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Discussion on the Impact of International Evaluation on Development of Construction Management Professional Education

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ABSTRACT

In order to guarantee the quality of education with international standards, Chongqing University passes the international professional evaluation by RICS, and the evaluation by NBCMA is also recognized by CIOB and ACCE. In this paper, we discuss the impact of international evaluation on development of construction management education by comparative analysis on the change of objective, course system and undergraduate's quality of education.

Keywords: construction management, international evaluation, professional education, impact

INTRODUCTION

Construction management is the technical integration management process of the specific construction projects in the specific industrial environment, the scientific management and control of the whole process of construction project requires diverse and complex technical background and foundation, which involved in building engineering, road and bridge tunnel engineering, railway engineering, port and waterway engineering and other categories. Construction management is a cross discipline of technology and management with characteristic of complexity (The engineering management and engineering cost specialty steering committee, 2015).

China is in the period of promoting new industrialization and new urbanization development comprehensively, the construction projects are wide-range, large-scale. With the continuous development of the globalization process, internationalization has become the only way for China's construction industry. The undergraduate students' international professional ability and comprehensive ability of construction management has become very important. Chongqing University construction management so far has received three international recognition of the industry association. This paper attempts to analyze the impact of international evaluation on development of construction management education by comparative analysis on the change of objective and graduate's quality of employment.

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State of the literature

- Studies on construction management education system are mainly center on improving the ability of Construction Management Majors through the development of curriculum or evaluation system.
- Combined with the experience of foreign advanced assessment, domestic scholars have made the improvement to the curriculum system, evaluation system.
- There are few studies assessing the impact of international evaluation on development of construction management professional education

Contribution of this paper to the literature

- The significance of the study lies in its contribution to research on the impact of international evaluation on construction management professional education through the change of training objectives, the curriculum system and the employment quality from 1999 to 2014.
- According to the study, we found that the international assessment has positive effects on training objectives curriculum system the industry guide and career development concerns.
- Through the international evaluation to master industry trends, and timely adjust the training plan, it is an important direction for construction management professional development

LITERATURES REVIEWING

To ensure the quality of construction management education, British schools to set up the construction management professional generally must through the RICS, CIOB and other important industry association's evaluation, otherwise it is difficult for graduates to obtain social recognition, or enter into professional work corresponding to the industry, thereby affecting their industry association official membership application and subsequent professional development (Liu, Peng, & Wu, 2006). The American construction management major is to receive the ACCE or ABET evaluation certification, according to whether it is focused on the management or construction, and the evaluation results are recognized by CHEA. In order to guarantee the quality of education in construction management, and let the graduates of the University's construction management be in accordance with the requirements of the relevant professional qualification examination, China's Ministry of Housing and Urban-Rural Construction established NBCMA and the national higher education evaluation standards for construction management(Higher construction management education professional evaluation committee of the Ministry of Housing and Urban-Rural Construction, 2009), learning from the advanced experience of foreign professional evaluation. As of 2015, the construction management specialty in national total of 37 colleges and universities smoothly passed the evaluation, through the process of self-evaluation and external-evaluation (People's Republic of China housing and Urban Construction Department, 2005). We strictly grasp the evaluation criteria, and promote the construction and improvement of the construction management's teaching system in China.

In order to let the construction management personnel better align with the international standards, NBMA respectively signed a five-year mutual recognition agreements of bachelor's degree evaluation in construction management. We mutually recognize the professional degrees which have passed direct evaluation by both parties, to confirm that when its graduates apply for the British and American relevant professional qualifications or membership, they can enjoy the equal status of professional education.

CIOB is a professional organization which consists of personnel mainly engaged in the construction management, and is also a professional association involved in the construction of the whole process management. CIOB was founded in 1834, has been 170 years of history, is the only UK authority bodies involved in construction management professional, and is also one of only nine royal institute of Chartered within the UK construction sector. With more than 43000 members who are all management personnel and professional personnel with rich experience in the construction industry in more than 100 countries, CIOB has become one of the world's most influential international professional societies with the rapid development of global integration and construction industry. And its membership is widely recognized in the international construction industry. Chartered Builder

Table 1. Comparison of training objectives for the engineering management specialty in China, United Kingdom and the United States

