

What is Our Strategy to Perform a Sustainable Development in Education and Research Activities of Our Department?

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Key words: Education, Yildiz Technical University, Department of Geodesy and Photogrammetry Engineering, Strategic Planning

SUMMARY

By the motivation of Civil Engineering Faculty and the department's members, in 2005, Department of Geodesy and Photogrammetry Engineering of Yildiz Technical University (YTU) accelerated the works on developing its education activities for questioning itself to keep up with modern technologies and new-age tendencies in education of Geodesy and Photogrammetry Engineering. In order to organize the works, thirteen commissions were established under the umbrella of Sustainable Quality Education System (SQUES) in our department. One of those commissions is Strategic Planning Commission (SPC) which aims simply to draw the ways in order to develop education and research activities as well as cooperation with stakeholders and to increase the efficiency of the department's place among the others. This study gives a look through the current status of the department concerning education and research activities as a self-study and summarizes the preliminary strategic plan prepared for answering the question about what we should do to reach the objectives in the frame of sustainable development.

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1. INTRODUCTION

Quality defines the inherent or distinctive characteristics or properties of an organization, production, person or other. Such properties may set an organization as well as its production or services apart from the others, or may denote some degree of achievement or excellence on the works by the organization. In this context, the quality definition by ISO 9000 completes the idea for which the Department of Geodesy and Photogrammetry Engineering (DGPE) accelerated the works; “degree to which a set of inherent characteristics fulfills the requirements”. Although the department has been aiming to ensure the requirements in Turkey and follow the new developments in education and engineering areas since it was established in 1949, the well-organized work for the quality education implemented last year with the system which we call Sustainable Quality Education System (SQUES).

“What did trigger off us to be a piece of such a system last year?” The predefined vision of the DGPE gives a hint about the question; *“Being a department which can compete internationally in education and research areas and make a contribution to the development of our country as well as being a leader in Turkey”*. But, the real motivation source was the increasing demand by the academic members of DGPE and the executive board of Faculty of Civil Engineering in order to reach “high-quality” more than “being measured for a degree”. Considering this philosophy, the SQUES mainly focuses on the ways for improving the education activities at the DGPE with all essential parameters. They have been realized by one executive and 12 other commissions whose responsibilities vary from active learning methods to the relationships with stakeholders and from engineering ethics to the strategic planning. No matter the implementation of the system is a year old, a great effort was done by each commissions and one can feel easily the influence the quality understanding on all parts of the department today. However, there are many things to do.

An organization’s long-term existence and quality depend on drawing the line meeting the past and future of the organization. This means, “a strategy” is needed for reaching the quality. Therefore, one of the important parameters of the SQUES is the strategic planning of the department. Strategic planning shows the ways to identify and to move toward to desired future states and it consists of the process of developing and implementing the plans to reach the goals (Aksu, 2002; Harris and Ognabba, 2006; Mintzberg, 1994). In order to define the ways, Strategic Planning Commission (SPC) of the DGPE prepared a strategic plan which outlines basically; (1) current situation of the department, (2) statistical information about the department, (3) Strengths, Weaknesses, Opportunities, Threats (SWOT), (4) strategic goals, (5) ways to reach the goals. This paper focuses on the preliminary strategic plan prepared to

perform a sustainable development in education and research activities in the department as an important part of the SQUES.

There are many approaches, perspectives and models used in strategic planning. Some of the models for strategic planning are goals-based, issues-based, organic and scenario ([URL 3]). The department's strategic plan was prepared according to the goals-based model which is probably the most common one. The paper first gives a look through the DGPE in section 2. Some statistical information about the department is given in section 3. Section 4 presents the SWOT of the department and strategic goals as well as the ways to reach them under the heading of strategy works in the department; section 5 concludes the paper.

