

REPORT OF THE SECTION OF THE COMMITTEE FOR CIVIL ENGINEERING IN THE TERM 2007–2010

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This report describes the community involved in technology, organisation, and economics of the construction industry. The community includes mainly academics gathered around KILiW PAN, the Polish Academy of Sciences Section for Civil Engineering Projects. The results have been obtained based on the survey conducted in the period of 2007–2010. Some financial issues are presented here which influence the scope of the research underway and the didactic process. Some of the issues presented here comprise the subject matters of research, postgraduate studies, academic degrees, as well as publications and international cooperation. Conclusions were presented in the form of suggestions in the field of research and teaching.

Key words: construction engineering, construction management, survey results, academic community.

1. INTRODUCTION

The Section of Civil Engineering Projects is one of the nine Sections of the Committee for Civil Engineering of the Polish Academy of Sciences (Division IV – Technical Sciences). At the end of its term, the Section is required to report on its activities and developments. The reports are made by the Chairperson of the Section, who then presents them to the Committee. This time, the report had been preceded by a survey which covered the period of 2007–2010.

The members of the board of the Section were: Prof. Oleg Kapliński (Chairman), Prof. Tadeusz Kasprowicz, Prof. Janusz Biernacki, Prof. Witold Werner, Dr Jerzy Paślowski (Secretary). There were 34 members of the Section, including 3 members of the Committee. There also was one Associate Member – Prof. Edmudas Zavadskas (VGTU, Lithuania). The senior members of the Section included nine people. All meetings of the Section were particularly open to the young academics who are normally invited to the Section meetings.

The Section began its term of office with a new name. The former name was: The Section for Organisation and Management in Construction. At the beginning of the term of office, the publication of a monograph entitled *Methods and Models of Research in*

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Construction Engineering Projects [1] became a strong accent. This co-authored work was granted an award by the Minister of Infrastructure (2008), and has had a number of formal reviews (for example, [2]).

In the term which is now coming to an end, the participation of the members of the Section in plenary meetings of the Committee for Civil Engineering must be stressed, namely of Dariusz Skorupka's: *Risk Management in Implementation of Construction Projects* (October 23, 2009) and Ryszard Trykosko's (the President of the Board of Investment Office for EURO Gdansk 2012): *The Investment Process of Construction of Gdansk Arena Football Grounds and Road Infrastructure in View of EURO 2012* (of April 9, 2010).

The survey, distributed in the summer of 2010, comprised of nine sections and included, all in all, 48 questions. The answers came from 22 academic centres and individual members of the Section (2). There was no reply from Kielce TU, Koszalin TU i Zielona Góra University. The results of the survey are expected to become the foundation for analysing the developments, heritage, and problems of not only the Section itself but also of the community (and specialisation) that the Section represents. In previous years, all synthetic conclusions had a very vibrant response. The review of former problems and phenomena appearing alongside the development of our specialisation can be found in [3-6] and in reports [7, 8].

2. CHARACTERISTIC EVENTS

As the surveys from the turn of the 20th and 21st centuries showed [9], there were some characteristic events primarily related to the surveyed academic community, connected with **F**inances, larger **F**emale presence, and **F**luctuation of staff (3xF). Obviously, the most painful issue touched upon by the respondents were finances. The respondents stressed relatively low salaries of academic teachers at all levels. The difficulties in continuation of scientific work, due to shortage of financing devoted to research, was also indicated. The growing phenomenon of larger female presence in the area of specialisation was also revealed (which was evident in, for example, the number of female PhD students and female academic teachers and researchers). Increased fluctuation of staff, compared to previous decades, could be observed in that period. Mobility of young people resulted from different work conditions, and the (negative) influence of the level of pay. In some academic centres it was impossible to anticipate who would begin and complete their PhD.

The 2010 survey shows that the phenomenon of growing presence of women did not disappear, while the staff was employed in additional places. For the first time financial issues (especially salaries) were put aside. Some of the problems became more emphasized, but the lack of balance between supply and demand on the first place. On the side of demand a large number of students occurred, while the supply side revealed the lack of staff. Such a situation puts a very big burden on the academic

staff. Reluctance for supervising specialisations is observed. The case of liquidation of one of two specialisations was even noted at one of the universities, as a form of protecting the academic teachers from having to work for a very long time. The "evolutionary" partition of institutes (for example Warsaw TU), gradual transformation of an institute into a chair (for example, Kraków TU), as well as "absorption" of some academic teams by other departments (stronger in staff, for example Gdansk TU).

