

# INTERNATIONAL COLLABORATION THROUGH A POSTGRADUATE EUROPEAN MASTER DEGREE IN CONSTRUCTION PROJECT MANAGEMENT

**Paweł O. Nowak<sup>1</sup>, Eugenio Pellicer<sup>2</sup>, Leonas Ustinovicius<sup>3</sup>, José C. Teixeira<sup>4</sup>, Jerzy Paślowski<sup>5</sup>, Piotr Nowak<sup>6</sup>, Tatjana Vilutiene<sup>3</sup>, Mariola Książek<sup>1</sup>, Arunas Barvidas<sup>3</sup>, Alicia Lozano<sup>2</sup>, Andrzej Minasowicz<sup>4</sup>**

<sup>1</sup> *Civil Engineering Faculty, Warsaw University of Technology (POLAND)*

<sup>2</sup> *School of Engineering, Universitat Politècnica de Valencia (SPAIN)*

<sup>3</sup> *Faculty of Civil Engineering, Vilnius Gediminas Technical University (LITHUANIA)*

<sup>4</sup> *Department of Civil Engineering, University of Minho (PORTUGAL)*

<sup>5</sup> *Institute of Structural Engineering, Poznan University of Technology (POLAND)*

<sup>6</sup> *Chartered Institute of Building (UNITED KINGDOM)*

<sup>7</sup> *Polish Association of Building Managers (POLAND)*

## Abstract

The Leonardo da Vinci programme, financed by the European Union, encourages international projects focused on education and recognition of professional qualifications. The project "MBA in Construction - Postgraduate European Common Studies in Construction Project Management" aims to create common postgraduate studies at the Master of Science level among several European universities (Warsaw University of Technology, Vilnius Gediminas Technical University, Technical University of Valencia, Poznan University of Technology, and the University of Minho) supported by professional associations (the Chartered Institute of Building and the Polish Association of Building Managers). This project deepens the ideas of Directive 89/48/EEG, which will lead to the creation of a proper European system of comparison, certification and mutual recognition of managerial qualifications in construction. The project is based on several successfully finished projects which enabled the creation of a set of nineteen construction managers' manuals. As a result of this project, new postgraduate studies for construction managers will be created by constituting a common platform for managerial knowledge. Results of the project will improve didactic process and qualifications recognition of European Union managers in construction. The modules of studies include: IT support for construction projects, cost and time management, site management, risk and value management, management of infrastructure projects, human resources management in construction, health and safety, environmental and quality management, procurement and marketing, and legal aspects in construction.

Keywords: Common Knowledge, Construction, Contents, European, Master Degree, Project Management.

## 1 INTRODUCTION

Knowledge on construction project management is a key issue in today's construction industry across Europe. This applies to the whole range of project participants from inception to conclusion of construction undertakings thereby involving professionals focusing in distinct perspectives yet working for a common goal. Many countries in Europe have developed substantial knowledge in this topic through academic courses, professional training and experience of practitioners. Other countries have not achieved this stage but the need to prepare professionals to work in the open European market is impelling efforts for convergence in this matter.

The European Commission Directive 2005/36/EC [7] provides a basis for the recognition of professional activity not only on the basis of previously required "profession" or "title" but it also states that the activities may also be pursued by other professionals who work in the profession and passed appropriate training in this area of activity. The construction industry is one of those areas where there is a large flow of human resources between countries. Therefore, EU citizens with the professional qualifications recognized in one Member State should be able to move and work in other EU countries. Building profession was previously treated as a regulated profession, one whose performance in a Member State of the European Union is subject to the fulfilment of certain

requirements. Working in this profession, in accordance with Directive 89/48/EEG, requires direct or indirect (by virtue of the laws, regulations and administrative provisions of the Member State) possession of evidence of education and training or / and specified attestation of competence. The attestation may be in the form of a certificate confirming the level of competency. Such certificate would be issued by a professional association in one EU country and would be recognized by associations in other Member States. The idea of the Professional Certificate arose in many EU countries and was promoted by universities and professional associations.

