

**A Research Framework for Evaluating the Maturity of Relationship
Management in Chinese Mega-Construction and Infrastructure Megaprojects:
A Relational Contracting Perspective**

Albertpingchuen Chan¹; Yun Le²; Yi Hu³; and Ming Shan⁴

¹Professor, Faculty of Construction and Environment, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong 999077, China. E-mail: bsachan@polyu.edu.hk

²Professor, Department of Construction Management and Real Estate, School of Economics and Management, Tongji University, Shanghai 200092, China. E-mail: yunle@kcpm.com.cn

³Assistant Professor, Department of Construction Management and Real Estate, School of Economics and Management, Tongji University, Shanghai 200092, China. E-mail: yi_hu@tongji.edu.cn

⁴Ph.D. Candidate, School of Economics and Management, Tongji University, Shanghai 200092, China; and Department of Building and Real Estate, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong 999077, China. E-mail: ming.shan@connect.polyu.hk

Abstract

The number of mega construction and infrastructure (MCI) projects has increased exponentially in China over the past two decades as a result of the outstanding economic achievement and rapid urbanization development. However, projects of that size are commonly beset with performance paradox. Relationship management has been increasingly recognized as a key for improving the outcomes of construction projects by developing and implementing various related tools, such as relational contracting, partnering schemes, and strategic alliance. Given that good relationships amongst project parties is crucial to project success as Guanxi plays an essential role in Chinese societies and businesses, this study aims to develop a systematic and pragmatic framework for evaluating relationship management practice in Chinese MCI projects in terms of its maturity. This study will be conducted as part of a key program funded by the National Natural Science Foundation of China. Mixed methodology, including interviews, survey, and case studies, will be employed to identify the critical factors for and their relative importance in good relationship management to formulate a unified and pragmatic evaluation framework. Furthermore, the developed framework will be used to evaluate the status of relationship management in MCI projects based on case studies of selected projects. Findings of this study will be beneficial to promote relationship-based collaboration and improve the outcomes of MCI projects.

INTRODUCTION

The number of mega construction and infrastructure (MCI) projects with an individual cost of RMB 5 billion (nearly USD 800 million) or above has increased exponentially in China over the past two decades as a result of rapid urbanization. However, these projects are usually beset with performance paradox (Flyvbjerg et al. 2003), such as cost overruns, delivery delay, quality defects, safety and environmental incidents, as well as insufficient outcomes.

Lack of good relationships and inter-firm collaboration amongst key project parties is a key cause to failures of construction projects (Cook and Hancher 1990; Eriksson and Laan 2007). This may be either because of insufficient economic incentives provided by clients (Rahman and Kumaraswamy 2004; Eriksson and Laan 2007) or because of the lack of top management support from both contracting parties (Chan et al. 2008). Thus, relationship management plays an essential role in developing mutual trust and building collaboration amongst project parties for achieving prescribed objectives and benefits. In the past two decades, various managerial strategies for strengthening trust-based relationships amongst key project parties such as partnering schemes, strategic alliance, design and build, and joint ventures have been developed and tested widely in construction practices (Chan et al. 2010). Particularly, relational contracting, the latest relationship management tool, has received growing advocacies from researchers and practitioners for its crucial role in building, sustaining and strengthening the relationships between two contracting parties through the design and implementation of a relation-oriented contract (Macneil 1978; Baker et al. 2002). Compared with other existing strategies, relational contracting provide a proactive and formalized approach that can better facilitate the operation of the partnering mechanism in construction projects. Particularly, the New Engineering Contract (NEC) 3, a standardized relational contract published by the U.K. Institution of Civil Engineers (ICE) in 2005 (Gerard 2005), has greatly promote developments of relational contracting practices in the UK, South Africa and other 19 countries (Patterson 2007). Despite the emerging trends of relationship management research worldwide and the rapid growth of MCI projects in China, limited studies are available on relationship management in Chinese construction projects. With the recognition that some critical factors for good relationship management in MCI projects, such as contract incentives and top management support (Tang et al. 2008; Hu et al. 2012), have been well operated in some Chinese MCI projects, which have revealed a potential for application of relationship management strategies to Chinese MCI projects, this study aims to develop a project relationship management (PRM) framework to evaluate the status quo of relationship management in Chinese MCI projects and examine the applicability of relational contracting for future application. The following are specific objectives to be addressed in this study: Identify the PRM evaluation criteria for MCI projects; evaluate the applicability, usefulness and operation mechanisms of PRM evaluation criteria in Chinese MCI projects; Developing and validating a PRM evaluation model for MCI projects in China.

