GIS INTEGRATION AND EVOLUTION INTO THE ALBANIAN SYSTEM EDUCATION AND MARKET

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Abstract

This paper offers a general overview of GIS integration as a curricula and technology in the Albanian Education System. Basically it presents the evolution history of this technology, the development environment and the efforts of a closer approach to the state and private institutions. A detailed analysis will be performed between the growing market needs in Albania for GIS utilities and the handicap due to the lack of experts in geospatial technology. Results of a questionnaire survey in the university areas will be presented, where students expressed their approach to GIS technology. The need to build a complete chain of GIS curricula beginning from secondary school level up to graduate and master programs is necessary to be accomplished. Many problematic fields in Albania like flood management, population census, transport, urbanization, pollution, tourism, illegal constructions, professional orientation, etc. which are subjects of topic interest in many university courses require the use of GIS utilities. In this article it is discussed the position of GIS in the university system and the major efforts departments must carry out in increasing interaction between each other followed by a substantial intervention of the proper government institutions to the benefit of GIS development. "Albania in the age of internet" is the latest reform the government is implementing, with the scope of informing young people mainly in rural areas to develop ICT infrastructure basically in public schools and state offices, which will have a powerful impact in GIS developing technology in Albania.

Keywords: Gis, education, university, technology, department, curricula

Introduction

The role of higher education is to assist students in becoming effective thinkers with the knowledge and skills that will lead them toward becoming meaningful contributors to society [9]. Today, more and more schools are including GIS in their curricula to help their students gain valuable background knowledge and skills which they need to face global challenges. Three are the main reasons GIS has known a rapid development in Albania especially in the last years; education, internet and the growing market needs for geospatial data. For each of these categories we are going to present a full picture containing their weak and strong points.

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Meanwhile other countries had a faster approach to GIS technology, in Albania we found the first signs of GIS usage about eighteen years ago. The first institution that decided to embrace the implementation of a GIS system was the Science Geographic Academy of Albania in 1994, followed by the department of Geography near the University of Tirana in 1999 as a single course part of the undergraduate program. Even though at a slow pace GIS profile has evolved since then. Nowadays GIS is integrated as a single course in the undergraduate program in the Universities of Shkodra and Gjirokastra in the departments of Geography, Architecture and Urban Planning, Geodesy, Computer Sciences and Geology departments in the university of Tirana, but it still remains part of the undergraduate program.

Once again the department of Geography in Tirana advanced forward by integrating GIS subject as part of a graduate program at the Proffessional Master level. But we have to ask ourself: Is that enough? How come that besides the great potential this technology affords, the vast usage in some of the crucial sectors governments dispose, the known advantages in the education field in enforcing group collaboration, increasing students creatitvity and interactivity, offering methodologies in gathering, analyzing and outputting data, coming to concrete results and conclusions, building complex reports and diagrams in a short time period, helping decision-making and understanding situations, enlarging human knowledge in an upper level, institutions in Albania are still doubtful in approaching this technology. Today more than ever Albania is facing specific circumstances that require GIS implementation in finding solutions and also helping decision-making.

Gis Education In Albania

Geographic Information Systems in higher education provide an integrated solution to assist faculties and students with their educational goals. The advance of GIS has opened up millions of employment opportunities. More than 3,000 colleges and universities have developed excellent courses and certificate and degree programs in GIS [10]. GIS has a vast extent starting from government level down to municipality or commune. In the state universities of Albania GIS is introduced only as a single general course called Geographical Information Systems, including this way a compressed program that many times results to be inadequate to be acquired by students. The main reason of this phenomenon is the fact that GIS is developed only at a single level in the Albanian Education Institutions which is the state university. The lack of the subject development at the secondary school level is the primary reason of such a handicap. The major problem is the lack of geospatial information.

