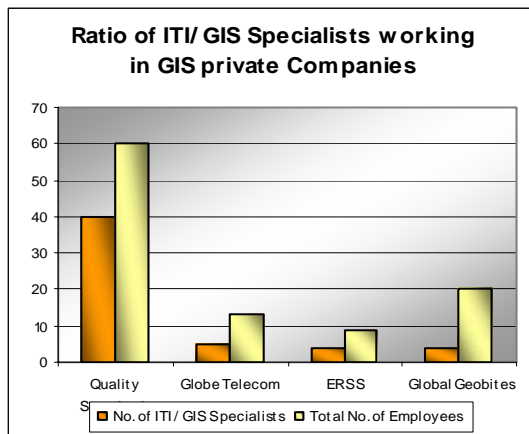
#### 4 GIS GRADUATES AND MARKET NEED

Until recently, ITI was the main supplier of GIS specialists in Egypt, figure 4 illustrates the number of GIS specialist graduated from the ITI over the past 12 years.

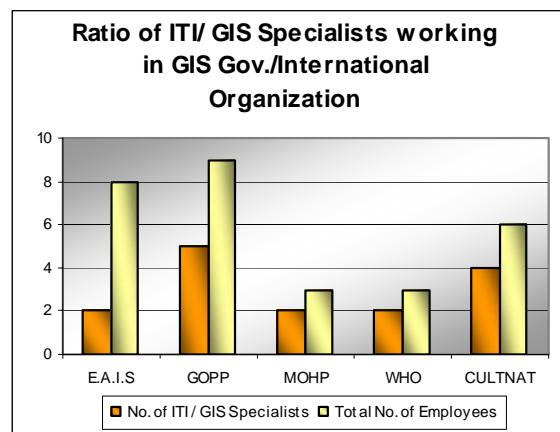
The GIS specialists graduated from the ITI make the main skeleton of the GIS professional market in Egypt; this can be easily shown by comparing the numbers of ITI graduates to other GIS specialists in different companies as shown in figure 5, the ratio of the GIS graduates to the total number of GIS specialists in these companies e.g. Quality Standards, Globe Telecom, ERSS and Global Geobites. The GIS graduates also represent a high ratio in the GIS governmental organization such as E.A.I.S, GOPP, MOHP and CULTNAT as shown in figure 6.



**Fig. 4** Number of GIS Graduates annually



**Fig. 5** Ratio of ITI/ GIS Specialists working in GIS private Companies



**Fig. 6** Ratio of ITI/ GIS Specialists working in GIS Governmental /International Organizations

About 41% of ITI graduates are working in GIS private companies as systems developers, 18% in GIS department in Governmental Organization developing a GIS system for them. The biggest 5 GIS Companies in Egypt, ITI graduates represent between 70% and 40% of their staff, and last but not least, ITI does not only supply the Egyptian market with GIS specialists but also feed the regional and international market such as; KSA, UAE, Kuwait and USA.

## **5 ACADEMIC LINKS WITH FOREIGN UNIVERSITIES**

ITI has always been at the forefront of international exposure. Throughout its operation, ITI has collaborated with a number of international Universities in the field of IT to provide its graduates with a master degree from the most significant international universities of which are: University of Nottingham (UK), University of Bergen (Norway), University of Paderborn (Germany), University of Sunderland (UK), University of Calgary (Canada).

ITI offers two Master degrees in the GIS field. ITI 9-months diploma is equalized to the preliminary stage to obtain the master degree from two international universities, namely; University of Nottingham and University of Calgary, the agreement with the former has been signed in 1998 after the postgraduate studies committee in Nottingham University accepted ITI graduates to continue their study for three months in the university to write-up the dissertation, ten GIS graduates have enrolled in the program and obtained a master degree in IT-GIS specialization. As for the department of geography in University of Calgary, the agreement was signed recently with the MGIS program to allow GIS graduates to enroll into the M.Sc. program in GIS and obtain a master degree in GIS after studying for one academic year in Canada.

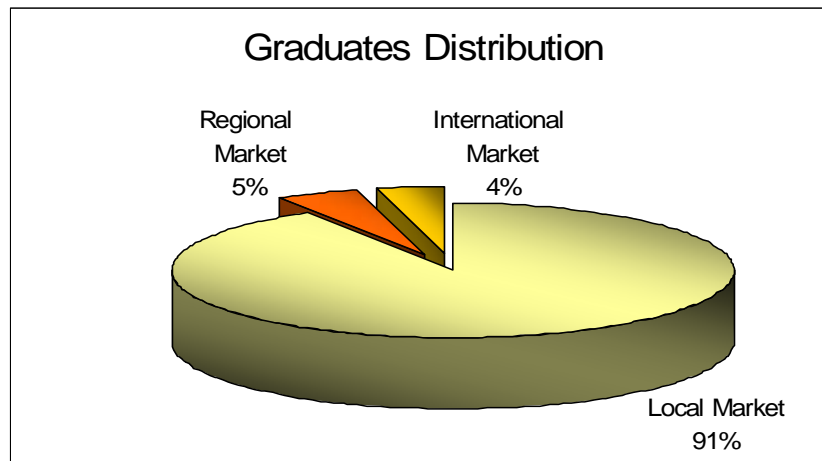
## **6 ITI CONTRIBUTION TO THE NATIONAL & REGIONAL IT INDUSTRY**

Since its establishment, ITI has contributed significantly in the national & regional IT Industry. Alongside its training activity, ITI has developed information systems, websites and various solutions for other parties. On many occasions those parties have been government organizations, and in many others they were private sector parties. Moreover, ITI has been awarded several international and local awards for its remarkable products and has participated in organizing several international and regional conferences. ITI contribution can be summarized in the following points:

### **6.1 Graduates**

Over the past 12 years, ITI has given the local and international Markets more than 2000 highly-trained professionals in different computer fields, each specializing in one of the ITI platform previously mentioned. Those graduates are spread all over the local, regional and international market as illustrated in Figure 7.