2. AN OVERVIEW TO THE DEPARTMENT

The department has the longest history concerning “geodesy and surveying” education in a university in Turkey; it was established at the current main campus in Istanbul in 1949. The first name of the department was “Harita ve Kadastro” (Map and Cadastre) and had the aim to train the engineers for the renewal projects, cadastral and survey works for the developing Republic of Turkey. Then it was renamed as “Department of Geodesy and Photogrammetry Engineering (DGPE)” and reorganized in 1980 to keep up with its contemporaries and to respond to the necessities of the country. For the duration between 1952 and 2003, the number of graduates from DGPE is 4099 which means about half of the total number of Geodesy and Photogrammetry Engineers in Turkey (Serbetci, 2002). Besides this, more than 450 students graduated from Master of Science and PhD programs of DGPE until today.

DGPE is currently one of the three engineering departments of Faculty of Civil Engineering and consists of 5 different divisions;

- (1) Geodesy Division,
- (2) Photogrammetry Division,
- (3) Surveying Division,
- (4) Land Administration Division,
- (5) Cartography Division,

and 60 academic members for 2006.

In addition to the two undergraduate engineering programs for 4 years in the department, there are two programs more for graduates who want to get a master of science or Ph.D. degrees on (1) Geomatics and (2) Remote Sensing and GIS (see Fig. 1 for the place of the department in the organizational structure of YTU). The master of science program is for 2 years while the Ph.D. program is for 4 years under the administration of YTU Science Institute. The number of registered undergraduates and students for master of science and PhD for 2006 is 1030 and 120 respectively. For undergraduate program, there are 58 lectures (182 hours) in 8 semesters, and for graduate programs, there are 35 lectures in Geomatics program and 32 lectures in Remote Sensing and GIS program (see [URL 1] for the courses’

plans and ECTS credits of the lectures at the department). Moreover, for the undergraduates and graduates of master of science, two semester English course is obligatory if they have no proficiency for English.

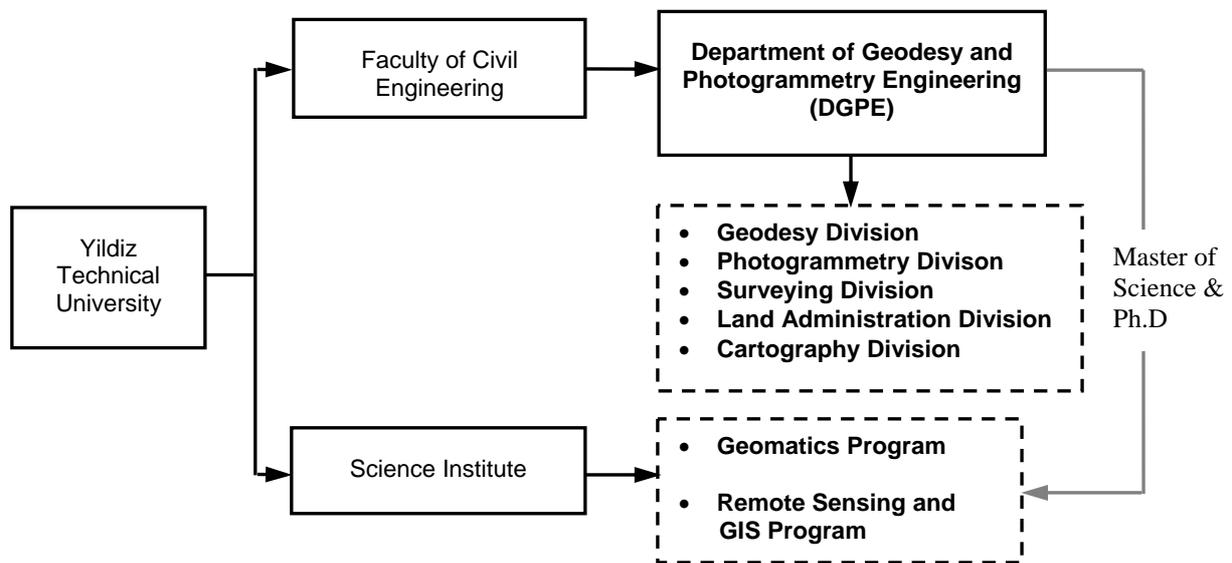


Fig. 1: The place of DGPE in organizational structure of YTU

3. SOME STATISTICAL INFORMATION ABOUT THE DEPARTMENT

This section gives the statistical information about DGPE in 3 subsections; (1) statistics about academic life (2) statistics about students, (3) statistics about infrastructure; offices, classrooms, laboratories etc.