What makes some of the teams distinctive in particular universities is continuing their teaching specialisation. At the moment, the number of teams related to the subject of the section, and specialisations is 17, while 12 carry on specialisations closely related to the profile of particular section, the most common names of representatives of these customisations being: Technology and Organisation in Construction (7), and Engineering of Construction Processes (3). There are also the Organisation and Management in Construction (1) and ECEM – the European Engineer (1, Szczecin TU) among them. Another distinctive feature is a category of the department hosting a given specialisation.

The research is carried out of the budget grant of the Ministry (indicated as BW and DS.), and as a part of the so-called contractual work (for example, with construction industry) and as expert analyses and audits. All sorts of grants are becoming more and more important.

The data were collected from 16 centres. A relationship between type of research and the category of department could be seen. Teams worked at the departments of the first to fourth category, and it influenced the financial range of the research. The following cases of not carrying out research within the problem range of the section were typical at: the UMW Olsztyn (due to the fact that the Department was classified as category IV), the Łódź TU (the team was still small), and the TU Silesia team in Gliwice where they did not teach subjects of organisation and management, but carried on an intensive technological and material research work. Below are examples of subjects (some of them are presented in a generalised form):

- sustainable development,
- timetabling in deterministic and stochastic conditions,
- risk management,
- intensive usage,
- using artificial intelligence methods,
- rate of return of investment,
- cost of own and loaned capital.

During that period, only a small number of grants were used, while the implementation of a dedicated project No 6T07 2004 C/6413 in the national system of managing construction projects, financed from public money, should be noted. It was a project ordered by the Ministry of Infrastructure, implemented in 2005–2008 by colleagues from Warsaw TU. The initial results were discussed during the Section meeting (2 February 2008), see: Kulejewski [10].

In the respondents' opinions (and naturally the academic centres' opinions), regarding the level of research, one can notice a larger degree of confidence, because theoretical solutions were assessed as being at the level of foreign academic centres, while lagging behind in practical applications was stressed in answers.

At the end of the 20th century, the issues of organisation and management in construction industry had a stunning comeback in Poland, both from the viewpoint of their development, and practical applications. The conference of the Puławy Section [4] in 2001 highlighted that comeback, as more than 75% of papers presented there were devoted to this subject. Nevertheless, in the developed countries, those problems are much better understood by civil engineers and academic community.

3. PROMOTION WORKS AND PUBLICATIONS

3.1. PhDs, POST-DOCTORAL THESES, AND PROFESSORSHIPS

In the time frame of the survey, there were 19 PhD dissertations presented, which means that less than 1 PhD was presented in three years per a centre. Work on 10 PhD theses was officially commenced. In the nearest 3 years period, it is anticipated that 19 PhD dissertations will be presented, the largest number (4) in the Warsaw TU. Two dissertations were awarded prizes in the competition announced by the Minister of Infrastructure: K. Zima (Kraków TU), and M. Gajzler (Poznań TU), [12].

Four postdoctoral thesis presentations were noted in this time. In all of them current members of the Section: D. Skorupka [13], A. Minasowicz [14], B. Hoła [15], J. Paślawski [16] were involved. One application for an academic title is under way (A. Sobotka [17]). The research work done by M. Nowak [18] should be categorised in this group, because he has been cooperating with the Section and the Lithuanians. It must be noted that there had been some problems in acquiring reviewers due to a lack of nominated professors.

It is quite surprising that in the nearest future, as many as 20 post-doctoral thesis will be presented (and most of them, namely 4, at the Kraków TU), and five applications for academic titles. The situation of reckless planning is repeatable, just like in the past years - see remarks in [9].

3.2. BOOKS, TEXTBOOKS, MANUALS

Publication efforts transpire in different forms: as books, papers, and articles. It was a nice surprise to find out that there is a relatively large number of the so called compact publications, including textbooks, monographs, manuals, and conference materials. There are as many as 45 of those publications. Only when they are compared, one realizes how active the academic community is. Yet another surprise is the frequency of publishing of those texts by other universities and foundations, and not by universities

where those texts have originated. The issues of the organization of investment process are dominant in textbooks. A set of textbooks which should be highly praised is the one used in teaching of Management and Marketing at the Kraków TU. Unfortunately the specialisation has been suspended by the accreditation committee (PKA) due to the fact that it lacked independent research staff. Apart from the above-mentioned team award, granted by the Minister of Infrastructure [1], we have also been granted an award by the Minister of Education (2010). Z. Orłowski, a member of our Section, was granted an individual award for a textbook on technology of concrete constructions [19].