The EU Leonardo da Vinci (LdV) programme funds activities related to education and recognition of professional qualifications. This paper presents the efforts undertaken by a set of European Universities and professional associations in the scope of this programme for achieving better quality of managerial education of European construction engineers and for facilitating qualifications recognition. The paper presents assumptions, goals and results of the following Leonardo da Vinci projects, co-financed by European Union:

- LdV CLOEMC I-III projects (years 2006-2014) titled "Common Learning Outcome for European Managers in Construction", Warsaw University of Technology, Civil Engineering Faculty (WUT, Poland) was the promoter of the project and partners were as follows: The Chartered Institute of Building (CIOB, in United Kingdom and in Ireland), University of Minho (UMINHO, Portugal), Polish Association of Building Managers (PSMB, Poland), Salford University (United Kingdom), Polytechnic University of Valencia (PUV, Spain), Thomas More Kempen University (TMKU, Belgium), European Association of Building Surveyors and Construction Experts (AEEBC, Belgium/UK), Technical University of Darmstadt (TUD, Germany), Polish British construction Partnership (PBCP, Poland), Reading University (RU, United Kingdom).
- LdV MBAIC project (years 2013-2015) titled "MBA in Construction - Postgraduate European Common Studies in Construction Project Management". WUT (Poland) is the promoter of the project and partners are as follows: PUV (Spain), Vilnius Gediminas Technical University, (VGTU, Lithuania), Poznan University of Technology, (PUT, Poland), PSMB (Poland), UMINHO (Portugal), CIOB (United Kingdom).

## **2 CONSTRUCTION MANAGERS LIBRARY**

Theoretical basis of proper European system of comparison, certification and mutual recognition of managerial qualifications in construction was developed within Leonardo da Vinci programs financed by EU funds. The aim of the project (finished in 2006) titled "Development of New Management Studies and Courses in the Field of Management in Construction for Engineers According to the Requirements of European Union" was to develop a system of managerial education in the field of management adapted to the requirements of a market economy. As a result of the project, models of education in the field of construction production engineering and construction management were created. Those models include production engineering in the construction industry, management of new construction projects and their implementation, and real estate management. Figure 1 shows the training needs and areas of knowledge for construction managers.

The set of domains of knowledge developed by project for different construction organizational units is shown in figure 2. As a result of the analysis of the knowledge base structure, fields were created on each intersection of rows (corresponding to the areas of activity in the construction sector) and columns (corresponding to the areas of knowledge). Those fields correspond to scopes of managerial knowledge in construction and were later used to determine the scope of knowledge for the set of manuals created during the project, named "Construction Managers' Library".

Project CLOEMC is based on the European Directive nr 89/48/EEG on regulated professions in respect to scope of recognition, maintenance of high standards in professional disciplines, promotion and certification of qualifications by international associations and organizations – also from the construction sector. The construction sector in the EU is one of the most important branches of the economy. Through realization of construction objects and employing several millions of people it plays a very important role in European integration. The main task of the project is to deepen and improve ideas mentioned in the directive, which will lead to creation of European system of comparison, certification and mutual recognition of managerial qualifications in construction. The profile of construction managers' education, that lays the basis for cooperation in the construction field in the EU, developed differently in countries with command economy and market economy.

As a result of the CLOEMC project, a set of manuals was created, forming a common platform of managerial knowledge, necessary for management in construction. This base of knowledge forms a foundation of recognition and certification of managerial qualifications in construction, in the European Countries. Managerial knowledge required for construction is different from that necessary for industrial production. Partners of the CLOEMC project have vast experience in this area because some of them took part in previous successful LdV projects, as mentioned above, which allowed for the creation of the managerial knowledge structure in construction along with the certification system compliant with the EU requirements.