3.1 Statistics About Academic Life

Academic permanent staff for 2006 consists of 12 professors, 4 associate professors, 11 assistant professors, 4 doctor-assistants, 28 research assistants and 1 specialist. Their distribution by division is given in Table 1. Comparing the number with the total number of 38 in 1998, we see that expansion rate is 58% related to 1998.

The lectures of the department are given by the professors (including associate and assistant professors). As can be seen from Table 1, 45% of the academic staff is professor and remain is research assistants. The weekly hours of the lectures given in the first and second semesters of a year by the five divisions are presented in Fig.2. The figure include both theoretic and application hours, and the hours of different groups for a corresponding lecture. According to the Fig. 2, surveying lectures in the department outweigh compared the others; photogrammetry and geodesy lectures' hours are almost the same; both land administration and cartography lectures have the least weekly hours at the department.

Table 1: Number of academic members at the divisions of the DGPE for 2006

	I	II	III	IV	V	Total
Professor	4	4	2	1	1	12
Assoc. Professor	–	1	2	1	–	4
Assist. Professor	3	3	4	–	1	11
Doctor Assist.	1	2	–	–	1	4
Research Assist.	4	8	9	4	3	28
Specialist	–	1	–	–	–	1
Total	12	19	17	6	6	60

I: Geodesy, II: Photogrammetry, III: Surveying, IV: Land Administration V: Cartography

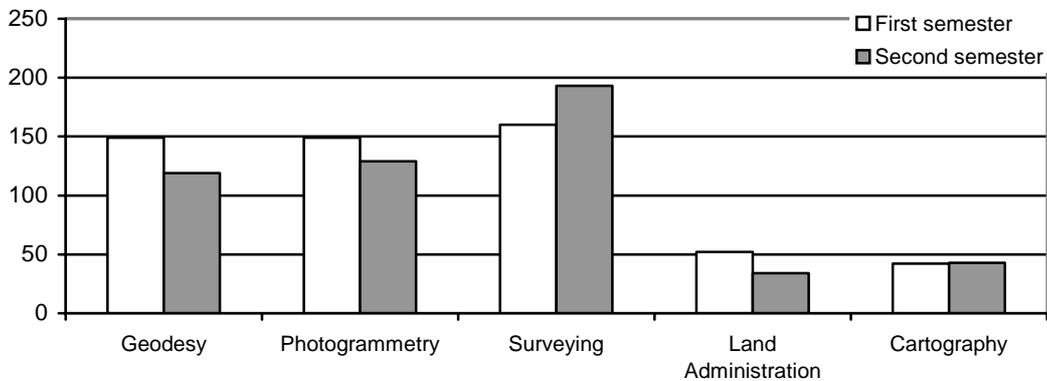


Fig. 2: The weekly hours of the lectures given at the DGPE for two semesters by the division's professors

An important indicator of an academic life and research activities of a university's department is the publications. The number of the publications by the members of the DGPE is given in Table 2. As can be seen from the table, the number of the articles increased after 2003. The number of publication per an academic member is 0.15 for international journal, 0.38 for international symposium, 0.13 for national journal and 0.32 for national symposium article in 2004-2005 academic year.

Moreover there exist 6 research projects which our academic members incorporate and/or manage in 2006. One of them is a TÜBİTAK (Scientific and Technological Research Council of Turkey) project, the others are the projects supported by YTU Research Project Fund.