3.3. PAPERS, ARTICLES, PERIODICALS AND MEMBERSHIPS IN EDITING BOARDS

The following tendency can be observed in the data: there are more papers than articles. The proportion between papers published at home and those published abroad is: 314 /100. An extreme example can be seen at the Warsaw TU, where 17 papers have been published in Poland, 25 abroad, while the number of articles was marginal.

The number of periodicals in which the members of the community published their texts decreased by a half compared to the results of the previous survey. In the past those numbers were as follows: 60 Polish periodicals and journals and 15 foreign ([6, 9]). On the other hand, the number of articles published in ISI Web of Science periodicals has increased. This is mainly due to the efforts of our colleagues from Lublin, Poznań, and Wrocław. The most popular foreign journals in which our authors publish their texts are: *Journal of Construction Engineering and Management*, and *Technological and Economical Development of Economy* (both Lithuanian, with the ISI index), while the Polish ones are the following: “*Przegląd Budowlany*”, *Builder* (Wrocław TU), university or departmental proceedings.

12 academic centres can boast a membership in editing boards. Most popular is *Builder* (3 representatives); moreover, we have representatives in six foreign boards: *International Journal of AHP*, *Journal of Construction Engineering and Management*, *Technological and Economical Development of Economy*, *International Journal of Strategic Property Management*, *TRB-Washington*, *Journal of TU Ostrawa*.

4. PROFESSIONAL AND ORGANISATIONAL ACTIVITIES

4.1. ORGANISATION OF CONFERENCES AND SYMPOSIA

Organisation of conferences and symposia (of different profiles) is a characteristic element of this academic environment. Two types of conferences can be indicated here. Type I, also called gatherings of single profile teams, are devoted to technology, organisation, and economics in construction (initiated in 1966). Type II are conferences with the patronage of the Section. Type I conferences are flagship conferences of the Section, organised annually by different universities in turn. In the term of office

now coming to an end, four conferences were organised by the following technical universities: Gdańsk (in Jelitkowo, 2007), Wrocław (in Łądek, 2008), Silesian (in Wisła, 2009), Kraków (in Muszyna, 2010). Published conference materials accompanied all those academic events. Each was connected with a jubilee or retirement of leaders of the teams: Zdzisław Kowalczyk, Ewa Macinkowska, Janusz Szwabowski, Janusz Biernacki.

One of the distinctive conferences is organised cyclically under the heading of "Strategies and risk management in an enterprise" and takes place annually in Bydgoszcz. All in all, there have been 12 such conferences. The Section was the patron of a cycle of workshops in civil engineering (PZITB) under the heading "Problems in preparation and implementation of construction investments", held between 18 and 20 October 2010 in Puławy.

Independently from the two types of conferences mentioned above, conferences organised by the members of the Section are also worth mentioning. In that tenure, there were six such events. Materials accompanying the conference organised by WSOWL in Wrocław in October 2010, under the heading "Crisis management in the region" were scored with six points. More and more often the number of declarations of participation in a conference seems to depend on the way the materials are published, and a number of points. The prestige of a conference does not go hand-in-hand with parametric values.

4.2. PROFESSIONAL ACTIVITY AND CERTIFICATION

Members of our community take actively part in the works of: Civil Engineers Chamber, PZITB, SITK, TNOiK; PIB (functions), Lower Silesian ZMRP (1). They act as chairpersons and members of professional committees granting qualifications. They collaborate with, for example: The General Office of Building Control, General Directorate of National Roads and Motorways, State Labour Inspection Office. It has been noted that in 18 academic centres, the members of the community have their own companies, participate in programme boards, or supervisory boards. Among the Section members, we have one dean, 3 deputy deans, 2 heads of PhD programmes.

38.3% of the employees have building industry certifications, while many of those have also other certificates (for example real estate surveyors). The Wrocław TU is a record holder; the proportion of people with certificates to those who do not hold certificates is 10:1.