In Albania only few institutions have operational GIS databases. We are facing the fact that mostly of geographic data is owned by private agencies for their personal needs, using inconsistent data which is mostly not updated. Inadequate development of geospatial technology is also closely connected with the evolution of computer science. In 2009, as reported in Figure 1, among 9478 students graduated in public universities, only 171 belonged to computer science profile [5].
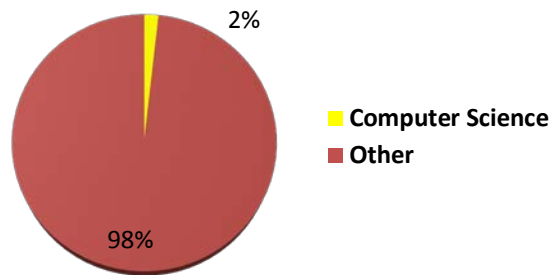
Figure 1: Computer Science attendance toward (compared) other fields

Still, it remains determinant the increasing role the government is playing through substantial reforms which aim to develop internet utilities in a large scale environment in Albania. The results are optimistic, during the last two years in the department of Informatic in the University of Tirana the number of students applying for computer science increased from 70 to 500 students.

Departments can and should integrate into their annual programs GIS course. The stimulation point can be succeeded by orienting GIS utilities into the current problematic situations. Departments can find it easier te embrace geospatial technology as a solution possibility to their barriers. Biology department can benefit from GIS by studying the degradation process the lake of Shkoder is facing day after day, accompanied by radical changes in vegetation and animal life. Geography department can better approach analysis to flood management in the districts of Shkoder and Lezha. Inundations have become endemic to the region, causing huge economic and social damages [8]. On the other side transport problems, pollution, illegal construction, minerary, deforestation, urbanization, population census are only a few of the many topics that can use GIS as an analytical tool in their specific scientific discipline by the respective departments in the Albanian Universities.

Dealing with geospatial data is strictly connected with terrain practice. This way we can develop students concept and knowledge about GIS structure and give a sense to their theoretical conceptions. Unfortunately we have not reached this stage, which remarks us (*specialists of the field*) the essential task of digitizing the Albanian territory with updated geospatial information [1]. First of all this process needs the government enrollment which must be the primary support in fulfilling this mission basically by covering finanacial, logistic and technical aspect. Second it is important the collaboration between universities and private agencies offering their field experts. Actually laboratory practices are limited up to *data manipulation* and not *data creation*. Which means that we do not have the proper conditions to accomplish a full map process including data collection, data processing and output. Another problematic situation students have to face is the lack of teaching materials. Actually there are only a few books translated into Albanian language that address topics connected to GIS. These books contain basic GIS principles, technical and management issues, remote sensing, digital mapping.

A set of surveys, as shown in Figure 2 and 3, involving 1000 students were made. The outcome of this surveys intended to define the relation between their approach toward GIS as a concept and GIS utilities.
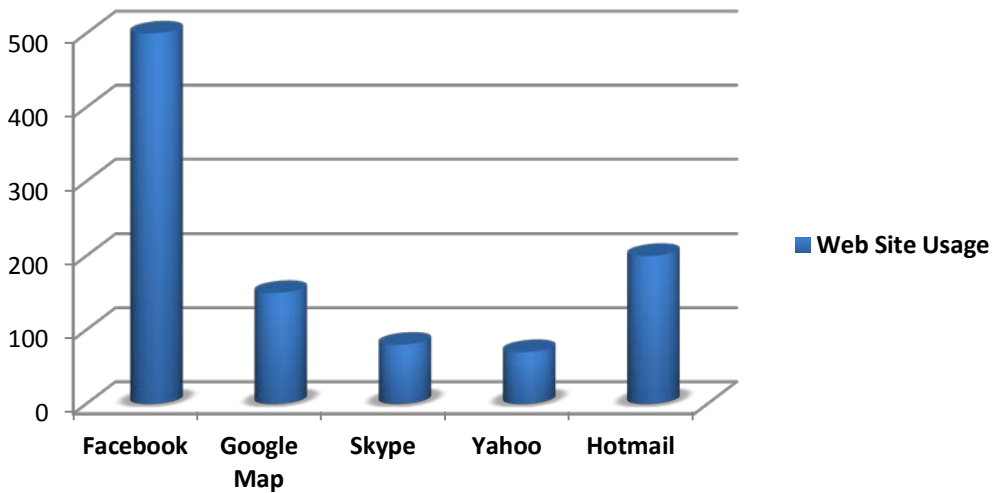

