



AUTHOR(S):

TITLE:

YEAR:

Publisher citation:

OpenAIR citation:

Publisher copyright statement:

This is the _____ version of proceedings originally published by _____
and presented at _____
(ISBN _____; eISBN _____; ISSN _____).

OpenAIR takedown statement:

Section 6 of the "Repository policy for OpenAIR @ RGU" (available from <http://www.rgu.ac.uk/staff-and-current-students/library/library-policies/repository-policies>) provides guidance on the criteria under which RGU will consider withdrawing material from OpenAIR. If you believe that this item is subject to any of these criteria, or for any other reason should not be held on OpenAIR, then please contact openair-help@rgu.ac.uk with the details of the item and the nature of your complaint.

This publication is distributed under a CC _____ license.



COBRA 2016

Toronto, Canada

20 - 22 September 2016



Supported by:



rics.org/cobra

RICS COBRA 2016

**The Construction, Building and Real Estate Research Conference
of the Royal Institution of Chartered Surveyors**

Held in Toronto, Canada in association with George Brown College

20 - 22 September 2016

© RICS 2016

ISBN: 978-1-78321-160-9

ISSN: 2398-8614

Royal Institution of Chartered Surveyors

Parliament Square

London

SW1P 3AD

United Kingdom

www.rics.org/cobra

The papers in this proceeding are intended for knowledge sharing, stimulate debate, and research findings only. This publication does not necessarily represent the views of RICS or George Brown College.

CONSTRUCTION COST AND COMMERCIAL MANAGEMENT SYSTEM IN THE UK AND CHINA – PROFESSIONAL BODY AND BUSINESS COMPARISON

Srinath Perera, Lei Zhou and Michele Victoria¹

Northumbria University, Newcastle upon Tyne, United Kingdom¹

ABSTRACT

Cost and commercial management processes and practices in different parts of the world vary significantly. UK-China cooperation agreements foster greater economic cooperation and professional mobility. Therefore, UK Cost and Commercial Management (CCM) Systems are mapped against Chinese Engineering Cost (EC) Systems to promote better understanding through this research. The research was conducted in three phases: detailed literature review of both systems, review of the professional bodies in both countries – Royal Institution of Chartered Surveyors (RICS) and China Engineering Cost Association (CECA) and business comparisons through questionnaire survey and case studies. Main focus of the paper will be survey findings. In addition to that professional body comparison will also be presented briefly. Findings indicate that EC service profile looks significantly different from cost management profile of the UK firms. In terms of usage of tools and documents, both countries have some common as well as distinct set of tools and documents. Both the UK firms and Chinese firms agreed that internationalisation is challenging for construction business though internationalisation can increase profit margin. Further, BIM is identified as most relevant trend in both the countries while internationalism, e-business, green buildings and carbon estimating are considered to be less significant trends.

Keywords: china, construction business, cost and commercial management, engineering cost, UK.

INTRODUCTION

The role of the Quantity Surveyor (QS) has evolved over the years since its origins in the mid 19th century and the development of the QS service profile is well documented in Cartlidge (2013). However, Quantity Surveying in its name exists mainly in the British Commonwealth whereas in Europe they are known as Construction Economist. In the US, China and Russia, Cost Engineers perform the core functions of the British QS. The Chinese Engineering Cost system evolved from the former Soviet Union with the introduction of a fixed price system. The establishment of the market economy in 1978 resulted in a boom in construction. Consequently, China Engineering Cost Association (CECA) was established in 1991 to better regulate and standardise the market oriented cost engineering profession. Then, Ministry of Construction in China launched a Bill of Quantities System in 2003 which was mainly influenced by the British QS systems. Since then, there had been significant growth in cost management consultancies catapulting the Chinese engineering cost profession to the forefront of

the construction industry. Although there are a few QS consultancies opened their branches in China, the rest of the industry has limited knowledge about the developments in the Chinese construction industry. The recent RICS research led by Ding and Smith (2012) concluded that Chinese cost management services are shifting from Russian Cost Engineering system to British Quantity Surveying format and that the RICS could play a key role to influence this change. However, Ding and Smith's study did not examine the difference between UK and Chinese cost management systems and their current practices. The absence of such a process comparison limits the ability of UK construction companies to penetrate the vast Chinese construction industry. Therefore, the gap is intended to be filled by the research findings and thereby, facilitate knowledge sharing and professional mobility between the UK and China.