4.3. INTERNATIONAL COOPERATION

In some centres, the cooperation is carried on the base of individual contacts. In most cases, though, this cooperation is held by university departments (as part of the mutual agreements). Generally, the range of cooperation has decreased. Below are examples

of current destinations of collaboration: Brno, Koszyce, Żylna, St. Petersburg, Mińsk, Purdue University, VITUS Bering, Lipsk, Wilno.

Memberships in international associations: the Euro Real Estate Society, Reseaux de PGV, Euro Working Group OR in Sustain Development & CE. We have one representative at the International Council for Thermal Energy Storage, and one at the Ukrainian Building Academy. There are also members of: IPMA, CIOB, PMI, EAPPM. The Chair of Production and Management Engineering at the Warsaw TU is the most active, collaborating with 11 academic centres, mainly through shared projects. The TOB Poznań Chair has been collaborating within the triangle of Lithuania, Germany and Poland. The colloquia take place every two years, and the results of this collaboration has been documented in a number of publications, for example [20-25].

The trend in shared publications, compared to the previous years, has changed significantly. Colleagues from TU Częstochowa have the largest share, namely 4 joint publications with colleagues from Russia, 6 in Brześć, and 1 in Koszyce.

4.4. POST-GRADUATE STUDIES

The report on the facts of academic centres offering 13 different courses of postgraduate studies was a part of the survey studies. Below are examples of subjects:

- project management
- management in construction industry
- a real estate management
- building product costs
- management and maintenance of real estate
- real estate agency
- cost estimates in market economy
- audits, certificates, energy retaining characteristics of buildings
- carrying on investments projects - FIDIC procedure, World Bank requirements.

It is obvious from a perspective, that the option has changed from real estate estimations to international procedures and costs. The number of choices has also decreased (for example in the Szczecin TU there used to be seven, while today it is only one institute). Moreover, the organization of a number of different courses, mainly in cost estimation, is typical for the majority of academic centres.

4.5. CO-OPERATION WITH STATE ECONOMY AND ADMINISTRATION

In the majority of cases, cooperation in this respect take place at an individual level. Moreover, the staff, through their universities, are employed as trainers at different forms of trainings for companies, as well as for the PZITB, and other associations. The activity in the area of expertise, and active collaboration with the Chambers, the PZITB, participation in programme boards, different organisations within universities, and members of staff running their own businesses, etc. is worth mentioning.

5. CONCLUSIONS FROM THE RESEARCH VIEWPOINT

The respondents have pointed out a variety of aspects of their research activities, both positive and negative.

The significant limitation of research and scientific work financing was reported, which also results in the limitation of direct contacts. In this group of suggestions, some difficulties regarding the acquisition of grants was reported. The globalisation in the area of research through the access to databases of libraries online was assessed as a positive phenomenon. Even a suggestion has been put forward (though only by few academic centres) that their research subject matters are convergent with global tendencies. A large group of suggestions included parameterisation:

- Conference papers are not granted the points as a result of the participation in conferences being not subsidised, and the possibility of joining a conference in the following year, especially for young academic staff, is restricted;
- Very few Polish academic journals are to be found in quotations;
- Granting the points in the process of parameter assessment of academic centres does not reflect the ranking of journals and monographs. An absurd case has been reported: PhD theses, and a local conference materials, are published in the form of monographs!

The development of academic staff in our area of specialisation (that is a number of independent research workers) lacks dynamics, in contrast with the other areas of specialisation.

It is obvious that there is a need of promoting independent research workers. The fact that they are so sparse (i.e., government nominated professorships) causes the necessity of organisational changes, for example in academic centres which have been very strong until now: Kraków, Warsaw, Gdańsk.

A number of respondents stressed the fact that professional activity of the construction engineering and management academic staff outside of the universities is necessary for properly shaped research and teaching. One of the suggestions was even formulated in a categorical form: work in economy oriented organisations should be an obligation, not only privilege of an academic teacher.

It is also seen clear in the survey that small academic centres praise the possibility of participation in the work of the Section more highly, including finding new contacts, participation in conferences organised under the patronage of the Section, compared to centres stronger in academic staff.