Figure 2: Results of approach toward Web Pages based on GIS Software

The results were very interesting. In the first survey students were asked to mention three of their most used web sites. The top five were ranked. Interestingly "Google Map" is among these web sites. Which means that students are looking forward to interact with dynamic maps and not just navigate in the internet. Also these students where asked about their knowledge of the term GIS. From the results we see that 87% of them didn't know what GIS meant, 11% were familiar to the concept and only 2% of them had the chance to use GIS utilities. This is a meaningful contrast to the fact that students use GIS applications like Google Map, Google Earth, etc but are not aware of the concept of dynamic maps.
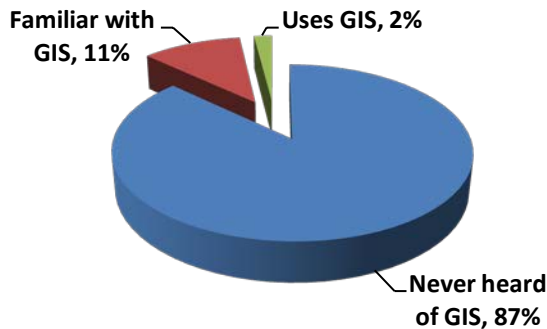

Figure 3: GIS integration into the University Environment

According to statistics it results that among many annual conferences that take place in Albania none of them refers to Geographic Information Systems as a primary field or topic to relay on. This induce the necessity of paying greater attention by the departments

in introducing step by step GIS as a modern and undisputed technology. Gradually it is neccesary to start from several national conferences followed by international ones. Also another issue is the fact that students prefer to avoid GIS profile subjects as a possible theme during their master thesis (*either professional or scientific*) defending. So far no such thesis has been deposited near the departments archive. This is another delicate point which requires the intervention of the Ministry of Education (MASH).

Gis Exploitation Environment

The Albanian population and Housing census held in October 2011 after ten years from the last one (2001) is another determinant factor in evolving geospatial technology. The overall objective of the project is to contribute to the strengthening of the Albanian statistical system. In Albania the need for a census is perhaps greater than anywhere else, and the extracted information will be of great importance to many departments subjects like geography, statistic, history, engineering, politic, etc. It will have an immediate effect on policies, but it will also provide material for further profound studies. GIS is the perfect platform to hold, manage and analyze all the data, also to produce important diagrams and reports reflecting the geographical distribution of the population in Albania in the recent years. According to statistics it is thought that during January 2011 Albanian finally passed from a rural to urban country. There is also an important evolution in fertility, since on average families nowdays have fewer children than before. The profound changes in the health system also have had its effects on the age distribution. The outcome of the census will answer many important questions on various issues. This way GIS turns out to be the perfect tool that will finally integrate these data into dynamic maps which with allow us not only make parallelisms between periods but also produce better results in comparison to the previous used softwares like Excel, etc.

After flood inundation in Shkoder during 2010, 2011 from the World Bank has been granted a fund of €50.000 for the construction of the laboratory of researches for natural hazards management which will be administrated by the department of Geography in the University of Shkoder. The scope of the laboratory is intended not only for research, acquisition, integration, management, analysis and presentation of spatial data but also to provide for the students suitable conditions for developing their theoretical and practical background on advanced GIS technologies. This is the first project to be initiated under the survey of an academic institution for an important issue such as flood rather than any government unit. This trend aims to be a future incentive for other departments to create a parallel operating level system with those supervised by the ministery. On the other hand it puts in evidence the need for re-training teachers to integrate their concepts and technology into the spatial decision process.

