



## Improving the competence of construction management consultants to underpin sustainable construction in China



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### A B S T R A C T

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As a vital component of construction professional services (CPS), construction management consultancy is in nature knowledge-intensive and client-tailored. Although recent studies have acknowledged the increasing role of this subsector of CPS in the attainment of sustainable construction, little attention has been given to the education and training of its main body, namely construction management consultants (CMCs). This study investigated the competence and knowledge structure of CMCs by taking China as an example. Using the methods of interview and questionnaire survey, three key competences of CMCs and the underpinned knowledge structure were identified. The identified competences are personnel quality, onsite practical skills, and continuing professional learning. Underpinned these competences are the knowledge structure composed of a number of disciplines including construction cost planning and control, civil engineering and construction, engineering contract and law, and construction project management. The research findings lay a solid foundation for future studies to probe into the role of construction management consultants in the area of sustainable construction.

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### Introduction

The construction industry has become both a vehicle for improving the quality of life and an entity that can determine the environmental and social sustainability of development efforts (Plessis, 2007). Such dual roles spell out the significant contribution of the industry to sustainable development. “Sustainable construction”, which means creating and managing a built environment based on resource efficient and ecological principles (Kibert, 1994; Manoliadis, Tsolas, & Nakou, 2006), outlines the sphere that the construction industry can reach sustainability. After a long evolution in ontology, the seed of “sustainable construction” has matured into a discipline comprising various practical and scientific issues (Hill & Bowen, 1997). One of the critical issues in the discipline is to determine a proper approach to keep sustainable construction informed in accordance with the hierarchical definitions of construction. In effect, the definition of construction ranges from site activity, project lifecycle, everything related to construction

business to the broader process of human settlement creation (Irurah, 2001). Construction activities are executed for constructing physical facilities (i.e., buildings and infrastructures), which will normally last for decades. The sustainability performance of a physical facility is triggered to a large extent from its construction process, suggesting that sustainable construction is fundamentally activity-specific.

The activity-based nature of sustainable construction calls for adopting creativity, skills, know-how, and modern technologies as many as possible to implement cleaner production (Berggren, 1999). In this sense, sustainable practices make it necessary to improve interdisciplinary collaboration and multi-stakeholder partnerships on construction sites. Construction activities in general involve three primary stakeholders – clients, contractors and consultants. The former two stakeholders have attracted much consideration under the heading of sustainable construction, while the subject of consultants has not (Frattari, Dalprx, & Salvaterra, 2012; Riley, Pexton, & Drilling, 2003). As a result, there are two questions that have not been explored explicitly, namely what kind of consultants should be and how to educate and to train them effectively with the pace of sustainable development. Consultants provide a wide array of professional services to clients and on behalf of them monitor construction process and interact with

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contractors. They can exert immense influence on sustainability of to-be-built facilities by providing practical solutions to construction activities, varying from the use of cleaner, more efficient technologies to end-of-pipe management approaches. Furthermore, a full capacity of competitive consultants underscores a sustainable growth of construction industry. For instance, construction-related consultants in Hong Kong have built up a reputation outside the territory, and they have become an imperative factor of the industry's competitiveness (Wong, Ng, & Chan, 2010).

It is widely acknowledged that developing countries have met great challenges of finding a holistic approach to guarantee sustainability in the construction industries (Plessis, 2007; Ye, Shen, & Zuo, 2013). As one of the largest developing countries in the world, China appears to be a huge construction site (Chen & Chambers, 1999; Lu, Ye, Flanagan, & Jewell, 2013). The challenge of the Chinese construction sector is not only to produce sufficient housing and infrastructures to the society, but also to do it in a socially and ecologically responsible way. There is an urgent need to address the aforementioned two questions in China's construction industry wherein sustainability challenges have been aware of. Recent years have witnessed special academic attention given to the evaluation of engineering consultants' capabilities (Ng & Chow, 2004), the performance of engineering consultants (Chow & Ng, 2007), and sustainable competitive advantages of project management consultants (Betts, 1994). Nonetheless, research works devoted to the competence of construction management consultants (CMCs) are very limited, and they have not pinpointed the ways to manage the competitiveness of CMCs properly in responding to social appeal for sustainable construction. In view of the intricacy of the subject, this paper presents takes an early step to investigate the key competence of CMCs and its underpinned knowledge by taking China as an example. By doing so, the research outcomes can lay a useful foundation for future studies to examine the contribution of CMCs to sustainable construction.

