

COMPARISON OF KEY COMPETENCES OF CLIENTS AND DESIGN-BUILD CONTRACTORS IN THE CONSTRUCTION MARKET OF THE PEOPLE'S REPUBLIC OF CHINA (PRC)

Bo Xia*

School of Civil Engineering and Built Environment, Queensland University of Technology, Australia

Albert P. C. Chan

Department of Building and Real Estate, Hong Kong Polytechnic University, Hong Kong SAR, China

Jian Zuo

School of Natural and Built Environments, University of South Australia, Australia

ABSTRACT

Clients and Design-Build (DB) contractors are two key stakeholders in DB projects, and contribute significantly to the successful project performance. This study aims to identify and compare such key competences in the construction market of the PRC. After the survey of available literature and face-to-face interviews, a two-round Delphi questionnaire survey was conducted to identify the key competences of clients and DB contractors in DB projects. Relative importance of these identified competences were ranked and compared. The questionnaire results indicated distinct differences between the key competences of clients and that of contractors. The contractor's key competences emphasise on DB experience, corporate management capability, building and design expertise, financial capability, enterprise qualification and reputation. While the client's competences focus on the ability to clearly define the project scope and requirements, financial capacity, contract management ability, adequate staff, effective coordination with DB contractor and similar DB experience. Both clients and DB contractors should clearly understand the competence requirements in DB projects and possess all the necessary competences for the successful outcome of DB projects. The identification of these key competences provides clients and DB contractors with indicators to assess their capabilities before going for the DB option. Furthermore, the comparison of competences for clients and DB contractors will result in better understanding of DB system and improve the communication between these stakeholders.

Keywords: China, Competence, Delphi Method, Design and Build.

1. INTRODUCTION

As key stakeholders in DB projects, both clients and DB contractors contribute towards the project success (Songer and Molenaar, 1997, 1998; Mo and Ng, 1997; Leung, 1999; Pearson and Skues, 1999; Chan *et al.*, 2001; Ling, Chan *et al.*, 2004; Lam *et al.*, 2008). Although both clients and DB contractors play a critical role in the project, they are required to possess different competences. DB client's responsibilities are mainly commissioning and financing (Kamara *et al.*, 2000). They should, for example, be able to develop clear definitions of project scope, express their requirements clearly in project briefs, and possess the ability to manage design changes (Kometa *et al.*, 1995; Mo and Ng 1997; Songer and Molenaar 1997, 1998; Leung 1999; Deakin, 1999; Pearson and Skues 1999; Chan *et al.*, 2001; Gransberg *et al.*, 2006; Lam *et al.*, 2008); while the requirements for DB contractors mainly focus on techniques of design and construction, track record, and adequate skills in project management (Mo and Ng 1997; Songer and Molenaar, 1997, 1998; Hemlin, 1999; Pearson and Skues 1999; Chan *et al.*, 2001; Ling *et al.*, 2004; Ling and Liu, 2004; Lam *et al.*, 2008). It is clear that clients and DB contractors have different responsibilities; and therefore, both should clearly understand the competence requirements in DB projects accordingly.

* Corresponding Author: Email - paul.xia@qut.edu.au

However, in the DB market of the PRC, many clients and DB contractors lack clear understandings of requirements for their DB competences. According to the survey conducted by China Construction Industry Association (CCIA), many clients do not clearly define the project scope or objectives before handing over projects to DB contractors. Even though many DB contractors lack the sophisticated design expertise to fully integrate the design and construction functions, they still try to assert greater control of DB projects (Wang *et al.*, 2004). As a result, conflicts of interest arise among project stakeholders.

Furthermore, most of Chinese clients and DB contractors lack the adequate competences to execute DB projects successfully (Xia and Chan, 2008). The DB system has not been widely used in the Chinese construction industry, with only less than 10 per cent of the construction projects delivered in DB method in 2006. Given the unique characteristics of the domestic DB market, the requirements of DB competences for clients and DB contractors in the PRC will probably be different from those required in other countries.

Therefore, this study aims to identify and compare the required competences of clients and DB contractors in the PRC construction market. It is expected that the identification and comparison of those competences will provide clients and DB contractors with measures to evaluate their DB capabilities and further promote their understanding of the DB system.

2. LITERATURE REVIEW

Clients and DB contractors are two key stakeholders in DB projects. Previous studies have identified key competences of clients and design-builders for the success of DB projects (see Table 1).