The tendency in the area of research subjects can be reformulated as follows:

- it is common knowledge, that taking into account only the costs of construction itself is not enough, because the cost of usage can be decisive (not to mention the cost of demolition or modernisation). More attention is paid to the problems of life cycle of a construction (LLC);
- A “new”, broad area of research includes problems of management of construction projects cost;

- A number of academic centres suggested a need of highlighting the problems of organisation and management as a social-technical, and not only technical system. Generally, an effective financing of research by the industry is noticeable. Also different forms of collaboration were pointed out in the report. In recent years, there were some difficulties with acquisition of materials for research and investment projects. The reasons are not only of the financial nature, but may also stem from the confidentiality of data. It means that the conditions of data acquisition have changed significantly.

It is a sad conclusion, namely that there are very few PhD students interested in the subject of Construction Engineering and Management/Construction Engineering Projects.

6. CONCLUSIONS FROM THE TEACHING AREA

All of the centres stressed that the academic staff is burdened with teaching duties. There is a visible lack of assistants (not only independent research workers). The respondents reported the exceeding of the nominal number of teaching hours at the level of 200% to 400%, which is a violation of the Act (not more than 125%). Consequently, the didactic overload of the staff is a limitation to their research, publications, etc. Moreover, the introduction of the two-stage education has resulted in doubling of the number of diploma dissertations.

The level of education varies. In most cases the level consequently decreases: in a reverse proportion to the number of students accepted to a university. The level of education of students in mathematics has decreased dramatically.

The state of affairs described above is even more complicated by the "mess" resulting from the introduction of the three stage university education, and an unclear situation regarding construction industry certification. Implementation of three stage university education has met resistance. Some universities do not recruit students (full-time day students) for the second stage. In some responses there are suggestions to returning to an unified five-year course of studies. Uncertainty among the staff and students results additionally from a vague situation regarding acquisition of construction industry certificates, namely doubts whether such certificates can be granted after the first or second grade of university studies.

There have been statements, that in the light of Construction Law (which keeps changing, probably too dynamically), the planned introduction of full entitlement to construction supervision for the graduates of the first stage of a university course of studies will result in depreciation of both certification, and specialisation.

There have also been voices to the effect that current standards of education are not well fitted to contemporary conditions and needs.

7. FINAL REMARKS

In conclusion, it can be noted that preparing traditional conferences, congresses of single profile team meetings are one of the most important activities of the IPB Section. Such congresses are organised in turn by different universities, and the organisation level, as a rule, is very high.

The Section is a form or organisation of single profile conferences and congresses, initiated in 1966 by Prof. Aleksander Dyżewski. There is a number of advantages of such a form.

Firstly, apart from the prestige itself, the influence of a plenary approach of the Section on the entire specialisation community is stronger.

Secondly, it is possible to coordinate activities: prepare shared publications and work on other tasks together. For example, in the term of office that is coming to an end, work has begun on editing a textbook entitled *Managerial Decisions in Construction*, in collaboration of Section members from five different academic centres.

Thirdly, the participants, originating mainly from the academic world, highly praise the organisation of congresses by the Section, because such encounters make it possible to consult other academics (it is here that the first assessments of PhD and post-doctoral dissertations take place); as well as an exchange of information and the integration of the community.

Fourthly, it is possible to control the level of promotional works and publications (papers presented at conferences) and impose certain standards. More than a decade ago were introduced a Science - Method - Application triad, according to which we started to review work presented at conferences in order to increase the level of papers presented and rebuff the criticism that what we do is a craft and not science ([9, 26, 27]). Such an attitude has resulted in very specific advantages. This trend should be continued in the next tenure.

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SEKCJA INŻYNIERII PRZEDSIĘWZIĘĆ BUDOWLANYCH W KADENCJI 2007 – 2010.
Raport

S t r e s z c z e n i e

Artykuł jest raportem charakteryzującym środowisko zajmujące się technologią, organizacją i ekonomiką budownictwa – głównie środowisko akademickie zgrupowanego wokół Sekcji Inżynierii Przedsięwzięć Budowlanych KILiW PAN. Wyniki opracowano na podstawie ankiety obejmującej okres 2007– 2010. Przedstawiono zagadnienia finansowe rzutujące na zakres prowadzonych badań oraz na proces dydaktyczny. Dokonano przeglądu między innymi tematyki badań, studiów podyplomowych, stopni naukowych a także publikacji i współpracy międzynarodowej. Uogólnienia przedstawiono w postaci wniosków ze sfery nauka i dydaktyka.