THE CONTEXT

Cost Management System – The UK

Conventional quantity surveyor offered cost advice on alternative design solutions and advice on the cost implications of the design morphology and procurement (Kirkham, 2007). They assist the design team on all cost implications of construction projects. Traditional quantity surveying activities listed by Ashworth and Hogg (2007) includes: single rate approximate estimates, cost planning, procurement advice, measurement and quantification, document preparation, especially bills of quantities, cost control during construction, interim valuation and payments, financial statements, final account preparation and agreement and settlement of contractual claims. As the industry evolved, more value added services were expected from quantity surveyors. For instance, whole life costing, value management and risk analysis and management emerged as other roles of quantity surveyor which add value for the client (Ashworth and Hogg, 2007). Today, quantity surveyors are viewed as financial managers of the construction team who add value by monitoring time and quality while achieving budget. Therefore, traditional role of QS has changed immensely and now QS is responsible for discovering a long-term vision of building projects, assessing alternative options and providing clients with valuable information to make informed investment decisions and sustainable development ((Ashworth & Perera, 2015; Kirkham, 2007).

On the other hand, QSs are increasingly developing better client focus to be aware of the ways in which a particular client perceives or even measures value (Cartlidge, 2011). Moreover, the new paradigm of software-centred service delivery has irrevocably changed the way that cost planners work in professional QS and cost consultancy practice (Kirkham, 2007; Potts, 2008, Ashworth & Perera, 2015). The NRM suite of documents (RICS, 2012a; 2012b; RICS, 2014) spanning from early stage cost management to maintenance and facilities management stages published by the RICS formally defines the total process. Hence, cost and commercial management systems in the UK stand out globally as exemplary.

Engineering Cost System – China

Under the old planned economic system of China, there was no competition between contractors as they were all state-owned and the Chinese government guaranteed construction cost reimbursement. The most commonly used project procurement system was the traditional state assignment where the price was agreed by the

contractors through a direct government assignment, rather than through competitive or negotiated tendering (Smith, et al, 2004). Then, the government gradually transferred its planned economic system into a market-oriented economic system with the implementation of the “open-door” policy since 1980s (Fan, 1988; Chen and Wills, 1999). Eventually, new procurement methods used in other countries were introduced to supplement and gradually replace the past “centralised” government assignment system (Smith, et al, 2004). Later, the Ministry of Construction promulgated The Code of Valuation with Bill of Quantities of Construction Works in 2003 (CVBOQ) (Chen, et al, 2011) which lead to a revolution in the history of Chinese construction industry. Then, there was transformation from the traditional mode of standard rates based valuation to the modern mode of Bill of Quantities (BQ) based valuation which is market-oriented (Chen, et al 2011). Now contractors are experiencing a new operating system in which engineering cost depends on market rates instead of the traditional standard rates controlled by the government. During the past decade the competitive tendering system based on the bill of quantities method, influenced by the British systems, became the predominant system in China. Now the quantities take-off for generating bill of quantities plays an important role in tendering and bidding, progressive payment and final accounting. The CVBOQ code is reviewed and revised every five years, and the latest version was launched in 2013. The industry has achieved significant progress in developing national standards towards approaching international practice (Shen and Song, 1998).