RELATIONSHIP MANAGEMENT IN CONSTRUCTION

Relationship management stems from relationship-based management philosophy embedded in relational contracting. Relational contracting refers to the design and implementation of a formalized agreement established by contracting parties for future relationships (Baker et al. 2002). This approach addresses a commitment to deepening collaboration for predefined targets (Bird 2005). In the construction industry, this method is regarded a pragmatic means of improving collaborative relationships amongst two main project parties, thus contributing to the success of construction projects. With the rapid development of relationship management practice in construction projects worldwide (Chan et al. 2010), relational contracting has been increasingly promoted as an innovative approach that reflects the latest relationship management experience and widely practiced in the UK, South Africa, Australia, New Zealand and other countries mainly through the newly released NEC contracts (Wright and Fergus 2009; Ling et al. 2014b). With the rapid developments of relational contracting in many major developed countries, Guanxi, a Chinese concept close to relationship management, has also received increasing attention from scholarship in some Asian countries and regions, particularly those with Chinese origins. These studies usually benchmark western relational contracting theory and practice. Zou et al. (2014) stated that relationship management can be regarded “a structured approach of understanding, defining, and supporting a broad spectrum of inter-business activities regarding providing and consuming knowledge and services via networks”, and thus there is a need for developing a set of comprehensive strategies and processes to strengthen relationships amongst key project parties. Based on a survey in Singapore-based contractors, Kumaraswamy et al. (2005) further identified some critical factors for building integrated teams through relationship management strategies. Wong et al. (2008) also proposed a framework for developing trust-based relationship in construction contracting, and examined three kinds of trust’s effects on construction contracting in Hong Kong.

Guanxi plays an essential role in Chinese businesses (Wong 2007), there is no exception in the construction sector either (Kang et al. 2007). Based on an empirical survey in 12 Chinese large construction firms, Cheah et al. (2007) identified Guanxi as a determinant of resource-based capabilities for Chinese firms in increasing revenue and profitability. Previous relationship management research in construction focuses on trust-based relationships amongst key project parties. Jin and Ling (2005) proposed 16 tools to strengthen inter-firm relationships in Chinese construction projects. In their later study, Jin and Ling (2006) further examined the execution factors and operation risks of utilization of these tools on key project performance in China. Ling et al. (2014b) compared the relationship quality in Sydney and Beijing, and revealed that the quality of relationship among key parties in public projects can achieve an excellent level or above, and relationship quality have better performance in Sydney than in Beijing as a result of the wide promotion of relational contracts. Similar findings are obtained from a comparative study between Hong Kong and Beijing (Ling et al. 2014a). However, existing studies seldom address the degree of relationship management practice in Chinese MCI

projects. Therefore, there is a need to develop a systematic and pragmatic PRM framework and evaluate relationship management practice in Chinese MCI projects. The development of PRM model will also benchmark the capability maturity model (CMM) by the Software Engineering Institute, Carnegie Mellon University; the CMM is a widely accepted model used to evaluate the maturity of project management capability of a software developer, and this concept has been extended to various aspects of relationship management in construction, such as partnerships, supply chain and working relationships (Meng et al. 2011).