Gis Market In Albania

In Albania, as shown in Figure 4, there are 38 private universities and 11 state universities which make a total of 49 universities for a population of 3.2 million. According to statistics [5] for the last 10 years more than 65 thousand students graduated but only 16 thousand could get employed. This category tend to manage mainly through small private business activities in a competitive environment

which requires high qualification and effective performance in retreiving valuable information from the sorrounding area, save traces of where customers or other competitive businesses are distributed, plan a marketing campaign, optimize sales territory, etc. Due to this situation GIS course turns out to be a sustainable support to their background knowledges which will lead them to a successful performance.

GIS allows interactivity, querying, makes us understand better and evaluate the data by creating graphical presentation through information derived from databases [1]. The economic crisis that has affected the world in recent years has made it possible for many organizations to restructure their operating practices. Many of these businesses are aware of finding new ways to develop their activities, primarily through internal sources. Now is the time to invest in geographic information systems, a solution that has helped many organizations to overcome their operational challeng es and increase profits.
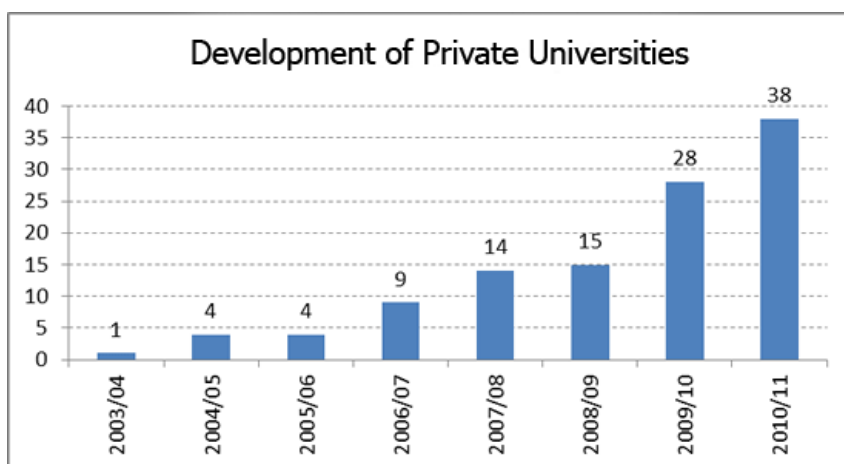

Figure 4: Private University development (2003-2011) Source: INSTAT

According to statistics only in private universities we find 229 curriculas included into different levels of programs like Bachelor, Master of Science or Proffesional Master. The contrast in this scenario is that during the last five years the number of private universities in Albania has almost decuplicated but none of them offers a GIS course.

Many of the Albanian private universities have close connections with homologue Europian Universities including student professional exchange, mutual experience exchange, revealing a clear tendency in strictly approaching their way of management and administration of the study process. Despite everything it is clearly visible their policy consists in avoiding geoscience subjects. Regardless their vision they stand as business institutions which try to find the best products to offer to the market. Being the first to understand the major market needs, private institutions insist in neglecting GIS potential

in the Albanian mart. They focus on social and economic curriculas which actually are easier to integrate and adopt rather than hazard to involve students into a course that still suffers from government indifference in launching this "product" on the market and at the same time simulate private companies in embracing the idea of GIS position.

This scenario reflects their pessimistic point of view according to GIS technology. Their choice not to introduce GIS into their curricula makes us believe that although GIS usage in Albania has evolved and has found more space in the Albanian market than before, private university boards are still doubtful of its real capabilities and potential.

Up to now Albanian market has been handled from a range of people that have been a kind of "forced-adopted" experts in environment conditions who suffered from the lack of real geo-informatic experts. That's why very often geospatial tasks have been performed from geographers who had little informatic knowledge or vice-versa from technic informaticians who held the responsibility to manipulate and manage geographic information, producing a range of non-professional results.

