

UNIVERSITY - COMPANY COOPERATION IN THE CONTEXT OF THE GEODESY AND CARTOGRAPHY DEVELOPMENT

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Abstract

This article presents aspects of the cooperation between university and the company, on the example of Polish technical universities, which educate students, in the field of geodesy and cartography (among many others). Nowadays scientific development is one of the most important elements affecting the economy of the country. This involves continuous contact between the two parties, the business community and the scientific societies. Thanks to such cooperation, highly valued commercialized products, which goes to the customer, are formed. With many programs, enabling the financing of the consortia between these parties, the significant increase of undertaken cooperation between industry and universities is noticed. The article describes examples relating not only to joint scientific and development research, the issues of student internships in companies outside were also discussed, for both the practice in the home country and in other European countries. Graduate knowledge should not be based solely on the experience gained in the theoretical classes (lectures) and practical (exercises, laboratories, projects) elements, the student should also inquire the knowledge and skills outside their own university and find out what problems he may encounter at professional work. Contact between the academic staff and representatives of the industry should be carried out continuously. Despite the research conducted at the university, guided educational policy should be adapted to the requirements of employers to students (Engineers and Master of technical sciences).

Keywords: Student internships, scientific internships, research, geodesy, photogrammetry, remote sensing.

1 INTRODUCTION

Geodesy is the science dedicated to fixing of the size and shape of Earth, and determining the position of points on its surface. Some of the divisions geodesy on subareas distinguished (with examples of publications): engineering-industrial surveying (Szulwic and Ziolkowski 2016), photogrammetry (Paszotta et al. 2015; Burdziakowski & Szulwic 2016; Burdziakowski et al. 2016; Janowski et al. 2016) and remote sensing (Bobkowska 2016; Bobkowska et al. 2015, 2016b), economic geodesy (Belitz & Lejpras 2016;

Lejpras 2014), satellite geodesy (Nowak 2015), physical and gravimetry surveying, cartography, adjustment computations (Filipiak-Kowszyk & Kamiński 2016a,b; Daliga et al. 2016), astronomical geodesy, topography.

The awareness of academic staff members on the need for communication between the sectors of industry and education grows. There are new units and positions in order to maintain constant contact and cooperation between these two sectors. In the case of geodesy, typical methods used by professionals in this field are used in completely new branches of where it has not been used. This phenomenon is becoming more common. Such interdisciplinary and multidisciplinary allow the development of not only the geodesy and its individual specialty, but also allow the development of other fields of science and industry.

2 USE GEODETIC METHODS FOR NEEDS OF OTHER AREAS

Today, research by combining knowledge from different fields have become extremely successful. It is precisely this type of analysis excel in many development and application projects. An example of multidisciplinary analysis, using the method of geodesy, in particular photogrammetry and remote sensing, are research carried out for applications in medicine, psychology, and biometrics. This is confirmed by articles elaborated in several Polish scientific centers. Specialists in the field of geodesy and psychology work together on a remote method of analysis emotions (Blazek et al. 2014a,b). Apart from the analysis of facial images taken using a custom recording speed, the team analyzes the face image acquired by other techniques, for the purpose of biometrics (Bobkowska et al. 2016a,b). A sample material was collected through specialized optical scanners.

Another quite typical example of interdisciplinary approach is the use of engineering geodesy the needs of all building-construction works (Filipiak-Kowszyk et al. 2016; Kamiński et al. 2015; Miśkiewicz et al. 2016; Chróścielewski et al. 2014; Kedzierski & Delis 2016). Surveying is often associated with construction. And thanks to new technologies used in surveying instruments, the development of less expensive during the measurement methods is very dynamic. One method frequently used in recent times is laser scanning, which significantly speeds up the measurement, eg. railway areas (Makowska & Strach 2016; Mikrut et al. 2016). This measurement method is developed and widely used in civil engineering. For example, for the analysis of concrete (Nagrodzka-Godycka et al. 2014, 2016) or other building materials (Suchocki & Katzer 2016).