The following manuals have been created (in several EU languages): M1 - Project Management; M2 - Human Resources Management; M3 - Strategic Collaborative Working/Partnering in Construction; M4 - Business Management in Construction Enterprises; M5 - Facilities Management in Construction; M6 - Economy and Financial Management in Construction; M7 - Construction Management; M8 - Risk Management in Construction; M9 – Processes Management and Lean Construction; M10 - Computer Methods in Management of Construction Projects; M11 - PPP projects in Construction; M12 - Value Management in Construction; M13 - Best Practice in Construction Projects; M14 - Due-diligence in Construction; M15 - Motivation and Psychology Aspects in Construction Industry; M16 - Professionalism and Ethics in Construction; M17 - Sustainability in Construction; M18 - Health and Safety in Construction; M19 - Managing Building Pathology and Maintenance.

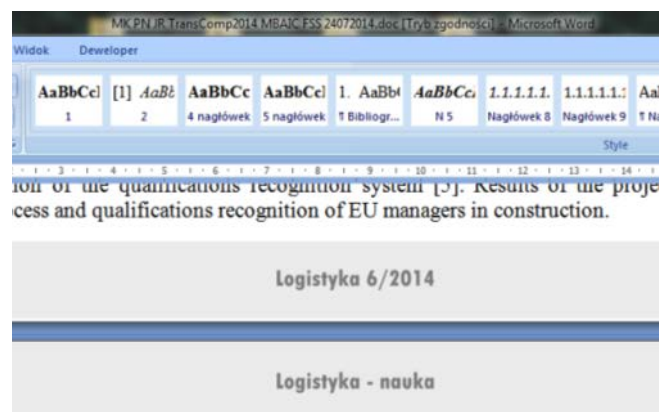


Fig. 1. Manuals from Construction Managers' Library.

### 3 POSTGRADUATE STUDIES IN CONSTRUCTION PROJECT MANAGEMENT

The main task of this project is to deepen Directive's 89/48/EEG ideas, which will lead to the creation of a proper European system of comparison, certification and mutual recognition of managerial qualifications in construction. The project is based on the successfully finished CLOEMC I, II and III projects which enabled for the creation of a set of 19 Construction Managers' Library manuals as presented in chapter 2 above. CLOEMC manuals are commercially published in the Polish market, in response to the demand from construction engineers. As a result of this project, new postgraduate studies for construction managers will be created thereby constituting a common platform for managerial knowledge. This base of knowledge will extend the foundations of recognition and certification of managerial qualifications in construction in EU. The project is based on the European Directive nr 89/48/EEG on regulated professions in respect to scope of recognition, maintenance of high standard in professional disciplines, promotion and certification of qualifications by international construction sector associations and organizations. This follows from the recognized need to create didactic system, in the form of Postgraduate Study, as a follow-up activity, promoting recognition of qualifications and accreditation of construction managers in the European Union.

Results from previous projects are put into practice by i.e. creation of Polish Association of Building Managers (PSMB) and its close cooperation with The Chartered Institute of Building (CIOB) and The Association of European Building Surveyors and Construction Experts (AEEBC, creator of EURBE Card – European Building Expert), thereby assuring the European dimension of the project. The foreseen didactic materials, methodology and organization scheme will become a new tool allowing for promotion, certification, comparison and recognition of construction engineers and manager competence at the European domestic sector level.

The postgraduate studies will allow the process of standardization (in all 12 countries associated in AEEBC, and other also) of certification the process of engineers applying for the title of EurBE. Partners of the project are responsible for the preparation of project products later checked and approved by professional associations. Results of the project will improve didactic process and qualifications recognition of EU managers in construction. The project objectives are as follows:

- Creation of new studies programmes and choice / preparation of didactic materials (Innovation: Universities create common study program which will be the base for common postgraduate diploma).
- Creation of lecture methodology (interactive way of teaching with use of internet).
- Creation of the studies organizational scheme (blended learning – first lectures and meetings, as well as exams – at the University – face to face, rest of lectures – on Internet).
- Creation of the qualification recognition system.