Table 2: Number of publications by the academic members of the DGPE between 1999-2005

	1999	2000	2001	2002	2003	2004 *	Total
Int. Journal article	1	1	1	–	9	9	21
Int. Symposium article	9	10	22	23	4	23	91
National Journal article	6	7	7	–	6	8	34
National Symp. Article	7	8	8	4	17	19	63
Reviewed Books and Lecture Notes (in Turkish)	9	11	2	5	3	5	35
Total	32	37	40	32	39	64	244

* Includes 2004-2005 activities

3.2 Statistics About Students

The universities of Turkey accept the undergraduates for a corresponding department in accordance with their grades from a general university exam, so-called ÖSS. The grade includes both academic achievement in high school and the number of true answers in the exam. The departments broadcast their quotes in every year, and the ones passing the exam among about 1.5 million students apply for the departments via the official organization ÖSYM (Selection and Placement of Students in Higher Education Institutions in Turkey). One of the important criteria for the placement of the students is the rank of the departments. Simply, a department's rank shows the portion of the grades of the students selecting the department to the other students' grades. Table 3 compares the ranks and the quotes of the some Geodesy and Photogrammetry Departments at different universities in Turkey for 2004.

As can be seen from Table 3, the DGPE of YTU has the biggest quota and the second degree after the one of Istanbul Technical University. In other words, the students placed to Istanbul Technical University are more successful in the exam than the ones to YTU.

Table 3: Comparing some Geodesy and Photogrammetry Engineering Departments in Turkey according to their ranks and quotas

University	Rank (%)	Quota
Istanbul Technical University	13.67	50
Yildiz Technical University *	21.45	190
Karadeniz Technical University	29.88	70
Samsun On Dokuz Mayıs University Üniversitesi	31.24	35
Konya Selcuk University *	34.89	130
Zonguldak Karaelmas University	37.13	40

*) rank is the mean, quota is the sum for two undergraduate programs

The graduates from the DGPE of YTU constitute about the half of Geodesy and Photogrammetry Engineer community in Turkey. As we mentioned earlier, for 2003, the number of graduates from the department is 4099. Fig. 3 depicts the place of the graduates from the department among the ones from other universities in Turkey.

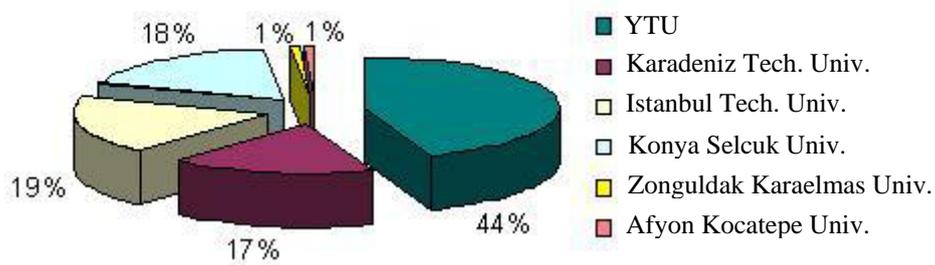


Fig. 3: The place of the graduates from DGPE among the other departments at different universities ([URL 2])

The number of students at the department in 2006 is 1030 for undergraduate and 120 for graduate programs. For some years, the numbers of students are given in Table 4.

Table 4: The number of students at the DGPE for some years

Year	Undergraduate Program	Graduate Program
1998	988	98
2000	1023	109
2002	1178	138
2004	1091	108
2006	1030	120

If we think about the number of students per an academic member in the department, the statistics follows, using the information in Table 1 and 4: $1030/60 = 17.2$ undergraduates and $120/60 = 2.0$ graduates per an academic member; $1030/27 = 38.1$ undergraduates per a professor and $1030/33 = 31.2$ undergraduates per an assistant. According to the preliminary report on “Strategy of Higher Education of Turkey” prepared by the Council of Higher Education of the Republic of Turkey (YÖK) in 2006-June, the mean rate for the number of students per a lecturer in technical sciences of Turkey is 31 while the mean rate for all sciences is 29. The rate of 38.1 at the DGPE is bigger than these mean rates. Moreover, according to the same report, this mean rate is under 10 in Austria, Belgium, the Netherlands and Germany.

In 2005, with ERASMUS program one student went to Darmstadt University of Technology. In 2006 and 2007, some students will go to the departments related to Geodesy and Photogrammetry Engineering in Bonn University, Hannover University, Liege University, Valencia University and Aalborg University.

