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Peer Visit to Faculty of Civil Engineering

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DEPUTY RECTOR PROF DR ALEKSA BJELIŠ (UNIVERSITY OF ZAGREB, CROATIA)

Preface

In the framework of the Austrian Project "Support for Higher Education at the Ss. Cyril and Methodius University" (thereafter referred to as "the University" or "UKIM"), sponsored by the Austrian Ministry of Foreign Affairs, peer visits to 6 Faculties (selected by the UKIM leadership) took place on 21-22 October 2003. These peer visits had been requested by the project coordinator at UKIM, and took place in combination with the complex external evaluation of the Faculties executed by three Macedonian experts. The visits benefited greatly by the comprehensive self-assessment reports produced by the Faculties, which were made available to the international visitors beforehand.

The primary purpose of these visits was to provide an independent outside opinion by international experts regarding the quality assurance (QA) and institutional assessment provisions that have been introduced into the higher education system of the Republic of Macedonia in the course of the last year. Moreover, a focus on the theme of Study Programmes had been chosen by UKIM.

"Evaluation is to determine the significance or worth of something by careful appraisal and study ... it is a developmental process that illuminates or enlightens the specific policies, processes and practice of its stakeholders and contributes to collective learning" (CERN - Capitalisation and Evaluation Research Network). Thus, rather than "examining" these UKIM Faculties, the international experts engaged in fruitful, profound and mutually beneficial exchange of experiences and ideas. The accumulated and horizontal findings of the international experts from Austria, Bulgaria, Croatia, Germany, and Serbia during their visits to the Faculties of Architecture, Civil Engineering, Economics, Technology and Metallurgy, Mining and Geology, and Philosophy will be contained in a Comprehensive Opinion paper, to be produced under the project. Selected horizontal findings are attached to this report as well.

The preface and the annex are common to all 6 reports, the main text is written by the visiting expert.

Tel/Fax: +43-1-945-6558
 Mobile: +43-699-1945-6558
 Email: office@navreme.net
 Website: www.navreme.net

Registration: FN 205174 b (Vienna Commercial Court)
 UID: ATU51288609
 Bank account: 000 0203 9591 at Erste Bank (BLZ 20111)
 IBAN / BIC: AT43 2011 1000 0203 9591 / GIBAAATWW



Introductory Note

The coordinators of the project kindly invited me to serve as an external expert in peer reviewing of the quality assessment process and study programmes at the Faculty of Civil Engineering (FCE) of UKIM. My professional background is theoretical physics of condensed matter, and at present I am in charge as a vice-rector for science and development at the University of Zagreb. Assuming that these elements are relevant enough to qualify myself for the aforementioned duty, I accepted the invitation and took part in the one-day visit to FCE as a member of a group which also comprised the external evaluation team nominated by the Macedonian Agency for Evaluation (Prof. Kosta Talaganov, Prof. Dragan Slavkov, Prof. Nikola Krstanoski) and Dr. Bernd Baumgartl, Consortium Leader.

During the visit we enjoyed the hospitality of Prof. Sandre Atanasovski, Dean, and Profs. Elena Dumova-Jovanoska and Zlatan Srbnovski, Vice-Deans, as well as of the members of the Faculty Commission for Self-evaluation [Prof. Vasil Vitanov, President, Prof. Kiril Gramatikov, Prof. Orhan Avdović, Prof. Živko Veljanoski, Prof. Risto Ribarovski, Marijana Eftoska, student, (beside Prof. Dumova-Jovanoska, vice-dean)]. We had also the opportunity to separately meet and talk with representatives of professors, assistant and students. We had at our disposition a comprehensive and detailed report on FCE prepared by the Commission for Self-evaluation, and a well composed and designed web-page on FCE prepared and presented by Prof. Dumova-Jovanoska and her collaborators.

The members of external evaluation team had already had an evaluation visit to the Faculty in 2002. This visit served as an additional insight before the final redaction of their text. The present report could be considered as a complementing material to their official report.

1. Observations

1.1. Study Programs

Historically study programs covering civil engineering at UKIM were established in 1949 within then Technical Faculty. From 1975 they have been performed within the present FCE. Postgraduate studies leading to MSc were established in 1975.

Today there are three active programs in civil engineering (*Civil/Structural Engineering–Structural Division, Roads and Railways, Hydro-technical Engineering*), and one program on *Geodesy* which started recently as an enlargement of the initial two-year vocational program. The nominal duration of all programs is 9+1 semesters.

The first two years are mainly common for all programs, while the diversification starts in the 3rd and 4th year.

Critical remarks regarding the present structure of undergraduate studies are:

- optional courses are not present in the curricula;
- more profiled specializations are not offered;
- curricula contain too many long (two semester) courses;
- fieldwork contents are insufficiently present;



- the curricula do not offer interdisciplinary and/or multidisciplinary combinations, particularly those combining engineering and managerial or similar skills.