The first phase of the project is related to creation of the draft of studies programmes and curricula. At the first Partner's meeting in Warsaw, November 2013) the following structure of studies was created (now – December 2013 to March 2015 – under testing with Universities and construction industry representatives):

A. Possible technical subjects (modules of studies):

- IT support for construction projects (incl. BIM at 4/5 levels, software for management in construction).
- Cost and time management in construction (site finances, scheduling techniques, time space balance).
- Site Management (incl. elements of lean construction).
- Risk and Value Management.
- Decision Support Systems for Construction Managers (mathematical tools for various problems).
- Design Management (incl. RAMS).

B. Possible soft subject related to management in construction (modules of studies):

- Human Resource Management (incl. Psychology, Ethics and Motivation, Team Management, Communication Management, Cultural Aspects).
- H&S, Environmental and Quality Management.
- Procurement and Marketing.
- Legal Aspects in Construction (Claims Management, Disputes, Change/Variations Management).

## 4 SURVEY ON CONTENTS OF THE STUDIES – RESULTS

A very important factor influencing the selection of the content of study was a questionnaire of individuals – construction engineers and managers. The individuals are strongly related to the civil engineering industry, especially to the EU funded infrastructure projects. Over 240 responds were gathered and summarized. Responders, during numerous meetings, conferences and seminars were asked for assessment of studies' contents. Each module was marked from grade 1 – not sufficient / not relevant / not necessary subject, to grade 5 – excellent, very interesting subject. Programme received good opinions from participants, which pointed some additional elements of the modules, like agile management, crisis management, BIM case studies, planning, contracting, including FIDIC contract conditions, leadership, conflict management, communication skills. Detailed results of the survey is presented below.

### 4.1 Is the overall suggested program of studies sufficient?

| 1  | 2  | 3  | 4  | 5  | Number of observations | Average |
|----|----|----|----|----|------------------------|---------|
| 11 | 15 | 48 | 76 | 67 | 217                    | 4,02    |

## 4.2 Possible technical subjects (modules of studies)

### 4.2.1 IT support for construction projects

| 1 | 2  | 3  | 4  | 5   | Number of observations | Average |
|---|----|----|----|-----|------------------------|---------|
| 4 | 11 | 22 | 68 | 137 | 242                    | 4,33    |

### 4.2.2 Cost and time management in construction (site finances, scheduling techniques, time space balance)

| 1 | 2 | 3 | 4  | 5   | Number of observations | Average |
|---|---|---|----|-----|------------------------|---------|
| 1 | 9 | 9 | 43 | 179 | 241                    | 4,62    |

### 4.2.3 Site Management (incl. elements of lean construction)

| 1 | 2  | 3  | 4  | 5   | Number of observations | Average |
|---|----|----|----|-----|------------------------|---------|
| 1 | 10 | 33 | 68 | 130 | 242                    | 4,31    |

### 4.2.4 Risk and Value Management

| 1 | 2  | 3  | 4  | 5   | Number of observations | Average |
|---|----|----|----|-----|------------------------|---------|
| 6 | 14 | 28 | 62 | 133 | 243                    | 4,24    |

### 4.2.5 Decision Support Systems for Construction Managers (mathematical tools for various problems)

| 1 | 2  | 3  | 4  | 5  | Number of observations | Average |
|---|----|----|----|----|------------------------|---------|
| 9 | 28 | 66 | 61 | 77 | 241                    | 3,70    |

### 4.2.6 Design Management (incl. RAMS - Reliability, Availability, Maintainability and Safety)

| 1 | 2  | 3  | 4  | 5  | Number of observations | Average |
|---|----|----|----|----|------------------------|---------|
| 9 | 24 | 53 | 72 | 65 | 223                    | 3,72    |