3.3 Statistics About Infrastructure

There are 5 classrooms and 5 laboratories with the total spaces of 393 m² and 500 m² respectively in our department. Considering the number of students given in the previous section, the usage space for education per a student follows; $893 \text{ m}^2 / 1150 = 0.78 \text{ m}^2$. One laboratory serves for the PC requirements of the students. In this laboratory, there are 20 PCs. In other words, $20 \text{ PC} / 1150 = 0.02 \text{ PC}$ per a student. On the other side, in our university and in the department wireless internet service is usable for all registered students, officers and academic staff.

For the academic members, the total working space is about 300 m²; it means $300 / 60 = 5.0 \text{ m}^2$ working space remains for an academic member of the department.

4. STRATEGY WORKS AT THE DEPARTMENT

As we mentioned previously, the DGPE started to work on improving education activities with Sustainable Quality Education System (SQUES). The SQUES's parameters are implemented by the commissions whose members consist of the academic members of the DGPE. The commissions are shown in Fig. 4.

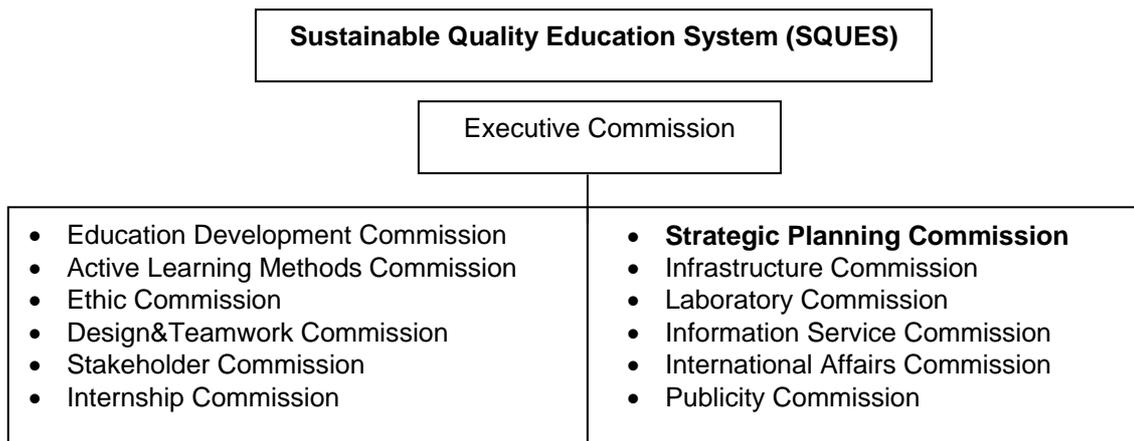


Fig. 4: The commissions of the department in the SQUES

One of the important commissions of the system is the Strategic Planning Commission (SPC) which aims to define the ways for improving education and research activities as well as collaboration with stakeholders and efficiency of the DGPE among the others. In order to achieve this, the SPC first revealed the current status of the department with some statistics, defined Strengths, Weaknesses, Opportunities, Threats (SWOT) and the ways to reach the aims. The SPC prepared a preliminary report in 2006-May and submitted it to the Executive Commission to be discussed on.

Before the strategies, it is helpful to look over first the mission and vision as well as the SWOT of the DGPE which illuminates the line meeting the current state and future states.

4.1 Mission and Vision of the DGPE

The mission of the department is defined with four items;

- Training the students such that they have the basic engineering discipline, they can solve the problems with the angles of science and engineering, they can produce information and can share them, they are respectful to the ethics of the profession, they have the talents on field works as well as such that they are creative, they can question the events and problems, they can collaborate, they are active in social and work life, they have talents on leadership.
- Considering scientific investigation, project, counselling and education system directed through the development of country important.
- Aiming to use the knowledge and production in the field of scientific investigation and education for the profit of the community.
- Developing the understanding for the collaboration in national and international areas.

The vision of the department is: “Being a department which can compete internationally in education and research areas and make a contribution to the development of our country as well as being a leader in Turkey”.