**Fig. 7** ITI Distinguished Fresh Graduates Placement

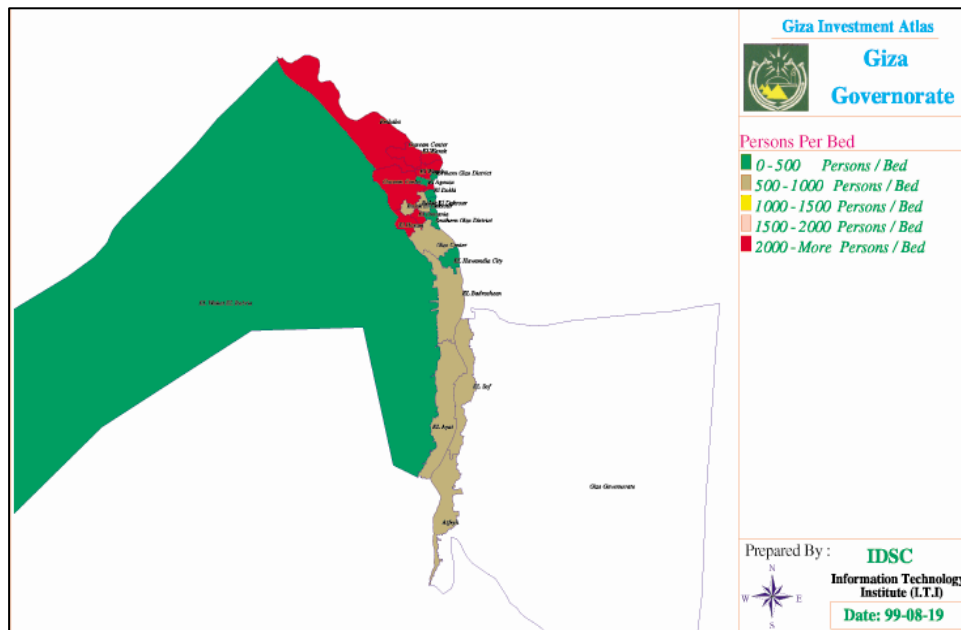
## 6.2 Projects

ITI has contributed significantly in developing different applications & websites in addition to various solutions for other parties, such as:

### “The Giza Investment Atlas” system

This system was built for the Governorate of Giza on a commercial scale. It serves as the main source of information for investors in the governorate. It provides a Geographic Information System and a Decision Support Tool that was developed using Arc/Info on a UNIX platform. The system is built upon a detailed map of Giza and a huge database, comprising more than 40 tables which include the data related to investment in the governorate. A directory of all industries in Giza is listed in the system, down to the detail of the individual plant; thus allowing them to be queried and viewed on the map.

The system also produces thematic maps, which reveal correlations between population and various economic facilities or economic indicators, including populations served by different facilities. Outputs include maps showing distribution of and indicators for: Tourism, Industry, Agriculture, Education and Health as shown in the report illustrated in figure 8.



**Fig. 8** A Report generated by the “Giza Investment Atlas” System

### “Powering A Cleaner World” system

This project introduces GIS to the field of developing new & renewable energies in Egypt to enlarge the usage of the resources of renewable energies in Sinai and demonstrate the efficiency of GIS in new frontiers. This System mainly performs the following functions:

- Choose best locations where projects can be built to electrify non-electrified regions & support the existing network.
- Maintenance Management System of Electric Network in Sharm El Sheikh.

The project also have a website which is concerned with supporting the decision making process within the error handling. This is performed by studying the distribution of the electrical boxes and service centers.



**Fig. 9** The interface of 'Powering a cleaner world' System

### 6.3 Conferences

In the previous years, ITI has organized several regional & International conferences in several IT fields namely;

- ITI 1<sup>st</sup> International Conference on "Information & Communication Technology".
- ITI 2<sup>nd</sup> International Conference on "Information & Communication Technology".
- Second Regional GIS Conference.
- ITI 5<sup>th</sup> Arab GIS Conference "Arab Map 2004".
- ITI International Digital Media Conference "DigiMedia 2005".
- "Egypt Till Year 3000".

### 7 RECOMMENDATIONS & FUTURE WORK

- GIS professional training must produce multiplier of current products but without any compromise on quality to accommodate the continuous demand of the market.
- Establishing post-grad research and degrees in GIS in collaboration with local Universities.
- Initiating a regional co-operation in the field of GIS professional training to exchange experiences between different countries.

## REFERENCES

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