Table 1: Summary of Required Competences of Client and DB Contractor

Authors	Geographical locations	Client's required competences	DB contractor's required competences
Songer and Molenaar (1997)	U.S	The owner should precisely understand and define the project scope, and have adequate staff dedicated to the project.	The contractor should have the design-build related experience.
Mo and Ng (1997)	Hong Kong	The owner should have the ability to develop high quality client brief, and have DB experience.	The contractor should have the Design-build related experience
Molenaar and Songer (1998)	U.S	The owner should clearly define project scope, have the DB experience; construction sophistication and enough staff	Track record
Pearson and Skues (1999)	Hong Kong	Abilities to develop clear project scope, owner's requirements and client's brief; manage the design process and design changes.	Experienced in design-build projects and familiar with local industry and regulatory system
Leung (1999)	Hong Kong	The ability to clear define the project scope; have comprehensive employer's requirements; thoroughly assess the bidder's qualification and technical proposal.	The contractor should be familiar with the local construction industry and have the experience in design-build concept.
Chan <i>et al.</i> (2001)	Hong Kong	The client had a good capability of managing DB project; a precise understanding of the DB project scope; and clearly articulated end-user's needs.	Construction technology capabilities; project management capabilities; and design capabilities.
Ling and Liu (2004)	Singapore	The client should have a high level of construction sophistication and construction experience, and have handled DB projects in the past.	Adequate human resources and skill set, track record for project execution
Lam <i>et al.</i> (2008)	Hong Kong	The client or his representative has the project management skills, technical skills, active involvement in the project, decision-making power, and DB experience and capability.	Project management skills, construction and design capabilities

As shown in Table 1, the key competences of design-builders mainly focus on previous experience on DB projects and building and design techniques; while the key competences of DB clients emphasise on the ability to clearly define project scope and end users' requirements.

In the DB market in PRC, most of the clients and design-builders lack the aforementioned competences. It constitutes barriers to entry into the PRC DB market (Wang *et al.*, 2004; Xia and Chan, 2012). Nevertheless, although the DB system has not been widely used in the PRC, it will bring benefit to the PRC construction industry. The advantages of the DB system, such as single-point responsibility, shortening duration time, leading contractors to keep on technological upgrading, can provide solutions to many problems in the current construction market (Xia and Chan, 2008). Consensus on the effectiveness of DB system has been reached among many owners and government officials. It is anticipated that the DB system will be widely used in the PRC construction market in the future. In order to take full advantages of the DB system, owners and design-builders should understand and possess all the necessary competences to ensure the smooth delivery of DB projects.

3. RESEARCH METHOD

Xia and Chan (2009) and Xia and Chan (2010) developed the key competences of DB clients and design-builders and their relative importance in the Chinese construction industry via semi-structured interviews with five DB professionals, followed by a three-round Delphi survey distributed to 20 construction experts.

The semi-structured interviews were conducted to identify a list of potential key competences of DB clients and contractors. All the interviewees had sufficient DB experience and knowledge in the construction industry. They were requested to list any key competences of DB clients and contractors according to their understanding. Considering the DB system has not gained the popularity in China, the key competences of DB clients and contractors may be different from those identified in the literature review. After the data collection from these interviews, all the transcripts were coded and analysed. Then, similar meanings and expressions were incorporated and rephrased, and different themes were categorised. Finally, a list of potential key competences of DB clients and design-builders has been finalised as shown in Table 2.

Based on the results of semi-structured interviews, a two-round Delphi questionnaire survey was conducted to validate and prioritise these competences. According to Chan *et al.* (2001), the Delphi method helps to extract the maximum amount of unbiased information from a panel of experts. With the features of anonymous response, iteration and controlled feedback and statistical group responses, the Delphi method can produce reliable and more objective outcomes (Masini, 1993; Adnan and Morledge, 2003).

A list of 20 experts was invited in this Delphi study in two rounds. All these experts have extensive DB knowledge and experience. In Round 1 Delphi Questionnaire survey, all the respondents were asked to give ratings to the key competences of DB clients and contractors, which were finalised in the face-to-face interviews. A 10 points Likert scale was used for the rating system as it is more familiar to the Chinese experts than the 7-point or 5-point scales. 17 experts completed the Round 1 of the Delphi survey. In Round 2, respondents were asked to reconsider their ratings on each competence with a reference to the consolidated results from Round 1 Delphi survey. Finally, 16 experts completed the round 2 of the Delphi survey.