RESEARCH PLAN AND METHODOLOGY

Objective 1: Identifying the evaluation criteria of Project-based Relationship Management (PRM) for construction projects. An in-depth literature review will be conducted to examine PRM developments in various types of academic publications, such as books, conference proceedings, and peer-reviewed journals. Best PRM practices in construction projects, such as those derived from relational contracting in developed countries/regions such as the U.S., the U.K. Australia, New Zealand, Singapore, and Hong Kong (Patterson 2007; Wright and Fergusson 2009; Chan et al. 2010), will be collected and documented. A critical analysis of PRM developments in academic publications will be conducted, and the PRM best practices in developed countries and regions will be summarized. A list of PRM evaluation criteria will be formulated based on the literature review; the applicability of these criteria will then be verified by comparing the successful PRM cases collected.

The questionnaire is the main research instrument to be adopted in this task. The questionnaire is a research instrument commonly used in surveys to measure people's attitudes towards certain subjects (Hoxley 2008). Given that little research on the subject of PRM in Chinese MCI projects, a survey is deemed appropriate to gather insights into related megaproject practices. A questionnaire survey instrument will be developed in terms of the refined list of PRM evaluation criteria. The questionnaire survey aims to identify the principal PRM evaluation criteria by comparing the ratings on relative importance of these evaluation criteria obtained from experienced practitioners involved in MCI projects. The target participants will be practitioners involved in Chinese MCI projects, mainly including clients, consultants, and contractors. Three main economically advanced regions in the country such as the Bo Hai Coastal, Yangtze River Delta and Pearl River Delta regions are the demographic target of the survey because the economic and social developments of these regions are similar to nearby developed countries and regions such as Australia, Singapore and Hong Kong, where relational transactions have been widely practiced. Considering that the information solicited through the questionnaire survey requires sound knowledge and hands-on experience about PRM in Chinese MCI projects, a purposive approach will be adopted to quantify the selection of survey participants through predefined criteria (Bryman 1996).

Objective 2: Examining the applicability, usefulness and operation mechanisms of PRM evaluation criteria in Chinese MCI projects. Both interviews and

questionnaire survey will be employed as main tools to collect opinion-based data on relationship management and its evaluation criteria from key project parties involved in Chinese MCI projects. Interviews with selected experts are used to examine practitioners' perception on the motives behind, difficulties and benefits for adopting the PRM maturity model in Chinese megaproject projects. The interviews can also refine PRM evaluation criteria identified. The questionnaire survey will further be conducted to extract the relative importance of the refined PRM evaluation criteria. In the survey, the respondents will be asked to provide ratings on the level of importance of each evaluation criteria based on a 7-point Likert scale. Through the survey, opinion-based data from participants will be obtained. In analyzing the survey data, the Statistical Package for Social Sciences (SPSS) will be used as a main tool. Main analyses proposed in this study will include factor analysis (FA), discriminant analysis, and fuzzy synthetic evaluation (FSE).

FA is a statistical technique commonly used to aggregate multiple variables into a few underlying factors, and to examine the underlying patterns for those variables (Norusis 1992). This study will adopt this analysis to extract the underlying factors from the PRM individual evaluation criteria identified and to reveal key issues in improving PRM of Chinese megaprojects.

Discriminant analysis is a technique to test whether a significant agreement exists in the group means of a number of independent variables among two or more (Hair et al. 2013). In this study, the technique is used to compare the ratings of PRM evaluation criteria obtained from different groups of respondents (e.g. clients, contractors, consultants). This procedure is particularly appropriate for variables whose group memberships are categorical.

FSE is employed in this study to develop the PRM maturity model for a specific megaproject. This method is used to address multi-attribute and multi-level problems in the construction management field, such as Lu et al. (1999) and Xu et al. (2010). Evaluating the maturity of PRM depends on the identified evaluation criteria and their underlying factors (categories) and they are often multi-layered and fuzzy in nature, which involve subjective judgment of experts, adopting the FSE technique is appropriate to develop such a PRM maturity evaluation system for Chinese megaprojects.