The EC management system can be divided into four parts: EC management legal system, EC management standards system, engineering quota system and engineering information system. The first two areas are classed as ‘Engineering Cost Management’ and the latter two are classed as ‘Engineering Pricing Management’ which are discussed in detail below (Zhou and Yin, 2013):

- EC management legal framework includes laws, regulations and guides for engineering cost management. It focus on two aspects: first, the macro level’s regime of project investment system, which is more about the content of infrastructure investment management norms, the second is about the construction cost project management related systems (Wu, 2014; Zhou and Yin, 2013).
- EC management system refers to the laws, regulations and norms for content management in addition to the traditional system, but based on national standards and industry standards so as to achieve a standardized project management and engineering cost consulting behaviour, and the quality of the technical content. These include: Unified Engineering based on the standard cost management basic terms, fee structure, specification of engineering cost management, project management division and measurement rules, norms; standardised various project cost outcome document preparation procedures; quality standards and quality engineering cost consulting archives; specification construction cost index published standards and the exchange of information among others.
- Engineering quota system is the core of Chinese cost estimating methods. It involves the use of pricing codes and index as the main method for project cost estimating. The quota system is based on engineering construction projects at different stages of vertical division for estimating indicators and budget estimates for the fixed quota. These are classified according to the type of the construction project as: unified national housing construction and municipal engineering, general engineering denominated fixed installation. Also includes railways, highways, metallurgy, building materials, and other professional engineering

denominated fixed, local housing construction and municipal engineering, general engineering denominated fixed installation.

- Engineering cost information system includes the construction cost index and construction labour, equipment, materials, construction machinery and pricing information.

THE METHOD

A three phased research approach was employed as follows:

- **Phase 1: Literature Review & Model Development**

Detailed literature review of cost and commercial management operations in the UK and China led to the development of a conceptual cost and commercial management system model for the UK and China separately. Models are developed for RIBA 2013 project stages for the UK and comparable stages for China, and cost management services delivered in each stage by different project stakeholders were mapped. Then the models were reviewed through a detailed Delphi method based expert forum. Two expert forums were formulated consisting of three members for each country. The conceptual models were then modified based on the experts' comments and the final models were derived. The summary of the final models were presented in COBRA2015 (See, Perera, et al., 2015).

- **Phase 2: Professional Body Review**

The key objective of this phase was to explore the background of the professional bodies, organisational structure, functions, qualification pathways, accreditation processes, education and training systems which governs the QS and EC profession in both the countries. Data were collected from the websites (of the organisation) and semi-structured interviews with 3 key members from RICS and CECA each.

- **Phase 3: Business Comparison**

This phase involved analysing and exploring business models and service profiles of cost management practices in both the UK and China. Both questionnaire survey and case study approach were used to compare the business models in the UK and China. Individual questionnaires were designed to study the cost and commercial management systems in the UK and China and sent to consultancy practices in both the countries respectively. Survey questions were designed to capture company profiles, business models of the companies, cost and commercial management functions delivered and expected future trends in cost management services. Survey sample consisted of 25 QS practices in the UK while 100 EC practices in China. Case studies were conducted to gain insights in to both the systems. Three QS practices from the UK and three EC practices from China were selected for the study where the cases included small, medium and large consultancy practices in both countries. However, case studies are not discussed in the paper due to space limitations.

RESEARCH FINDINGS AND DISCUSSION

Professional Body Comparison

RICS is the governing body for QS profession in the UK. On the other hand, CECA govern Cost Engineering profession in China. Table 1 presents the comparison of RICS and CECA. Comparison suggests that RICS is recognized all over the world and has a matured system in place compared to CECA. However, CECA demonstrates power and authority by regulating the Enterprise License System which is a

fundamental requirement to operate in China. Even though RICS has a long history compared to CECA, the number of chartered member in RICS is comparatively less. This is an indication of the rigorous process employed in each qualification pathway ensuring Excellency of its members.

Table 1: RICS vs. CECA

	RICS	CECA
History	140 years of history	25 years of history
Members	More than 120,000 chartered QSs over 140 countries excluding student members (approx.. 81,000)	Over 143,000 qualified Cost Engineers
Structure	Matured governance structure	Simple organization structure
Authoritative power over profession	Less authoritative on QS profession	More authoritative over Cost Engineering profession (i.e controls Enterprise License System that regulates business scope of CE firms and its service quality in China)
Regulating power	Has the power to influence and regulate industry standards	Has the power to influence and regulate industry standards
Routes to membership	Various routes to memberships are available	Only one route to membership is available
Types of memberships	Three levels of memberships: Associate, Chartered and Fellowship	Only Chartered membership
Assessment	Assessment of Professional Competence (APC) is facilitated through document submission and a final viva voce examination	Assessed through written examinations on four modules - project cost management, project cost estimating system, technology & measurement and case study analysis