Country	Agencies	Length of schooling	Degree	Training objective
China	Construction Management Professional Teaching Steering Committee	Four years	Engineering degree or Management degree	Advanced specialized personnel who can do the whole process construction management in the domestic and international civil engineering or other engineering fields. They should meet the needs of socialist modernization construction, completely develop morals, intelligence, physique and esthetics, master technical knowledge in civil engineering or other engineering fields, master knowledge of management, economics, law and so on, have higher professional comprehensive quality and ability, and have professional morality, innovation spirit and international perspective.
UK	CIOB	Three years	Engineering degree or Science Degree	Master the management, business, technology and other aspects of knowledge and skills of modern construction industry; Meet the basic qualification requirements for industry access determined by professional associations; Cultivate comprehensive quality (IT, expression ability, teamwork, etc.), to lay a solid theoretical foundation for developing into project managers.
US	ACCE	Four years	Engineering degree or Management degree	Acquire professional knowledge in the construction field; Access to comprehensive and balanced education, access to the ability of self-learning and self-improving; Get professional awareness and leadership skills to serve the construction and society.

has become one of the authoritative qualifications in EU, the US, Australia, Africa, Southeast Asia, the Middle East and other countries and regions (CIOB, 2014).

The Royal Institution of Chartered Surveyors (RICS) is the professional association covering many sectors such as land, property, construction, project management and the environment, and so far has been 142 years of history, there are currently more than 140,000 members distributed in more than 144 countries around the world. RICS is an international qualification which represents the highest qualification quantity surveying, evaluation and other areas, it is mandatory in Europe, America and Australia, and also recognized in Asia, Africa, the Middle East and most the countries in Latin America. There are now a total of more than 400 relevant university degree courses have passed the evaluation of RICS. Graduates of those schools recognized by the CIOB and RICS can directly apply to become an official member when they meet the requirements of the work experience. It is advantageous for the students to apply for and obtain the practicing qualification in the related profession, thereby influencing their future career development.

American Council for Construction Education (ACCE) is an evaluation and certification body of domestic construction management education, which aims to promote and enhance the level and quality of the school's architectural engineering education. Graduates of American construction management in architecture, design, business, or other technical college who are mainly for the construction industry are all evaluated by ACCE (ACCE, 2014).

Table 2. Changes in the training objectives of construction management in Chongqing University

Year	Training objectives
1999	Senior management personnel who can do the Project Decision and the whole process construction management in domestic and international civil engineering or other engineering fields. They must have a solid knowledge structure composed of engineering technology, economy, management, basic knowledge of law and basic professional knowledge of a specific professional direction, at the same time have some practical ability, innovation ability.
2004	Senior construction management expertise who have obtained comprehensive basic engineer trainings, along with a strong practical ability, innovation ability and healthy personality traits. They should meet the needs of socialist modernization construction, completely develop morals, intelligence, physique and esthetics, and have the systematic, open knowledge structure consisting of the basic knowledge and professional knowledge which include civil engineering technology, construction management, real estate management, international project management, and the management, economy and law related to investment and cost management.
2009	Advanced specialized personnel who can do the whole process construction management in the domestic and international civil engineering or other engineering fields. They should meet the needs of socialist modernization construction, completely develop morals, intelligence, physique and esthetics, and have the systematic, open knowledge structure consisting of the basic knowledge and professional knowledge which include civil engineering technology, and the management, economics and law related to domestic and international project management. They also should obtain a comprehensive basic engineer training, along with strong professional comprehensive quality and ability, practical ability, innovation ability, a healthy personality traits and good social adaptability.
2014	Advanced specialized personnel who can do the whole process construction management in the domestic and international civil engineering or other engineering fields. They should meet the needs of socialist modernization construction, completely develop morals, intelligence, physique and esthetics, and have the systematic, open knowledge structure consisting of the basic knowledge and professional knowledge which include civil engineering technology, and the management, economics and law related to domestic and international project management. They also should obtain a comprehensive basic engineer training, along with strong professional comprehensive quality and ability, practical ability, innovation ability, a healthy personality traits and good social adaptability. More importantly, they should have the environmental awareness, awareness of sustainable development and people-oriented consciousness, and have an international perspective and broad vision of engineering, professional ethics, professional responsibility, social responsibility.

EVALUATED MEASUREMENTS

The Change of Construction Management Training Objectives

In contrast to the training objectives of the construction management specialty in other two countries, we can find that the construction management education in foreign countries pay more attention to the students' comprehensive quality training under the environment of international construction management, not only the training of professional knowledge and ability, students are required to accept fully balanced education, professional consciousness and self-learning and self-improving ability. Foreign countries also pay more attention to the convergence of school education and vocational qualifications, emphasize meeting the basic qualification requirements of industry access of the professional association through study, and laying the foundation of the project manager in the future.

Changes of the training objectives in Chongqing University construction management can be seen clearly under the influence of international evaluation from **Table 2**. It can be found that professional training objectives become more and more detailed year by year. From the initial simple cultivation of students' knowledge structure, ability structure and description of work area, gradually began to emphasize the development of students' professional comprehensive quality and ability, then further refine the systematic and open knowledge background and knowledge structure, and adjust the training objectives combining with the new trend of sustainable development and people-oriented in the engineering construction field timely.