Some data given in the Table 11 of the *Annex of the Self-evaluation Report* on the ranking of skills acquired during studies seem to confirm these remarks. While work on project realization, work on computers and field work are top ranked ("excellent" and "good"), skills like written and oral communication, problem solving, analysis of professional and scientific literature, management, foreign language fluency and group work are among those marked by "not sufficient" and "sufficient".

1.2. Postgraduate Studies

Presently there are four specialized study programs (*Structural Engineering, Roads and railways, Hydro-technical Engineering, Geotechnical Engineering*) having a four semester duration, and aiming to MSc (*magistar*) degrees. Alternatively the postgraduate study may terminate after three semesters with a "specialist" certificate. FCE also enables acquiring of *Doctor of science* degree, but outside study programs.

1.3. Students and Studies

The annual enrolment at the undergraduate programs in the last few years is 150 or more at Civil Engineering programs and around 50 at Geodesy. The percentage of students who successfully pass the first year was about 50%. This percentage has been somewhat decreased recently after making modification (like inclusion of more elements of interactive studying) in the organization of courses which were the most serious obstacles to students of the 1st year (particularly of those on mathematics and mechanics). Table 15 of the Annex to the Self-evaluation report indicates that the drop-out also remain large after the second year, so that percentage of students entering into the second (specialization) part of programs ranges from 22% (1997/1998) to 44% (2001/2002), with a tendency of an increase in the recent years.

Tables 13 and 15 of the Annex also show that almost all students who successfully pass into the 3rd year, succeed in finishing studies. The real duration of studies is however considerably larger than five years. Table 15 indicates that the great majority of students finish the program after more than seven years.

The number of students at all postgraduate studies varies from 10 to 24 per year in the last five years. The number of master theses is in average two per year in the same period, and there was no specialization certificate. The total number of doctoral theses defended at FCE was 16. It is to be noted that according to actual legislation the previously obtained MSc degree is the prerequisite for applying for the doctoral theme (and afterwards the thesis).

Regarding postgraduate studies and educational process after undergraduate level in general it can be noticed that:

- a rather small number of students enrolled in postgraduate studies succeeds by acquiring MSc degree;
- the number of doctoral thesis overwhelms the number of MSc thesis; this signalsises that the regeneration of human resources at the highest scientific level has a negative trend;
- continuous education studies or courses are not offered.



The conversation with student representatives showed that their opinion about the Faculty is predominantly affirmative. They stressed that they are proud to be students of FCE, which is in their opinion among the best at the University. They pointed out a general impression about good relationships between lecturers and students. They also pointed out that, referring to a previous project investigation about corruption in the Macedonian higher education and at the University in particular, their Faculty was recognized as the institution without any indication of its presence.

The students also expect that they will not have serious problems in finding job after finishing their studies. This estimation was confirmed by the dean who stated that there are no unemployed engineers in Macedonia, and that directors of enterprises are permanently seeking new employees on the job market. This seems to be at variance with a wide belief that the job market in Macedonia is grim in general and for technical disciplines like civil engineering in particular. This is also certainly a stimulating element in students' efforts to perform their tasks and finish their studies successfully. Still, the word of warning should be added here regarding the fact that a considerable number of graduates from this Faculty were traditionally successful in continuing their professional carriers abroad, *i. e.* that Macedonia, like other countries from the region suffers from a large degree of brain-drain, particularly in natural sciences, and medical and technical disciplines.

1.4. Research and International Cooperation

It seems that the predominant orientation in research activities is towards professional expertises. This is not unusual taking into account the situation with financing (see also 1.5 below). Regarding scientifically oriented activities, they are mostly organized through 14 projects financed by Macedonian sources (Ministry for Education and Science), and 2 international projects (in collaboration with Slovenia and within FP5 of European Commission).

Detailed data on the scientific output expressed in terms of publication in international and domestic journal were not available. The number of participants at international and domestic conferences, symposia and seminars varies from 65 to 85 per year in the last five years.

The Faculty has also cooperation with equivalent institutions from Bulgaria, Romania, and some countries of ex-Yugoslavia area. The cooperation with EU countries includes two stays abroad (MSc thesis) and one visiting professor for one semester at the FCE in collaboration with the University of Bochum (Germany), and one PhD stay in Paris. Few assistants are also realizing their specialization stays abroad.