There is a core set of professional guidance developed by RICS available for QSs called the ‘Black Book suite’ of guidance documents. In addition to that, NRM suite is another important standard developed by the RICS. Further, RICS disseminates knowledge through an extensive series of Continuing Professional Development (CPD) programmes. Both RICS and CECA are actively involved in education and research with universities and also fund research projects. Furthermore, RICS facilitates internationalization via four strategies including: **standardisation of measurements, Memorandums of Understanding, reciprocal agreements and joint events** with other professional bodies. On the other hand, CECA is also very keen on internationalisation and supports companies that embark into international markets. However, language barrier and difference in cost and commercial management systems from one country to the other are identified as two key obstacles in internationalization for CECA.

Business Comparison

- Respondents’ profile

Respondents’ profile represented majority of medium to large companies in the UK as opposed to small to medium in China. Half of the respondents in the UK companies had over 50 years of business establishment compared to majority of the companies in China had less than 30 years of establishment. UK sample represented a wide range of

firms including sole trader, Limited Liability companies and subsidiaries. In contrast, Chinese sample consisted of mostly Limited Liability companies (LLC) reflecting the recent origins of firms in China following 21st century business trends. Most of the respondents (QS practices) in the UK have international operations compared to none in China. Further, all identified professional fee strategies - percentage, fixed rate and negotiation basis, are equally popular in the UK while in China the Percentage fees and Negotiated fees are more popular than Fixed fees. Range of professional fee charged in the UK is between 0.5% and 2.0% whereas much lower level of fees was reported in China. In terms of technology usage, Intranet and Internet are used heavily in the UK with less than half of the respondents using Extranets. Firms in China use technologies significantly differently with high usage of Intranet and Extranets while significantly lower use of Internet reflecting the barriers and limitations imposed by the State on the use of the Internet.

- Core Cost Management Services

Figure 1 presents the comparison of core cost management services provided by the consultancy practices in the UK and China. As can be expected all the identified core services are always or frequently used by the UK practices. This does not come as a surprise because these services are the core cost management services in the UK. However, EC service profile looks different from cost management profile of the UK. The prominent use is indicated in Measurement and Valuation, BoQs, Tendering and Final accounts. These services are then followed by Interim Valuations, Valuing Variations and Claims.

Lower level of practice is evident in early stage estimating, feasibility studies and cost planning in Chinese firms. An interesting finding here is the use of BoQs in China, which is becoming hugely popular following the practice in UK 20 year ago.

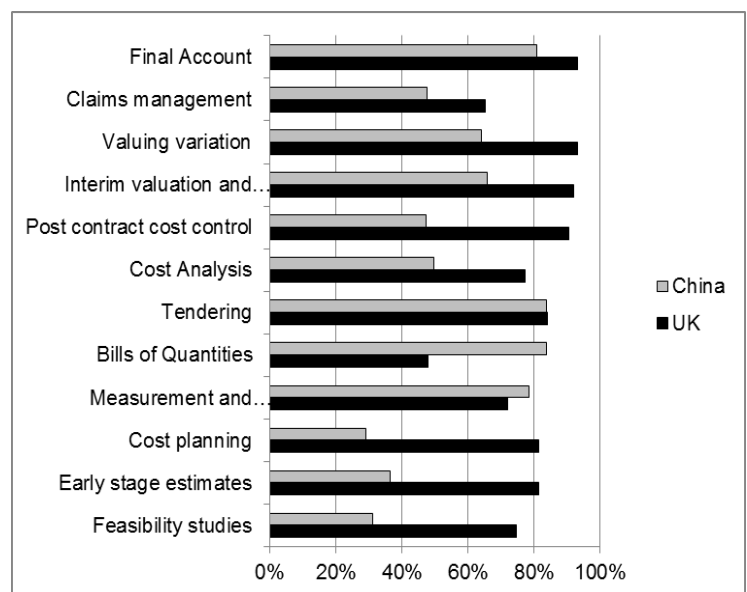


Figure 1: Core cost management services provided by consultancy practices in the UK and China

- Supplementary Services

Contract administration and procurement advice are identified as the most commonly delivered services (in the sample) in the UK while other services are exercised at a fair level. Most of the identified supplementary services are not included in the Chinese EC service profile. However, services related to Contract Administration, Dispute Resolution, and Cost Auditing are provided by some firms in China.