Objective 3: Developing and validating a PRM maturity model for Chinese megaprojects. Based on the findings derived from research works for objectives 1 and 2, a systematic and pragmatic PRM maturity evaluation tool for Chinese megaprojects will be proposed. The model will also benchmark against international best PRM practices identified in the work of Objective 1. Various PRM evaluation criteria will be systematically classified into several categories, analyzed and compared to each other. By evaluating their pros and cons and the associated project requirements, recommendations for improving PRM mechanism will then be provided.

Validation is the final and indispensable step in each research cycle to test whether the quality of a developed model has achieved an acceptable requirement. In this study, validation of the proposed maturity evaluation model will include focus group and action research through case studies. First, focus group discussions will be organized and designated to validate the research findings and developed tool with

related parties to examine the relevance of the findings in the Chinese context. Compared with traditionally one-to-one interviews, focus group meetings are regarded as a convenient, efficient and useful means of collecting a great amount of information from a group of participants. Second, several real MCI projects that are regarded as successful examples for relationship management in China will be selected; and their relational practices will be further evaluated using the developed model. Summarization of relationship management practices in these cases may provide an overall picture of the status quo of relationship management in Chinese megaprojects. The focus of action research is on research in action, rather than research about action, and thus this method is deemed appropriate in this study to validate the newly developed model.

CONCLUSION

Although relationship management have been practiced in western developed countries and some Asian developed countries/regions for more than two decades as a growing number of construction projects, particularly megaprojects, are reported to adopt various relationship management strategies, such as relational contracts, to strengthen relationship management in practice, the concept is very new in Chinese MIC projects. With the recognition of the dominant role of Guanxi in Chinese societies and businesses, identifying the evaluation criteria and promoting best PRM practices in the current surge of MCI projects in China has become increasingly important. Therefore, this paper provides a more systematic and in-depth research framework to examine the nature, components and their correlation of relationship management in the Chinese context so that some proper relationship management strategies will be proposed and practiced in future MCI projects for better performance.

ACKNOWLEDGMENTS

The work described in this study has been funded by the National Natural Science Foundation of China under Grant No. 71390523 of which Tongji University and The Hong Kong Polytechnic University are team members.

REFERENCES

- Baker, G., Gibbons, R. and Murphy, K.J. (2002). "Relational contracts and the theory of the firm." *Quarterly Journal of Economics*, 117(1), 39-84.
- Bird, R.C. (2005). "Employment as a relational contract." *Journal of Labor and Employment Law*, 8(1), 149-216.
- Bryman, A. (1996). *Quantity and quality in social research*, Routledge, London.
- Chan, A.P.C., Chan, D.W.M. and Yeung, Y.F.Y. (2010). *Relational contracting for construction excellence: Principles, practices and case studies*, Spon, Oxon.
- Chan, A.P.C., Chan, D.W.M., Fan, L.C.N., Lam, P.T.I. and Yeung, J.F.Y. (2008). "Achieving partnering success through an incentive agreement: lessons learned from an underground railway extension project in Hong Kong." *Journal of Management in Engineering*, 24(3), 128-137.