1.5. Financing

The study programs are financed by the Ministry for Education and Science, and by student fees (ranging from 100 to 200 Euro for all students, and from 400 to 1000 Euro for so-called self-financed students). Research programs and projects are also covered by the Ministry, and partially through international cooperation. Another part of the income is generated by providing services (expertises and projects) for the industry and similar partners as specified in Section XI of the Self-evaluation Report. These data evidently show that the part of budget from the Ministry has constantly decreased in the last five years (from 79% (1997) to 48% (2001)), while the part from



additional sources increased accordingly (from 25% to 49% in the same period). The situation regarding the financing from the state budget is even worse since this part of the Faculty budget decreased in absolute figures, too (from about 51.900.000 denars to 44.300.000 denars in the period mentioned above). Simultaneously the amount of income from the additional sources has been almost tripled. This was also confirmed by the Dean who stated that the state is less and less participating in financing. The Faculty is forced to look for other sources on the open market, which could obviously have harmful consequences on the quality of research and lecturing.

1.6. Staff

The FCE has a total staff of about 90 employees, of which 60% are lecturers, and 40% represent the administrative and technical support staff.

The average age of 27 full professors is 58.2. The average age of 5 associate professors is 45.4, and that of 12 assistant professors is 43.2. The average age of 11 senior assistants is 39.7, and that of 8 junior assistants is 29.

Among 27 full professors 15 (55.5%) have PhD, 5 (18.5%) have MSc, and 7 (26%) do not have academic titles.

The ratio of number of professors *vs.* number of assistant professors and assistants is 32 *vs.* 30. The ratio of number of all professors *vs.* number of assistants is 44 *vs.* 18. The staff is organized through 14 chairs (*cathedras*) established during the gradual enlargement of the Faculty in the last few decades from its foundation until today. Distribution of staff across *cathedras* is rather uneven ranging from 10 to only 1 academics per chair. Four *cathedras* have no assistant, and four *cathedras* have just one assistant.

1.7. Facilities

The space (building, lecture rooms etc) is mainly in bad conditions. It is evident that the permanent lack of financial means prevents regular maintenance and improvements, not to speak about investments into new facilities.

The computer room is overcrowded. The direct insight during the visit indicated that the number of students in the computer room, as well as during a lecture based on the use of PCs, is too large with respect to capacities.

The library is also not appropriate for the wider use of students. Furthermore, it is only partially available to students during the usual working hours, apparently because the number of librarians is insufficient.

2. Challenges and Recommendations

2.1. The Report of the Faculty Commission for self-evaluation recognized some steps which could be immediately undertaken in order to initiate modifications and changes. The Faculty leadership has acted in this manner in some cases, e. g. by initiating changes in methods of teaching and the assessment of learning progress. This led to immediate improvements, as already mentioned before. This approach deserves to be greatly encouraged. More widely, it would be useful if the Commission continues to monitor permanently the conditions of studies, and proposes appropriate steps towards ameliorations during its mandate.



2.2. The given structure and qualification of staff (age, academic titles in the group of full professors) is such that it appears natural to orient members of the staff with more professional (and less scientific) references towards vocational contents in study programs, or even towards organizing full vocational programs (perhaps shorter, three-year studies). Furthermore, it is an urgent necessity to employ new young lecturers (at the levels of assistants and associate professors). The encouraging first step in this direction was the employment of four young academic staff this year, which is very encouraging after a long period without any new positions.

2.3. Taking into account a rather demanding level of study programs, it would be advisable to invest more into some stimulating steps, like increasing the number of student scholarships, offering more possibilities for specializations abroad, increasing the external mobility of students, engaging more visiting professors from abroad, etc. Also, it would be highly beneficial for the Faculty to attract more foreign students to Skopje and again have a similar proportion of such students like before the economic and transitional crisis of the last decade.

2.4. The opening of the Faculty towards additional sources of financing would have to be selective in order to prevent a decrease of level of quality in research and studies. Routine expertise service to outside clients which is not focusing on scientific and innovative problems should be assigned mainly to those staff members who are not primarily involved in research activities. A considerable proportion of the income from this type of contracts should be channelled towards the improvement of working and studying conditions (including necessary reparations and improvements of basic facilities). Furthermore, the contracts with domestic partners would have to include components of applied research, beside standard expertise contents.

2.5. It would be advisable to undertake efforts towards increased use of international sources and the inclusion into European networks of research founding and joint study programs.

2.6. Considering the rather small number of students of postgraduate studies, it seems that the best possible solution would be to organize joint study programs on the regional (or even broader) basis, and to incorporate professors, students and research facilities of the Faculty into wider and more intense and efficient framework.

3. Additional Suggestions

3.1. It would be advisable to introduce optional courses and to modify programs in a way that would ensure more structured final profiles and specializations. This is particularly important taking into account that Macedonia has recently joined the Bologna Declaration which also inaugurates larger student's individual impact into choosing the content and direction of his/her studies. Furthermore, study programs would have to be more oriented towards practical skills and complimentary knowledge (like management, etc) apart from the narrowly defined professional qualifications.