Table 3. Comparison of the course changes of construction management specialty in Chongqing University

Year	Total credits	Total hours	Engineering technology		Engineering economy		Construction management		Construction law	
			Hours	Proportion (%)	Hours	Proportion (%)	Hours	Proportion (%)	Hours	Proportion (%)
1999	86	1399	743	53.1	128	9.1	496	35.5	32	2.3
2004	107.5	1952	792	40.6	216	11.1	872	44.6	72	3.7
2009	92	1472	704	47.8	128	8.7	576	39.1	64	4.4
2014	95	1600	664	41.5	128	8	736	46	72	4.5

The changing process of training objectives clearly reflects that domestic colleges and universities gradually value and refer to the competency requirements and training requirements standards of industry professionals which are identified by the International Trade Association. With the increasing scale of engineering, complexity of engineering technology, international competition of construction industry, wide application of information technology in construction management, implementation of global sustainable development strategy, expansion of project management and interdisciplinary development, construction management professional training is meeting newer and higher requirements. Therefore, construction management undergraduate education must expand horizons, and implement training programs converged with international education to meet the needs of talents under the international market economy. Under the influence of the international trade association evaluation, the training objective is becoming more refined, vivid, and more in line with the development trend of the industry with more industry characteristics.

Changes in the Curriculum System of Construction Management Training Program

Curriculum is the core content of construction management training program, it provides students with reasonable knowledge structure and learning process as well as a certain personalized training space to meet the needs of the rapid development of the industry (Wang, & Yang, 2010). CIOB believes that the educational framework should include the construction technology, construction environment and professional skills, industry and education should be fully interactive, industry orientation is the standard of construction education. As is shown in [Table 3](#), under the influence of the industry personnel training standards of the International Trade Association, the Chongqing University construction management adjust the curriculum settings of training program for many times (CIOB, ACCE, Chongqing University, 2014). Comparison shows that in the curriculum of 1999(when Chongqing University pass the evaluation for the first time), technical courses are in absolute advantage (53.1%), it reflects the technical background of civil engineering. Although management courses ranked second (35.5%), the gap (247 hours) between the two class hours is obvious. With the second and third round of re-evaluation, especially after the 2007 independent evaluation by RICS, from the big trend, the proportion of technical courses has declined year by year, but the number and class hours of management courses are gradually increasing, reaching 46% in 2014 and becoming the highest proportion of platform courses.

RICS provides 17 professional and 21 paths for membership application of APC. RICS also carried on the detailed stipulation and the description of mandatory capacity requirements, core capacity requirements and optional competency requirements in its "Professional competence evaluation guidelines". It is because of rigorous evaluation standards, RICS members became Professionals with globally recognized professional qualifications in the construction fields, enjoy a high professional reputation and the employer and the customer's trust, become the guarantee of professional authority. Referring to the RICS evaluation standard of professional competence, Chongqing University made a great change in the past training program in 2014. On the basis of the original core curriculum, Chongqing University added some featured courses such as Freshmen Seminar, Construction Management professional masterpiece review, Construction ethics, Introduction to Building Information Modeling to guide students to understand the industry trends and professional requirements as early as possible. And combined with the current graduate major career development, Chongqing University set up new general professional elective courses and three featured professional elective course groups ([Table 4](#)), which are all closely

Table 4. Elective courses for construction management in Chongqing University (2014)

Elective courses	General professional elective courses	Featured professional elective course		
		Real estate development and management	International construction management	Graduate pushed for Free
Courses	Construction Information Management Technology, Professional English Construction Project Risk Management Basic Principles of Steel Structure, Soil Mechanics and Foundation Engineering.	Urban Economy and Real Estate Market, Real estate development and management, Real Estate Appraisal, Real Estate Investment and Finance, Facilities Management Introduction.	International Engineering Contract, International Engineering Procurement and Risk Management, International Legal and Contractual Engineering.	Scientific Document Retrieval and Utilization, Introduction to Construction Research Methods, Intelligent Construction Management, Sustainable Construction, Construction management theory and practice frontier.

integrated with industry needs and future career development needs, so that students can be provided with personalized training programs, more professional development of space and choice.

In order to improve the students’ ability to solve practical problems, the construction management specialty in Chongqing University has always attached great importance to the practice teaching, and it has been occupying a large proportion (about 22%) in the whole courses. And according to the education orientation and standards formulated by the international trade association, Chongqing University strengthened close cooperation with enterprises so that students can get practical training in the enterprise, and hired long-term construction management experts to serve as a guest lecturer to deepen the students’ understanding of construction practice through cases. To help students master and be familiar with modern engineering technology, the college also built up the experimental center of urban development and construction technology, and Building information model (BIM) research center, and invited industry experts and experienced practitioners who can offer long-term engineering practice lecture.