### 4.2.7 Programme Management

| 1 | 2  | 3  | 4  | 5  | Number of observations | Average |
|---|----|----|----|----|------------------------|---------|
| 6 | 22 | 85 | 69 | 61 | 243                    | 3,65    |

### 4.2.8 Possible technical subjects (modules of studies) – summation

| 1  | 2   | 3   | 4   | 5   | Number of observations | Average |
|----|-----|-----|-----|-----|------------------------|---------|
| 36 | 118 | 296 | 443 | 782 | 1675                   | 4,08    |

### 4.3 Possible subjects related to management in construction (modules of studies)

#### 4.3.1 Human Resource Management (incl. Psychology, Ethics and Motivation, Team Management, Communication Management, Cultural Aspects)

| 1 | 2  | 3  | 4  | 5   | Number of observations | Average |
|---|----|----|----|-----|------------------------|---------|
| 5 | 16 | 28 | 76 | 117 | 242                    | 4,17    |

#### 4.3.2 H&S, Environmental and Quality Management

| 1 | 2  | 3  | 4  | 5   | Number of observations | Average |
|---|----|----|----|-----|------------------------|---------|
| 3 | 19 | 45 | 60 | 116 | 243                    | 4,10    |

#### 4.3.3 Procurement and Marketing

| 1 | 2  | 3  | 4  | 5   | Number of observations | Average |
|---|----|----|----|-----|------------------------|---------|
| 7 | 14 | 41 | 51 | 127 | 240                    | 4,15    |

#### 4.3.4 Legal Aspects in Construction (Claims Management, Disputes, Change/Variations Management)

| 1 | 2  | 3  | 4  | 5   | Number of observations | Average |
|---|----|----|----|-----|------------------------|---------|
| 3 | 14 | 29 | 61 | 134 | 241                    | 4,28    |

#### 4.3.5 Possible subjects related to management in construction (modules of studies) – summary

| 1  | 2  | 3   | 4   | 5   | Number of observations | Average |
|----|----|-----|-----|-----|------------------------|---------|
| 18 | 63 | 143 | 248 | 494 | 966                    | 4,18    |

## 5 NEXT DEVELOPMENTS IN THE PROJECT

The following elements of the projects are going to be prepared:

- For all modules, presented in chapter 3: choice and preparation of new didactic materials (texts, PPT presentations), in all Partners' languages, problem solving exercises, managerial games, case studies, materials will be uploaded at MOODLE platform in all Partners languages. Exercises are the important element of the studies. Partners suggested types of exercises for MBAIC project, examples presented in Figure 2.
- Lectures methodology is foreseen (interactive way of teaching with use of internet platform (MOODLE - Modular Object-Oriented Dynamic Learning Environment).
- The studies organizational scheme (blended learning – first lectures and meetings, as well as exams – at the University – face to face, rest of lectures – on Internet).
- The qualifications recognition system. Results of the project will improve didactic process and qualifications recognition of EU managers in construction.

**Matching questions B, words / sentences mentioned in one column and figures in the second one, course participant should match them. Example - Match element from column A with figure from column B:**



|                    |   |
|--------------------|---|
| <b>A</b>           | <b>B</b>  |
| wear goggles = = = |  |
| no entry = = = = = |  |

Fig. 2. Example of the exercises (in module related to health and safety).

## 6 CONCLUSIONS

The main effect of the projects presented in this paper is the recognition of needs for qualifications of construction and waste management personnel, recognition of applied systems of education, certification of the personnel and accreditation of studies and courses (formal and informal) in EU, formulation of complex structure of managerial knowledge in construction, assumptions of creating a set of textbooks, as well as the development of a curricula of studies and courses in the EU. Projects aim to develop a European system, which would assure standardization of levels and transparency of construction managers and waste managers qualifications. LdV projects (from 2006 within Life Long Learning European Programme) are proper tools for the creation of vocational courses for all professions, including construction.

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