Most of Delphi studies involve two and seven rounds of survey (Rowe and Wright, 1999; Adnan and Morledge, 2003). A large number of rounds would render high rate of dropout and waste respondents' time and energy. By contract, stopping the process too soon could not produce reliable results (Schmidt, 1997). According to Ludwig (2001), the majority of Delphi studies have involved between 15-20 respondents. Moreover, if the panel experts share similar research background and relevant expertise, the Delphi study can obtain good result even with a small panel with 10-15 individuals (Ziglio, 1996). With the careful selection of the panel members and close interaction with them, the final opinions solicited from the 16 experts are considered adequate enough to provide reliable findings. The prioritised key

competences of DB clients and contractors are presented in Table 2.

Table 2: Key Competences of Client and DB Contractor

Rank	Key competences of DB clients	Key competence of the contractor
1	Ability to clearly define project scope	Experience with similar DB projects
2	Financial capacity for the projects	Capability of corporate management
3	Capacity in contract management	Building technique and design expertise
4	Adequate staff or consulting team	Financial capability for the project
5	Effective coordination with contractor	Enterprise qualification and scale
6	Experience with similar DB projects	Reputation and credit record in the industry

4. DISCUSSION

For the DB clients in China, they should possess the ability to clearly define the project scope, have sufficient financial capacity, adequate staff and experience for the projects, and manage the contract and communication effectively. While for the design-builders, they are required to have sufficient DB experience, corporate management capability, building and design expertise, financial resources and enterprise qualification, and good credit record in the industry. Project stakeholders should have a clear understanding of their own responsibilities and roles in DB projects, and cooperate closely to achieve satisfactory project performance.

DB experience is undoubtedly the most important key competence for DB contractors in the PRC construction market. It echoes the research findings of previous studies that hat DB projects should be delivered by experienced DB contractors (Song and Molenaar 1997; Molenaar and Songer, 1998; Mo and Ng, 1997; Pearson and Skues, 1999; Leung, 1999). As the single entity taking the total responsibility of DB projects, the design-builder should have sufficient experiences to not only construct, but also to design, manage and coordinate the whole project. Especially in the construction market of China, where the DB system have not been widely used, DB clients only hand over their projects to the experienced contractors with sufficient evidence track record.

For DB client, although the DB experience is still one of its key competences, it is considered less important than others. This is mainly because inexperienced clients can leave most of the project and responsibilities to DB contractors. In addition, external consultants can be employed to provide sufficient specifications, clear project definitions, and all the necessary service to protect the client's interests. In the construction market of the PRC, owing to the close relationship between clients and design consultants in the traditional delivery method, most clients prefer to work with their design consultants to finish most of the design work before engaging the DB contractors. As a result, the risk of project failure, which may be attributed to a lack of DB experience, will be reduced. However, providing too much design work will prevent the innovation input from design-builders as most of the design solutions have been determined by the clients.

So far as clients are concerned, the competence to clearly define project scope and objectives/requirements is ranked as the most important DB competence. According to Quatman and Dhar (2003), only when the client can clearly articulate the project scope and objectives at the early stage, then the DB system will work to the owner's benefit. Even though DB clients can leave most of the project responsibilities to design-builders, they should establish the project requirements before the contractor selection. Otherwise, they may not obtain the final project as expected. In the DB market of China, considering most of the DB clients lack the ability of project definition at early stage, they tend to work with traditional design consultant until the phrase of design development, and then leave the remaining detailed design and construction to the successful design-builders.

According to participants of this study, the capability of corporate management is another key competence of DB contractors, been ranked second of the list. Although the current literature emphasises on design-builders' project management rather than the corporate management skills (Hemlin, 1999; Chan *et al.*, 2001; Ling *et al.*, 2001; Ling and Liu, 2004; Lam *et al.*, 2008), the Delphi panel experts in the PRC considered the capability of corporate management as the key competences of design-builders. This is mainly due to the fact that there is a very competitive market structure associated with the Chinese construction industry. All the construction companies have to face fierce market competition and low level of profit in the construction industry. In 2007, the total profit of the construction enterprises takes up only 3.0 percent of the product value, and the ratio of liability to assets is as high as 65.5 percent (National Bureau of Statistics of China, 2008). As a result, DB contractors should first survive and strengthen their competitive advantages in the fierce competitive construction market.