Nowadays the market in Albania is eager in finding new human resources specialised in geospatial information management which can help them solve many important issues getting away from simple techniques used lately. The Digital Albania program is one of the many future projects that require GIS experts. State institutions like the prefecture, municipality, commune, private organizations and many other NPO's are more than ever aware about the great importance of dynamic maping and satellite imageries, followed by the integration of these concepts and technology into the spatial decision making processes in the country.

Especially last years Albanian institutions faced a vigorous interaction with Europian agencies. Many funds have been granted with the scope of developing research projects towards problematics affecting Albania. Many of these projects need accurate data of the territory mainly geospatial information. This leads to an increasing demand for dynamic maps and as a result of GIS utilities.

Internet Evolution

The evolution of GIS in Albanian has been strictly connected to the evolution of Internet. The number of Internet users is an important indicator because it reflects the spread of information technology in one place, and information exchange globally [1]. Actually Albanian government is following a strong policy named "Albania in the age of the internet", which aims to push Albania among the countries with the highest internet usage in Europe. This has caused an immediate affect not only in the extend of internet distribution but also in laboratory equipments. Internet conditions as speed, availability, price and professionalism had a great improvement. Also almost all secondary schools have been equipped with new laboratories. This has caused a closer approach to the internet as far as the students are concerned, and online softwares like "Google Earth", "Google Map", or Esri applications which only a couple of

years ago were unknown for many people, now have turned familiar, easy to use and manage.

The World Economic Forum (WEF) has published a global report according to which Albania has improved its global ranking of The Networked Readiness Index 2012 by 19 places within a year positioning itself in the 68-th place gaining the right ta be part among the ten most improved countries in the NRI. This index has been calculated based on four primary sub-indexes which are: the regulatory-politic for the information technology, improvement of digital infrastructure; management of e-skills and services; using information technology by the population, biznes or government units; social and economic impact.

Technology primary sub-index sectors (Comparative level 2011-2012)	Rank Increase
Political and regulatory environment for the information technology, infrastructure	13
Management of e-skills and services	24
Using information technology by the population, biznes or government units	17
Social and economic impact of the technology	18

Figure 5: Technology profile sectors, increase position, (2011-2012)Source: World Economic Forum: Albania

The Internet and Communication Technology sector is rapidly expanding in Albania because it is both a stand-alone sector as well as a cross-cutting enabling technology for other industries [11]. Basically we have the neccesary tools to aim at developing GIS image in the market and institutional levels. Another element of minor impact in the development of GIS technology is the integration of GPS systems through a law recently approved in Albania by which the custom duties for cars has been removed. This way the percentage of imported cars produced recent years has increased rapidly, most of these cars have GPS systems included.

Conclusions

Due to many indicative factors in the past geospatial technology missed the evolution backbone in Albania. The integration process walked through small steps which didn't show to be determinant. The set of surveys show that the environment is ready for approaching this technology. Conditions are already mature, the increasing role the government is playing through substantial reforms toward internet extension, the vast expansion of educative institutions like private universities followed by the growing market needs for geospatial data and experts, creates the perfect circumstances for a sustainable GIS development.

On the other hand the primary role in the integration process must be played by public universities. A series of steps need to be taken, beginning from a deeper interest from MASH in giving the right priority by increasing universities funds in building modern GIS laboratory, which is the backbone to start every GIS project in the future. By doing

this universities have the obligation to increase collaboration between each other for the benefit of GIS development. It is necessary to build a continuos chain of GIS curriculum programs starting from secondary school, followed by several courses during undergraduate and especially graduate programs, ending with a closer approach of the students side during their thesis defending. To achieve a full education process a final step must be taken, including these students in training programms near GIS departments in countries with more experience in the field. Only by accomplishing this cicle we will be able to set the knowledge of these students into a higher level and make them able to build the future platform of Albanian GIS experts.

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