### Characteristics of construction management consultancy

Construction management consultancy is an integral part of construction professional services (CPS) that are created by a set of knowledgeable consultants including architects, engineers, engineer-contractors, architect-engineers, engineer-architects, environmental, planners, and geotechnical engineers, landscape architects (Lu, Ye, Flanagan, & Jewell, 2013). In the CPS sector, CMCs refer in a different way to those professional organizations and/or individuals that offer a combination of skills as well as strategic and tactical solutions to the construction process. The services of CMCs are characterized by a framework of appropriate disciplines and ethics, and decision-making on construction activities in independent, scientific, and impartial manners (Bowen, Pearl, & Akintoye, 2007). The wide span of consulting business requires CMCs to own multi-disciplinary knowledge and experience such as civil engineering, construction technology, financial management, law, and regulation.

The services of construction-related consulting spread out along some established management procedures, which are usually set forth and can be tailored to satisfy different demands of clients. Alongside this strand, the study by Ezeldin and Abu-Ghazala (2007) unveiled three main steps of a quality management system for design consultants to operate, namely awareness, benchmarking of existing practice, and verifying the validation of consulting model. Previous studies have demonstrated that an efficient consulting procedure enhances the value chain of construction projects by interweaving clients with consultants tightly (Kometa, Olomolaiye, & Harris, 1996). This gives the suggestion that value engineering is a useful tool for clients to appraise the performance of CMCs, and

clients have a profound effect on the performance of construction consulting firms. The effect in the view of Kometa et al. (1994) mirrors the main attributes of clients including financial stability, quality of management, organizational quality of client, past performance, client characteristics, client's duty, and past experience.

There are two approaches for measuring the extent to which consultants are able to provide quality services. One is using a number of firm factors, such as the background of firms, past performance, and the capacity to accomplish the work and project approach (Cheung, Kuen, & Skitmore, 2002). The other is using some project-related factors, such as design submission number, clarity and comprehensiveness of drawings and documents, quality of design solution, and recommendations for reducing project risks (Chow & Ng, 2009). However, previous studies have pinpointed that the competitiveness of construction consulting business lies in technical accuracy and overall quality of people (Cheng, Proverbs, & Oduoza, 2006), and embraces a well-qualified team, a well-defined project approach, and effective communication (Avila, 1997). As pointed out by Cheung et al. (2001), charismatic and participative leadership dominates the satisfaction of consulting team and eventually affect the performance of consultants. Soft skills such as conscientiousness, initiative, social skills, controllability and commitment have equivalent importance to construction consultants (Ling, Ofori, & Low, 2000). In a broader angle, the study by Ng and Chow (2004) suggested that consultants have technical capabilities, management capabilities, financial capabilities, and quality assurance and control.

### Construction management consultancy in China

Construction professional services (CPS) in China have undergone gradual changes after the successful development of some mega projects, such as Three Gorge Project and Qinhai-Tibet Railway Project (Lu, Ye, Flanagan, & Jewell, 2013). The current industrial landscape of CPS in China reflects an accumulative effect of long-time national reform and open-door policies on the construction sector (Lu, Ye, Flanagan, & Jewell, 2013). There are two major parts of CPS, namely, engineering architecture/design and construction management consultancy. The latter one includes construction supervision, project bidding agency and quantity surveying. As a typical subsector of CPS, CMCs originated from China's construction supervision system introduced to assist clients in improving construction process (Liu, Shen, Li, & Shen, 2004). In this system, construction consulting services are provided by construction supervision firms which employ engineers to supervise contractors' onsite activities. In effect, the growth of China's construction industry has been fueled by an unflinching inflow of capital investment, advanced technologies and managerial approaches from either advanced countries or developed regions (Ling, Ibbs, & Cuervo, 2005). The participation of foreign production elements has advanced the traditional construction business paradigm to an internationally competitive one. With the increasingly diverse requirements and expectation of clients, construction supervision has maintained evolution to embrace CMCs.

Meanwhile, the sizeable urbanization as well as the emergence of numerous construction projects characterized by complicated technologies and management challenges has yielded tremendous opportunities for CMCs to prosper. According to the Report of New Urbanization in China (Niu, 2012), the urbanization rate of China will sustain an annual growth of 1% until the year of 2020. This means that the Chinese construction industry would be facing a larger demand of housing development. Overwhelming housing demand could stir a rapid growth of construction consulting services. For instance, the subsector of construction cost consultancy has seen the increase of firms' income to RMB 80.685 billion and

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