Apart from having DB related experience and corporate management capabilities, DB contractors are required to have building techniques and design expertise, financial capability for DB projects, and enterprise qualification and scale. These key competences echo the high requirements of modern DB projects. The execution of DB system is different from the traditional way. It requires the fully combination of design and construction functions. Cheng (1995) asserts that a DB contractor should develop a good design with appropriate construction method. Therefore, DB contractors should have both building techniques and design knowledge to conduct the DB project and coordinate a variety of professionals. In DB projects, most of the construction work starts before the total completion of shop drawings, thus causing large fluctuation in the labour force and material supply (Ernzen and Schexnayder, 2000). It will, in turn, require huge capital scale of DB contractors. Only the big scale companies with corresponding qualification levels can afford the financial cost and gain competitiveness at the bidding stage.

Among the key competences of DB clients, the financial capability is considered the second-most important. In DB projects, although clients can leave most of the responsibility and risk to the design-builders; at the same time, they should fulfil their obligation to provide sustained capital supply. Otherwise, the DB contractors will increase the bidding price or resort to continuous claims to compensate the extra risk. Additionally, most of DB projects in the Chinese construction industry are from the public sector with large scale and complex, which are naturally capital intensive. DB clients should have sufficient financial resources to support the smooth delivery of the project.

The following key competences of clients, namely, contract management skills, adequate staff or consulting team, and effective coordination ability, reflect the requirements of mutual communication between clients and DB contractors in DB projects. Effective communication between DB clients and design-builders contributes to the success of DB projects (Ng and Aminah, 2006). The DB system requires the client to engage more active and effective ways of communication with DB contractors to express its ideas and solve the problems. In the contract management process, clients should clearly understand and convey the terms and conditions of DB contracts and make sure that specification and terms of contracts are fully met. In order to conduct efficient contract management and effective coordination with design-builders, clients should have sufficient staff to answer the design and construction related questions and provide instant feedbacks to contractors.

It is clearly demonstrated that DB projects have different requirements for clients and DB contractors. DB contractors should mainly possess the ability to integrate the design and construction functions and get the project under control. In order to acquire these abilities, experience with similar types of projects and according qualification levels are necessarily required. The key competences of clients, on the other hand, focus on defining project scope and objectives clearly, having sustained capital supply, and coordinating effectively with DB contractors to guarantee that DB projects will meet their requirements.

5. CONCLUSIONS

The DB system has accounted for an increasing proportion of the construction market worldwide. Although it does not receive the same popularity in the construction market of the PRC, it will bring

benefits to the construction industry and have great potential in the future (Xia and Chan, 2008). As key stakeholders in DB projects, both clients and DB contractors should possess certain competences to ensure the success of DB projects. The purpose of this study is to identify and compare the key competences of clients and DB contractors in the construction market of the PRC. The research findings indicate that the key competences for DB clients in the PRC are: (1) clear articulation of project scope and objectives; (2) financial capacity for the projects; (3) capacity in contract management; (4) sufficient staff or consulting team; (5) effective coordination with contractor and (6) experience with design-build related projects. To DB contractors, the key competences include (1) experience with similar design-build projects; (2) the capability of corporate management; (3) building techniques and design expertise; (4) financial capability for the project; (5) enterprise qualification and scale and (6) reputation and credit record in the industry. It is concluded that the contractor's key competences emphasise more on the capability to integrate the design and construction, and get the DB project under control. While the client's competences focus more on the ability to clearly define the project scope and requirements, to finance DB projects adequately, and to communicate effectively with DB contractors.

The findings can furnish stakeholders of DB projects with indicators to assess their DB competences. This study provides useful inputs to decision making process that helps to complete a DB project successfully and help to yield better project performance. For example, it can facilitate the clients to select appropriate DB contractors; at the same time the contractors can also assess the competences of DB clients to decide whether or not to accept the bid invitation. It is worth noting that stakeholders may interpret the competence differently. Therefore, future research opportunities exist to establish a comprehensive evaluation system providing quantitative interpretations/indicators for each competence. Furthermore, a large sample in the face-to-face interviews and the Delphi questionnaire survey should be conducted when the DB market matures in the future.

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