4.2 SWOT of the DGPE

Strengths: The DGPE has a long-established history. As a result of this, in Turkey, the department owns a big community of Geodesy and Photogrammetry Engineers (see, Fig. 3). Most of the professors studied and incorporated with the research groups in abroad universities (especially the ones in Germany); and they are experienced in education and research activities. Moreover, young researchers have been working in definite periods in abroad institutes with financial support of TÜBİTAK, DAAD program or the abroad countries’ scholarships; and they are in collaboration with the institutes. Another strength of the DPGE is the strategic location of the department; it is located at the heart of Istanbul which is the economical center of Turkey. Especially research projects with abroad institutes and TÜBİTAK-Marmara Research Center are remarkable. If we look over the students of the department, the followings are notable; each of them knows at least one foreign language, they are social and question continuously the quality of the education and profession. Furthermore, they attend to the national and international surveying organizations (for example, IGSM, FIG and national student meetings). Most of them want to study master of science in Geomatics or Remote Sensing and GIS or in related areas. Last but not least, the graduates from DGPE are preferable from engineering companies because they have experiences on field works with the surveying projects at the department and with their internship training.

Weaknesses: There exist some communication gaps between the department and private sector as well as non-governmental organizations. Not taking the expectation of the stakeholders for conducting the system as an important input parameter causes some problems to understand the demand of them, to follow and adapt the new developments. Also, some political and official procedures do not give any possibility to make some reformist changes; existence of them slows down the improvement acceleration. An another, maybe the most important, problem is the high rate of (number of students/number of academic members) at the department mentioned in Section 3.2. This fact decreases the efficiencies of both education and research activities. Although there exists a continuous and huge demand from young researchers to make research, and from students for improvement in education and about being a part of the research projects, this can not be implemented effectively due to the high rate. Moreover, infrastructural problems (quality and quantity problems of working offices, laboratories, classrooms) cause a decrease in motivation of both students and academic members.

Opportunities: New renewal projects, new occupation and specialization areas, such as real estate valuation, GIS applications, industrial surveying, GPS applications, deformation monitoring, image processing etc., create many opportunities for graduates and for the department. Innovation for education of information and communication technologies will effect positively the activities in the department. Furthermore, financial support programs of TÜBİTAK, as well as being in EU projects are the important chances to improve the research activities. An another opportunity that we should think about is the student and lecturer exchange programs, i.e. ERASMUS and SOCRATES programs. Moreover, the student exchange possibilities for the Turkish spoken students living in European countries and Turkic republics (Azerbaijan, Turkmenistan, Uzbekistan, Krygyzstan etc.) will incorporate many things to the culture of the department. A new modern building in the new and larger campus area located near the current campus and international airport will fulfill the infrastructural requirements.

Threats: Decreasing financial sources and budget for education and research will be one of the most important threats for the department. Moreover, without taking the necessities in Turkey, establishing new Geodesy and Photogrammetry Engineering departments will increase the threat. Also, lack of demand from industry to the department for R&D and losing the importance of the department in Turkey because of the opportunities for employment for the young researchers and engineers from European countries can be considered as the other threats.

4.3 Strategies of the DGPE

According to the mission and vision of the department, the SPC of the DGPE concentrates on the following four subjects, (1) Education, (2) Research, (3) Relationships with stakeholders and organizations, (4) Effectiveness of the department in national and international areas. However, in accordance with this paper, only the relevant sides of the last two ones are considered here inside of the first two subjects.

4.3.1 Strategies to improve education activities in the department

The strategic objectives and the ways for performing the quality education of DGPE are given as follows;

✓ To improve the current syllabus of the department's lectures:

At the end of 2006, the review of the syllabus of the lectures started by the Executive Commission of the SQUES will be done. The improved syllabus will be implemented in 2008. While doing this, the public surveys for the students and the graduates as well as other stakeholders will continue and will be considered everytime as an important parameter in the system.

– To be accredited for education activities: Present works for MÜDEK (Higher Education and Accreditation of Engineering Programs in Turkey) will continue and first self-study report will finish until the beginning of 2007. Reports of each lectures including the content, list of the used materials, success rates, evaluation criteria (exam, seminar, application report, etc.), suggestions will be prepared by the corresponding coordinators at the end of each semesters, and submitted to the department.

Moreover, concerning the item, the department will encourage the academic members to update their personal web-pages such that they include their lecture notes, homeworks, examination results, academic works and corresponding research and educational materials.