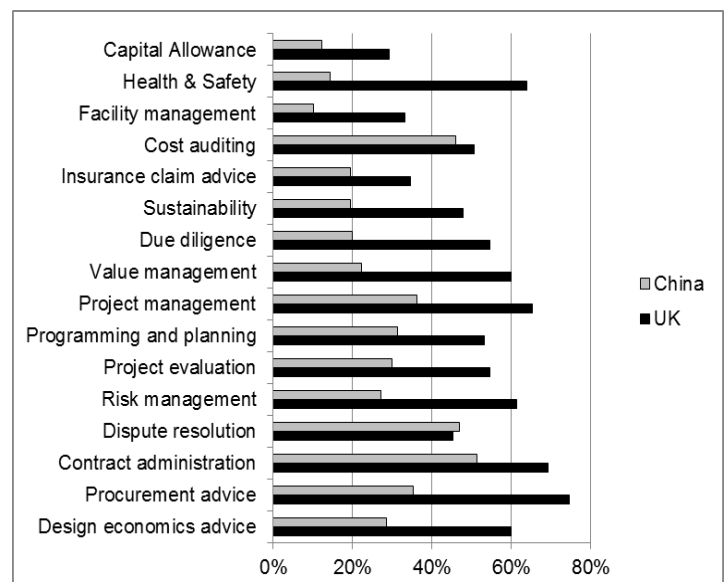


Figure 2: Supplementary cost management services provided by consultancy practices in the UK and China

The single scale comparison of these services between the two countries is illustrated in Figure 2.

- Tools and Documents for Cost and Commercial Management Services

16 documents and tools were surveyed in the UK including: BCIS, NRM1/2/3, SMM7, CESMM3, price books, online cost databases, Co-ordinated Project Information, UK Building Blackbook, CapIT, RICS Blackbook series, JCT, NEC and FIDIC . As expected, traditional tools like BCIS and Price Books are most commonly used. However, increasing popularity of the recently introduced NRM suite of documents is also evident. The Black Book series published by the RICS is yet to gain popularity. This might be due to lack of awareness among QSs. It is also noted that Embodied Carbon estimating data book CapIT has limited usage among respondents. The standard forms stack up in the order of JCT, NEC and FIDIC in terms of popularity in practice.

Similarly, 10 different tools and documents used for EC functions were surveyed in China namely: 2008 Code of Bill of Quantities, 2013 Code of Bill of Quantities, Construction Engineering Cost Estimating and Standard Database, EC Consulting Enterprise Management Guide, Engineering Cost Consulting Manual, Contract Law, P.R.C Construction Law, Construction Contract Form, Tendering Law and FIDIC. The analysis indicates a prolific use of almost all surveyed except FIDIC conditions of contract. This could echo upon the limited interest in internationalisation from the EC firms in China.

- Future Trend

BIM was identified to be the most relevant future trend for both the UK and China. Issues related to sustainability such as Green Buildings, Carbon Estimating and Environmental Assessment are also identified as important for QS profession in the future in the UK. Both the UK and Chinese firms agreed that internationalisation is challenging for construction business though internationalisation can increase profit margin and greater potential for e-business implementations in the future.

CONCLUSION

Cost management has evolved since mid-19th century while history of EC services can be tracked back from the late 20th century. Therefore, EC service profile looks significantly different from cost management profile of the UK firms. Also, cost and commercial management systems in the UK stand out globally as exemplary. Professional bodies play an important role in influencing the cost management profession in each country. However, RICS and CECA that govern the QS/EC profession in the UK and China respectively demonstrate distinct characteristics. Even though RICS has a long history and matured structured, CECA is more authoritative over Cost Engineering profession in China. Especially, the enterprise license system in China makes CECA more authoritative over the profession.