3 DIRECTION OF THE EDUCATION STUDENTS AND UNIVERSITY-INDUSTRY COOPERATION

One of the tasks of research and teaching is to educate graduates. Considering the Poland, every year colleges educate a large number of potential surveyors. This number from year to year is growing (Fig.1). The requirements that are placed by employers in relation to young professionals, is one of the key aspects to be taken into account by universities during the laying of the study program. Already at this stage, cooperation between the company-potential employer and the university should be fixed. On the example of Poland, other requirements may be placed on the south of the country, where the mining industry is dominant and the other in the north, where the maritime industry is growing (Burdziakowski et al. 2015; Stateczny et al. 2015; Janowski et al. 2015; Włodarczyk-Sielicka & Stateczny 2016; Szulwic et al. 2016, Rapiński & Janowski 2016; Przyborski 2016). Considering the such a division, not only Specialization program for the field of study is shaped individually, but also research at universities are often conditioned by the type of industry, which is run in a specific region.

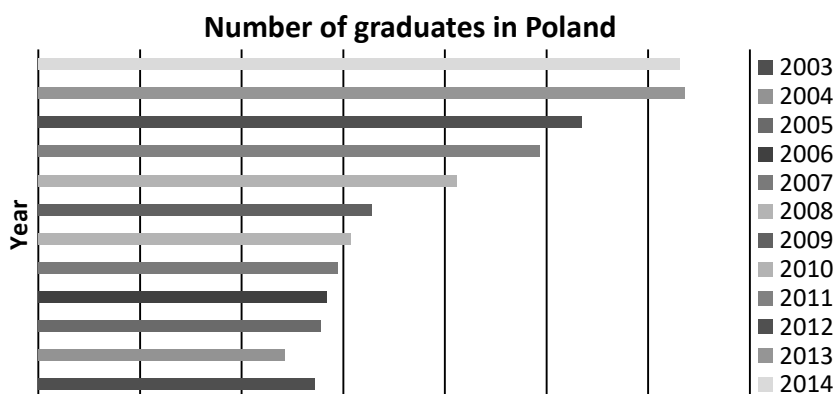


Fig. 1 Graduates of geodesy in Poland [<http://www.gugik.gov.pl>]

4 PRACTICAL KNOWLEDGE

Besides the education of students in the classroom teaching, such as lectures where they can acquire theoretical knowledge, important parts of the teaching are practical classes, such as classes, laboratories and projects (Hejmanowska et al. 2015; Janowski et al. 2014a,b; Daliga et al. 2015). Despite the many hours devoted to practical classes, student is not sufficiently prepared to professional work. Therefore, the study program provides for mandatory student internships, that deliver benefits for all parties - the student who recognizes profession, the university - which seeks to adapt the educational program to the needs of employers, employers - who recognizes the knowledge and skills student at a given stage of his teaching. It happens that students establish permanent cooperation with a company in which they apprenticeship or internship, which may result in an interesting scientific and professional work (Bernat 2014; Laskowski & Szulwic 2014).

5 RESEARCH

As I mentioned earlier, the type of industry in the region of the university affects on the subject of research. On the other hand this is no limit to research topics. Most of the funding opportunities appreciates the cooperation between the centers which are distant from each other. International consortia, which include companies and research centers from different parts of the world are highly valued, and even in some competitions required. Thanks to such international cooperation conducted the study, whose results may be of interest for a wide range of people. Another aspect of cooperation with external companies is the use of their services. It is quite an interesting form of cooperation. The organization of demonstration workshops regarding specialized equipment has many benefits in the form of ideas for new topics works and research projects. Often, these workshops are the first step in the establishment of permanent cooperation. Often companies make it possible to collect research material, during the workshop. Such material can be used to further scientific research or teaching (Bobkowska et al. 2016a,c).

6 SUMMARY

Presented possibilities for cooperation at various levels show that really scientific institutions educating in the field of geodesy are strongly associated with the industry, in the context of teaching and research. It is through collaboration and constant contacts, ideas are formed and their implementations enable the development of the economy. The field of geodesy and cartography is dominated by small and medium companies they usually do not have research and development offices, so the scientific development depends on the good collaboration between company and scientific institution. Geodesy has enormous power, geo-informatics, remote sensing and photogrammetry are the most dynamic fields many of other scientific and technology fields depends on their developments. The strong cooperation between university and company is in our opinion the key to build the strong economy and wellness of the country.

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