– To support the exchange possibilities for students and lecturers:

– Especially for ERASMUS program, new bilateral agreements will be added to the existent ones (see, Section 3.2). Students will be informed continuously and gradually about the program by the department. Attending to the information meetings in Istanbul about ERASMUS and SOCRATES will be supported.

– To support the publishing of the lecture notes:

– The department will encourage the lecturers for updating the current lecture notes or preparing the new ones and will support their printing in YTU-printing house.

– To solve the infrastructural problems:

– Renovation of the classrooms, laboratories and working offices of the department will continue. Especially, the new-modern building in the new campus area will be organized according to the department's structure and requirements.

– To decrease the high rate of (number of students/number of lecturers):

– The rate which effects badly the education activities will be solved. For this aim, the quota for the students given in Table 3 will be decreased gradually. Moreover, young researchers will be supported such that they will be lecturers at the department. In order to

make this continuous, successful undergraduates will be encouraged for studying a graduate program and for being research assistants at the department.

4.3.2 Strategies to improve research activities in the department

The objectives for improving research activities in the department are listed as follows;

- To decrease the high rate of (number of students/number of lecturers):
- Renovation of working offices, and laboratories:
The motivation and working performance of the academic members strongly depend on the situation of the working offices and the other infrastructures. The renovation works will continue. For the new building in the new campus area, working offices will be arranged such that they ensure the requirements of the researchers.
- To increase the number of research projects:
 - The department will encourage the members to develop new research projects by the financial support of TÜBİTAK and EU. Current TÜBİTAK and EU projects on the relevant subjects will be investigated and information meetings will be arranged in the department.
- To support attending to national and international meetings:
 - Especially, young researchers will be supported to attend the scientific meetings with their investigation on their master of science and PhD subjects. The financial problems will be solved with the budget of the research projects and/or the works for counselling services of the department etc. The members will be informed about applying for the national supporting programs for such meetings.
- To improve understanding for the collaboration with abroad institutes and other departments in Turkey:
The members will be encouraged such that they collaborate with the colleagues in abroad institutes and the other departments in Turkey for their research projects and/or investigation.
- To create the opportunities for working of young researchers at abroad institutes:
The department will support the young researchers such that they will work or study at abroad universities for some periods. They will be informed about the fellowship programs of TÜBİTAK, other institutes and organizations.
- To increase the access possibilities for on-line journals and research sources as well as other libraries in Istanbul
- To increase the number of national/international journal articles:
The department will embolden the young researchers such that they write at least one

national/international journal article from their investigation on master of science or PhD subjects. Furthermore, the members will be informed about the support programs in Turkey for the international SCI journal articles.

4.4 Discussions

According to the SWOT given in Section 4.2, in order to improve the education and research activities in a sustainable manner, the department has to take into account the four facts;

- Decrease in the rate of (number of students/number of lecturers),
- Suggestions, requirements and demands from the stakeholders, national and international organizations,
- Investment,
- Education of young researchers.