All identified core cost management services are frequently or always used by the QS practices in the UK while Measurement and Valuation, BoQs, Tendering and Final accounts are prominent in China. Contract administration is the most commonly used service in the UK among other supplementary services, while insurance claim advice is the least used. Most of services classed as supplementary services in the UK CCM service profile are not included in the China EC service profile. However, services

related to contract administration, dispute resolution, and cost auditing are identified as services that are trending in China. In terms of usage of tools and documents, both countries have some common as well as distinct set of tools and documents. Out of which BCIS, Price Books and other cost databases stand out in the UK while NRM suite is gaining popularity. Likewise ten different tools and documents used for engineering cost practices were surveyed in China. The analysis indicates a prolific use of all documents surveyed except FIDIC conditions of contract which echoes limited portfolio in internationalisation for EC firms. Both the UK firms and Chinese firms agreed that internationalisation is challenging for construction business though internationalisation can increase profit margin. Further, BIM is identified as most relevant trend in both the countries while internationalism, e-business, green buildings and carbon estimating are considered to be less significant trends.

REFERENCES

- Ashworth, A and Perera, S (2015), *Cost Studies of Buildings*, 6th Edition, Routledge.
- Cartlidge, D. (2011) *New aspects of quantity surveying practice*. Abingdon, UK: Spon Press.
- Cartlidge, D. (2013) *Quantity surveyor's pocket book*. 2nd edn. Abingdon, UK: Routledge.
- Chen, J.J. and Wills, D. (1999), (Eds) *The Impact of China's Economic Reforms upon Land, Property and Construction*, Ashgate, Aldershot.
- Chen, Q., Yan, J., Li., Q., (2011) Reengineering of Construction Project Procurement Process on Bill of Quantities, http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6035132 [Accessed on 10th Nov 2014]
- Fan, L.C.N. (1988), Equity Joint Ventures in the Construction Industry in China, Occasional Paper, Chartered Institute of Building, Ascot.
- Kirkham, R. (2007) *Ferry and brandon's cost planning of buildings*. 8th edn. Oxford, UK: Blackwell Publishing.
- Perera, S., Zhou, L., Udeaja, C. and Victoria, M. (2015) a comparative study of construction cost & commercial management systems in the UK and China, In: COBRA AUBEA 2015, 8 – 10 July, Sydney, Australia.
- Potts, K. (2008) *Construction cost management, learning from case studies*. Abingdon, UK: Taylor & Francis.
- RICS (2012) *RICS New rules of measurements, volume 1 – order of cost estimating and elemental cost planning*. 1st edn. UK: RICS.
- RICS (2012) *RICS New rules of measurements, volume 2 – detailed measurement for building works*. 1st edn. UK: RICS.
- RICS. (2014) How can building information modelling (BIM) support new rules of measurement (NRM1). London: RICS.
- Shen, L., and Song, W., (1998) Competitive Tendering Practice in Chinese Construction, *Journal of Construction Engineering and Management*, Vol 124 no.2 March/April, 155-161
- Smith, J., Zheng, B., Love, P.E.D., and Edwards, D.J., (2004) Procurement of construction facilities in Guangdong Province, China: factors influencing the choice of procurement method, *Facilities*, Volume 22, Number 5/6, pp. 141-148
- Smith, P.V. and Ding, G.K., (2012) Construction cost management in China: the impact of government economic reforms, In: Pearl, R.G. and Verster, J.J.P., (Eds.), *International Cost Engineering Council: 8th ICEC World Congress, 2012*, The South African Association of Quantity Surveyors, Durban, South Africa, pp. 1 – 20.
- Wu., Z (2014) Research Report of Cost Engineering System in China, CECA,
- Zhou, H. and Yin, Y., (2013) *Cost Engineering Manual*, Tianjing University Published.