- Cheah, C.Y., Kang, J. and Chew, D.A. (2007). "Strategic analysis of large local construction firms in China." *Construction Management and Economics*, 25(1), 25-38.
- Cook, E.L. and Hancher, D.E. (1990). "Partnering: contracting for the future." *Journal of Management in Engineering*, 6(4), 431-446.
- Eriksson, P.E. and Laan, A. (2007). "Procurement effects on trust and control in client-contractor relationships." *Engineering, Construction and Architectural Management*, 14(4), 387-399.
- Flyvbjerg, B., Bruzelius, N. and Rothengatter, W. (2003). *Megaprojects and Risk: An Anatomy of Ambition*, Cambridge University Press, Cambridge.
- Gerard, R. (2005). "Relational contracts—NEC in perspective." *Lean Construction Journal*, 2, 80-86.
- Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2013). *Multivariate data analysis, 7th ed*, Pearson Education, New York.
- Hoxley, M. (2008). "Section 11: Questionnaire design and factor analysis." *Advanced research methods in the built environment*, Wiley-Blackwell, Chichester, 11.122-11.134.
- Hu, Y., Chan, A.P.C., Le, Y., Jiang, W.P., Xie, L.L. and Hon, C.H.K. (2012). "Improving megasite management performance through incentives: lessons learned from the Shanghai Expo construction." *Journal of Management in Engineering*, 28(3), 330-337.
- Jin, X.H. and Ling, F.Y.Y. (2005). "Model for fostering trust and building relationships in China's construction industry." *Journal of Construction Engineering and Management*, 131(11), 1224-1232.
- Jin, X.H. and Ling, F.Y.Y. (2006). "Key relationship-based determinants of project performance in China." *Building and Environment*, 41(7), 915-925.
- Kang, J., Cheah, C.Y.J., Chew, D.A.S. and Liu, G. (2007). "Strategic adaptations to environments inside China: An empirical investigation in the construction industry." *Chinese Management Studies*, 1(1), 42-56.
- Kumaraswamy, M.M., Ling, F.Y.Y., Rahman, M.M. and Phng, S.T. (2005). "Constructing relationally integrated teams." *Journal of Construction Engineering and Management*, 131(10), 1076-1086.
- Ling, F.Y.Y., Ke, Y., Kumaraswamy, M.M. and Wang, S. (2014a). "Key relational contracting practices affecting performance of public construction projects in China." *Journal of Construction Engineering and Management*, 140(1), 13-34.
- Ling, F.Y.Y., Ong, S.Y., Ke, Y., Wang, S. and Zou, P.X.W. (2014b). "Drivers and barriers to adopting relational contracting practices in public projects: Comparative study of Beijing and Sydney." *International Journal of Project Management*, 32(2), 275-285.
- Lu, R.S., Lo, S.L. and Hu, J.Y. (1999). "Analysis of reservoir water quality using fuzzy synthetic evaluation." *Stochastic Environmental Research and Risk Assessment*, 130 (5), 327-336.
- Macneil, I.R. (1978). "Contracts: adjustments of long-term economic relations under classical, neoclassical and relational contract law." *North-western University Law Review*, 72(6), 854-906.

- Meng, X., Sun, M. and Jone, M. (2011). "Maturity model for supply chain relationships in construction." *Journal of Management in Engineering*, 27(2), 97-105.
- Norusis, M.J. (1992). *SPSS for windows, professional statistics, release 5*, SPSS Company, Chicago.
- Patterson, R. (2007). "NEC3: Introduction to NEC contracts." <<http://www.neccontract.com/documents/events/Introducing%20NEC%20-%20R%20Patterson.pdf>> (Jan. 12, 2014).
- Rahman, M.M. and Kumaraswamy, M.M. (2004). "Contracting relationship trends and transitions." *Journal of Management in Engineering*, 20(4), 147-161.
- Tang, W., Qiang, M., Duffield, C.F., Young, M.D. and Lu, Y. (2008). "Incentives in Chinese construction industry." *Journal of Construction Engineering and Management*, 134(7), 457-467.
- Wong, M. (2007). "Guanxi and its role in business." *Chinese Management Studies*, 4(1), 257-276.
- Wong, W.K., Cheung, S.O., Yiu, T.W. and Pang, H.Y. (2008). "A framework for trust in construction contracting." *International Journal of Project Management*, 26(8), 821-829.
- Wright, J.N. and Fergusson, W. (2009). "Benefits of the NEC ECC form of contract: a new Zealand case study." *International Journal of Project Management*, 27(3), 243-249.
- Xu, Y., Yeung, J.F.Y., Chan, A.P.C., Chan, D.W.M., Wang, S.Q. and Ke, Y. (2010). "Developing a risk assessment model for PPP projects in China—a fuzzy synthetic evaluation approach." *Automation in Construction*, 19(7), 929-943.
- Zou, W., Kumaraswamy, M., Chung, J. and Wong, J. (2014). "Identifying the critical success factors for relationship management in PPP projects." *International Journal of Project Management*, 32(2), 265-274.