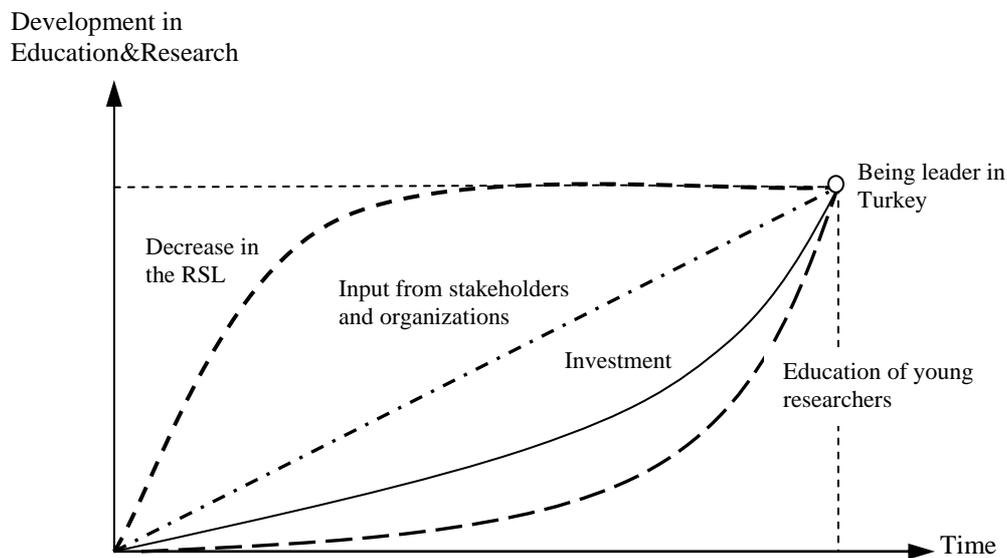


Fig. 5: The effects of some parameters on the development in education and research activities of the DGPE (RSL: rate of (number of students/number of lecturers))

The strategies about the facts are considered in the previous section. If we assume that the facts are the parameters of the function of “sustainable development in education and research activities”, their changes in time will effect the place where we want to be in future (see Fig. 5). Decrease in the rate first causes a fast improvement in education and research activities at the department. At the point which shows probably the general rate in Turkey given in Section 3.2 or the rate which we want to reach, decrease in the rate will not effect the improvement anymore. On the other side, the development increases linearly with considering the input from the stakeholders and organizations as an important parameter in the system. Moreover, investment for infrastructure and education of young researchers will improve the education and research activities at the department in a longer-duration but increasingly.

5. CONCLUSION

The DGPE of YTU has desired to reach high quality in education and research activities. For this aim, in 2005, a system called Sustainable Quality Education System (SQUES) implemented with thirteen commissions whose members are the academic members of the department. One of those commissions is Strategic Planning Commission (SPC). The SPC simply aims to draw the ways to perform a development in education and research activities as well as effectiveness of the department in national and international areas.

The first work of the SPC was to collect the statistical information about the department which helped to analyse the SWOT (Strengths-Weaknesses-Opportunities-Threats). After the SWOT, the strategies were defined to fulfill the vision of the department. This paper summarizes the works as a self-study of the department and shows some strategies to perform a sustainable development in education and research activities.

As a result of the paper, there are four important points which we have to concentrate on; the rate of (number of students/number of lecturers); collaboration with stakeholders and organizations; infrastructure for education and research; education of the young researchers. Their effects on the development in education and research areas are highlighted in the discussion session.

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BIOGRAPHICAL NOTES

Cüneyt Aydın was born in Istanbul in 1978. He got a master of science degree from Geodesy and Photogrammetry Engineering of Yildiz Technical University (YTU) in 2001. He works as a research assistant at the same department and is a Ph.D student in Geomatics Program of YTU Science Institute. His research interests are on deformation analysis, numerical analysis, variance-covariance component estimation and physical geodesy.

R. Cüneyt Erenoglu graduated from the Department of Geodesy and Photogrammetry Engineering of YTU in 1999. He has a degree of MSc since 2003, and is currently a PhD student. His work focuses on robust statistics. Moreover, he works on statistics, GPS and geodesy.

Atinc Pırtı was born in Manisa in 1972. He is an assistant professor at the DGPE of YTU. He has been academic staff at the university since 1996. His research interests focus on high precision surveying techniques, Real-Time Kinematic GPS, surveying applications.

Bülent Bayram is an assistant professor at YTU. He graduated from the Department of Geodesy and Photogrammetry Engineering at Karadeniz Technical University in 1987. He received his Ph.D. degree with thesis entitled “ Integration of Satellite Images with GIS: Case Study-Istanbul” in 1998. His research interests are remote sensing, digital image processing (especially medical image processing) and terrestrial laser scanning.

Mehmet Ali Yücel is a research assistant at YTU. He graduated from the Department of Geodesy and Photogrammetry Engineering in 1999. He received his master degree with the thesis entitled “Visualization of Geographic Information” in 2002. His research interests are cartography, 3D visualization and geospatial virtual reality.

Zerrin Demirel works as a professor in the Land Administration Division of YTU. Her research interests are land consolidation, rural development and cadastre.

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