



Enhancing engineer–procure–construct project performance by partnering in international markets: Perspective from Chinese construction companies

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Abstract

The engineer–procure–construct (EPC) approach has been increasingly adopted in international markets, in which contractors need to have adequate capabilities in effectively dealing with a wide range of risks in a complex environment that consists of various stakeholders. Many researchers have embraced the strategy of partnering to integrate diverse project delivery activities by meeting the needs of all project participants. However, limited research has addressed the cause–effect relationships among partnering, risk management, and organizational capability on how performance improvements can be generated from them on a holistic view. This study systematically investigates the causal relationships among these themes by establishing and testing a conceptual model. With the support of data collected from Chinese contractors with experience in delivering EPC projects by questionnaire, interview, and a case study, the results provide empirical evidences on contractors' partnering application degree, strength, and weakness of organizational capabilities, overall picture of risk management, and project performance level, which form a sound basis for contractors' decision making during project implementation. This study further reveals that partnering can not only directly facilitate organizational capability and risk management but also exert its influence on risk management through enhanced organizational capability, thereby improving project performance. The above insights suggest research and practical emphases on combining risk management with partnering principles to assist in both intra- and inter-organizational activities, and contractors' appropriate linking with involved stakeholders to obtain necessary resources and effectively transfer them for successfully delivering international EPC projects.

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1. Introduction

Increasingly adopted by both public and private organizations, the EPC approach has become a favored construction project delivery system that combines the procurement of construction services with a variable amount of engineering services in one contract (Galloway 2009; Migliaccio et al. 2009; Park et al. 2009). By using the EPC approach, clients can expect a contractor as a single-entity responsible for design/procurement/construction, to achieve superior performance in such areas as early builder involvement, innovation, cost savings, reduced schedule, and

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enhanced quality (Hale et al. 2009; Perkins 2009; Puerto et al. 2008). This approach requires the contractors in EPC projects to possess competent capabilities in effectively dealing with a wide range of risks in complex international environments that involve various stakeholders (Yang et al. 2010; Zou et al. 2010). Many researchers have suggested the partnering strategy to improve risk management and enhance the capability of project delivery by effectively managing involved stakeholders with win–win value (Bower et al. 2002; Bresnen and Marshall 2000; Chan et al. 2008; Cho et al. 2010; DeVibiss and Leonard 2000; Growley and Karim 1995; Jacobsson and Roth 2014; Rahman and Kumaraswamy 2008; Tang et al. 2006; Xu et al. 2005; Yeung et al. 2009). Partnering is a long-term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources (CII, 1991), which is based upon trust relationship in facilitating participants' cooperatively dealing with reciprocally interdependent engineering, procurement, and construction processes (Kadefors 2004). Owing to ineffective integration of the involved participants' resources, many Chinese contractors have suffered from unsuccessful delivery of EPC projects, e.g., the Mecca Light Railway project has a cost overrun of US\$ 0.676 billion accounting for 34.4% of the contractual amount (Xiang and Wan 2011), and the A2 Highway project in Poland was terminated with a potential cost overrun of US\$ 0.395 billion (Xiang and Niu 2012). Impediments to successful EPC project delivery encountered by the contractors can be largely due to a lack of understanding how to integrate diverse organizational activities by meeting the needs of all EPC stakeholders, thereby facilitating the joint risk management of project participants and enhancing the contractors' capabilities to fulfill the project tasks (Cho et al. 2010; Rahman and Kumaraswamy 2008; Tang et al. 2006; Xu et al. 2005). However, limited research has addressed the cause–effect relationships among partnering, risk management, and organizational capability related to how performance improvements are generated from them on the whole value-creation process by drawing a holistic picture (Jacobssona and Rotha, 2014; Lehtiranta 2014). Understanding the above in-depth underlying causes to improve project performance will be crucial to lift multi-organizational dynamics research to a state of the art and aid contractors in the appropriate handling of multiple or conflicting objectives in EPC projects (Asmar et al. 2010; Girmscheid and Brockmann 2010; Lazar 2000; Lehtiranta 2014; Li et al. 2000; Migliaccio et al. 2009; Rosner et al. 2009; Tang et al. 2009; Wong et al. 2009). Thus, the aim of this study is to systematically investigate the causal relationships among partnering, risk management, and organizational capability, together with their impacts on EPC project performance via the development and testing of a partnering model.

2. Conceptual model of delivering EPC projects

2.1. Literature review

EPC is typically used in large and complex projects with contractors taking on additional risk compared to the traditional approach, which is attributed to that many stakeholders are

involved during the implementation processes of a EPC project, especially in the complex social and economic environment of international markets (Asmar et al. 2010; Gunhan and Arditi 2005; Park et al. 2009). Stakeholders include all members of the project team as well as all interested entities that are internal or external to the organizations (PMI, 2013), and effective engagement with these stakeholders is key to a project's success (OGC, 2009). EPC contracts specify that the contractor shall design, execute, and complete the works as a single-entity, requiring the contractor, designers, suppliers, and subcontractors to form one project team in achieving EPC objectives (FIDIC, 1999; IPMA, 2009). The norms of EPC contracts (FIDIC, 1999) also regulate the relationships between the contractor and other interested entities, e.g., explicitly specifying that the contractor and the client shall make efforts to cooperate with each other, and the contractor shall take all reasonable steps to protect the environment that are closely relevant to governments' approval and local people's concerns. In general, EPC contractors should properly cooperate with their upstream business partners (e.g., clients, consulting engineers, and creditors), and downstream partners (e.g., designers, suppliers, and subcontractors) in project delivery (CII, 1991 and Tang et al., 2006; Tang et al. 2009). Besides, it is also critical for EPC contractors to cooperate with involved social–political entities (e.g., central government, local authorities, and local residents/communities), who provide resources, approval and support for enabling the project success (Cleland 1988; Gareis 1991; PMI, 2013). Partnering with the above stakeholders allows EPC contractors to examine factors in the environment and in their organizations from a broad perspective by surveying each stakeholder to ascertain if their objectives are in line with the needs of other partners (Bower et al. 2002; Bresnen and Marshall 2000; Chan et al. 2008; CII, 1991; Tang et al. 2008; Yeung et al. 2009). This win–win philosophy can enable project participants to manage the various risks collaboratively (Love et al. 2011; Rahman and Kumaraswamy 2002; Tang et al. 2007). Moreover, partnering with project stakeholders can enhance the contractors' capabilities to obtain necessary resources and successfully integrate and manage them (Anderson et al. 2001; Daft 2010; Girmscheid and Brockmann 2010; Isik et al. 2010; Nadler and Tushman 1997; Tang et al. 2009; Wethyavivorn et al. 2009).

The above views see EPC contractors as open systems that take input from the external environment consisting of various partners, add value to them in transformation process, then convey the fulfilled projects as output to meet the needs of stakeholders; by providing value added products and services, the contractors can win the markets for further gaining necessary resources to continue the process (Ancona et al. 2005; Wang et al. 2013). There is a need to shift partnering research from focusing on traditional project success factors to the whole co-creative process involving project stakeholders (Jacobssona and Rotha, 2014). From strategic management perspective, traditional success factors include project team building, optimizing the capabilities of the overall project team, appropriately managing risks from the project and its relevant environment, emphasizing the cooperative relationships with stakeholders (Cleland 1988; Gareis 1991). However, how these

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