3.2. The members of FCE should consider to establish joint study programs at the postgraduate level. These arrangements would also be naturally linked to the



international cooperation in research. It is therefore necessary to intensify international cooperation in the scientific programs, to encourage staff mobility, particularly the mobility of young researchers (on the PhD and post-doctoral level). Furthermore members of the research staff, in particular those who are at the initial stages of their careers, should be encouraged, and supported, to strive for more international recognition (by publishing in the international journals, participating in important scholarly meetings, etc).

3.3. It would be necessary and useful to reconsider the efficiency of the existing division and distribution of staff into the *cathedra* structure which seems rather crude and inappropriate with regard to modern demands on the organization of scientific work and study programs. A re-organization of the FCE would also have a positive effect on the system of Faculty governance and decision making which is currently hampered by the fact that each *cathedra* irrespective to its size and its relative contribution to research and teaching is represented the Dean's Collegium. It would be also necessary to ensure more balanced distribution of staff across the *cathedra* structure (if it is to be kept) taking into account the needs for modernization of curricula, in particular of those programs that are geared towards cross disciplinary and multidisciplinary professions. Furthermore, it would be advisable to take steps towards more flexible modalities of organization which would ensure more mobility of staff and students not only within the Faculty but also across the University.

3.4. The Faculty should take active part in the processes aiming at a more integrated university, particularly by participating in new study programs based on the Bologna study scheme which the Macedonian higher education have to adopt after the signing the corresponding declaration.

3.5. At the end of this document it is worth reiterating the statement from p.2.1 that the work of the Evaluation Commission for self-evaluation has resulted in a comprehensive and detailed assessment of the FCE. After the submission of the report, the Commission continued to be active in proposing specific steps and measures to address shortcomings and to change certain aspects in the operations of the Faculty. Some of these suggestions resulted in important improvements (e.g. re-organization of studies in the first and second reacting to justified criticism of students; efforts to employ of new assistants, etc). It is strongly recommended that the Commission continues its activities in terms of providing strategic directions and practical suggestions to strengthen the teaching and research capacity of the Faculty. Even under the very precarious financial circumstances which characterize the present situation at the FCE, there are many possibilities to achieve meaningful improvement and change.



Annex: Horizontal Findings

Observations

High commitment and enthusiasm on the side of internal self-evaluation commissions, and openness and interest of Faculty management for the process resulted in a solid diagnosis, thorough analysis, and a long list of recommendations for change. Moreover, in some cases measurable change was already reached as a direct result of the self-evaluation process.

Challenges and Recommendations

The over-aging of staff was identified as a time-bomb for UKIM. Filling this gap with young brilliant staff, and use their capacity instead of that of inactive professors without knowledge or practice in modern teaching techniques. There is a urgent need to increase the number of positions for assistants and young Faculty at all the Faculties visited.

Study Programmes need to be broader, less, and shorter. Broader programmes are requested by the labour market, where flexible graduates are requested who can swap from one field of action to another, applying so-called core skills and inter-disciplinary experience to a rapidly developing job market.

Continuing training offers, a variety of post-graduate programme (to be organised also jointly with and for industry and commerce), and specialisation courses for employed people are both a growing request from society and a possible source of income. Every University needs to react to the trend towards Life-Long Learning across Europe.

Innovation in teaching is badly needed across faculties. Despite individual successes, on average far too much inefficient ex-cathedra teaching takes place. It is to be substituted by contemporary, interactive and project-like and practice-oriented training and learning styles. Training of staff in this field, and tools for measuring the outputs of the teaching units should be developed therefore. Students' ability to cope with their challenges after graduation is the most important criterion to be used in this respect.

Additional Suggestions

Alumni organisations should be set up. Far beyond their immediate function of telling the Faculty/University what happens to their graduates, in many countries they have been found an extremely helpful source for inspiration, innovation, information on labour market requirements, sponsorship and political contact.

The budget allocated to research is too small at present. Regulations on a 90% percentage allocated to teaching (= staff costs) are counter-productive to innovative and updated curricula. Attractive teaching is key to attract the best students, and to guarantee to them success in their professional life, as competent individuals, and as democratic citizens.

The initiated process of self-evaluation should be re-launched with new tasks, and triggered with new responsibilities. The Commissions should be empowered to undertake further prioritisation and operationalisation of necessary change. Moreover, in order to be acceptable partner for international cooperation, to attract foreign students, and to be visited by top scientist and educators from other countries, the University as a whole needs to be seen. At the end, an institutionalised and regular system of continuous self-improvement and external advice will enable Faculties and UKIM as such to keep the speed of development in international Higher Education.