Changes in Employment Quality and Evaluation of Graduates in Construction Management

Employment Statistics (Table 5) of students in construction management of Chongqing University (Chongqing University, 2000, 2004, 2009, 2010) show that, with the convergence of personnel training and international standards, employment destination of graduates is changing. The number of overseas employment and further education is increasing year by year from scratch, and the number of students working in foreign-funded enterprises is also gradually increasing. Graduates are increasingly being recognized and accepted by enterprises with international background.

From the “Annual report on the social demand and training quality of Chongqing University” conducted by the MyCOS company through tracking investigation of graduates, we can see that after six months of graduation, construction management professional graduates are located in the forefront of school in the employment competitiveness, employment quality, professional relevance and alumni satisfaction survey. It’s fully explained that the adjustment of personnel training program system meets the needs of the industry development, the professional teaching reform has a good effect, and it unanimously approved students, employers and the industry.

Table 5. Employment statistics of the graduates of Construction Management in Chongqing University

Graduation time	Public institutions	State-owned enterprises	Private enterprise	Foreign-funded enterprises	Overseas employment/further education	Domestic further education
2004	9.01%	42.06%	21.89%	7.3%	0/0	14.59%
2008	1.67%	36.11%	20%	9.44%	0/0	16.11%
2013	2.96%	18.52%	30.37%	17.04%	0/3.7%	23.70%
2014	2.60%	29.87%	22.08%	9.74%	3.25%/7.14%	22.73%

Table 6. Training results of construction management and graduates' evaluation survey

Graduation time	Non unemployment rate (%) after graduation for half a year	Average monthly income (Yuan) after graduation for half a year	Relevance of work with the major (%)	Turnover rate (%) within six months after graduation	Alumni satisfaction (%)
2011	97	4310	93	3	98
2012	98	4328	96	6	99
2013	98	5100	93	4	100
2014	100	4802	98	5	98

CONCLUSION

Although our construction management specialty no longer need to pass the CIOB, ACCE independent evaluation based on a mutual recognition agreement, in the construction industry globalization integration trend and background, training objectives, membership standards and quality requirements of the international trade association have been affecting the construction and development of Engineering Management in china. Through the comparative analysis of various levels' training programs, curriculum and graduates' quality evaluation before and after the professional evaluation, the impact of international evaluation can be found mainly in the following areas:

- (1) **Training objectives:** Since the construction management is derived from civil engineering disciplines, the professional training objectives of our country have always emphasized on the mastery of professional knowledge and skills. After reference of international evaluation, and combined with some current irregularities and chaos in construction industry, the engineering management and engineering cost specialty steering committee and domestic colleges and universities reflect on the past training objectives, thereby affecting schools to revise and adjust the training objectives.
- (2) **Curriculum system:** China's existing construction management professional training system has basically followed the "four platform" curriculum system set by the engineering management and engineering cost specialty steering committee. The applicant's professional competence requirements and professional competence evaluation criteria of foreign trade association, lead the domestic construction management to conduct a continuing adjustment of professional competency requirements and the past curriculum system.
- (3) **The industry guide:** Although the past professional education emphasized the combination of theory and practice, often there is a disconnect between education and engineering practice due to less practical teaching and limited engineering resources. Under the influence of international evaluation, the proportion of practical teaching in domestic Colleges and universities is gradually increasing, and the content of the course is constantly changing, which are closely following the industry development and considering the combination with the future industry vocational qualification exam. Teaching methods gradually transit to the "classroom teaching + research + independent / collective work" approach from the traditional classroom teaching, to increase students' independent study time and cultivate students' self-learning and self-improvement capabilities.
- (4) **Career development concerns:** In the past the professional education paid more attention to the acquisition of knowledge and skills of students, rarely guided students to think future career development before employment. Under the influence of international evaluation, domestic universities also began to

realize the importance of guiding students to think and pay attention to the career development, and began to provide a variety of courses and personalized training program according to the main career development of students.

With the development of globalization in the construction industry and the full implementation of the “the Belt and Road”, it means that the construction industry is facing unprecedented opportunities, but also facing more intense international competition, therefore it puts forward higher requirements for construction management education in our country. Only by implementing training programs converged with international construction management education can we meet the needs of the international market economy. Therefore, through international evaluation, we should understand the standards and requirements of the International Trade Association for the training of professional personnel and timely adjust personnel training objectives and training plan to train construction management personnel with an international perspective and innovative ability, so that they can meet the need for social and economic development.

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