The challenges of radical innovation in Iran: Knowledge transfer and absorptive capacity highlights — Evidence from a joint venture in the construction sector

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ABSTRACT

We investigate the collaboration between an Iranian and a French company in a joint venture aimed at developing radical innovation in the construction sector. We identify the challenges involved, the barriers to technological change, and the difficulties of transferring knowledge related to absorptive capacity. We conduct an in-depth case study of a joint venture created by Freyssinet and Azaran to build a new roof to the Mashhad stadium. We conducted 41 interviews over a 19 month period. Our findings indicate that radical innovation is characterized by safety, quality, and planning challenges which engender delays, non-conformity to specifications, and additional costs. Freyssinet was unsuccessful in transferring explicit and tacit knowledge because Azaran suffered from poor organizational absorptive capacity. Its high absorptive capacity allowed Freyssinet to adapt its operations to Azaran’s tacit knowledge routines. Our research is meaningful to the construction sector, an economically and socially significant sector in Iran that faces serious issues. Our study has practical implications for Iranian firms and for foreign firms operating in Iran. We contribute to strengthen the understanding of Iranian technology development by focusing on radical innovation standards, joint venture specific learning dyads, and complex knowledge transfer.

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1. Introduction

“I am positively impressed by the design of the roof added to the Imam Reza Stadium in Mashhad. If this technology is now available in Iran, it would be great if we reuse such technology to build the roof to the Azadi stadium in Tehran.”

[Mahmoud Goudarzi, Minister of Youth Affairs and Sports, during a visit to the Imam Reza Stadium, May 2015.]

Emerging economies seek to transform and improve their domestic capabilities by acquiring new technology, by absorbing new knowledge, and by supporting innovation (Ponosovariv and Toivanen, 2014). Inspired by the resource-based view of the firm (Barney, 1991), the knowledge-based view of the firm considers knowledge as the firms’ most important resource (Nonaka and Takeuchi, 1995; Grant, 1996; Spender, 1996a, 1996b). Thus, organizations seek to acquire knowledge to gain competitive advantage. Transferability of knowledge is critical for businesses engaged in international business exchange (Kogut and Zander, 1993), especially in developing nations endeavoring to develop their economies. Technology transfer between developed and developing countries has drawn interest, not only among scholars, but also among firms, policy makers, and financial institutions.

Several studies have been conducted on knowledge flows in many emerging economies. Some countries have greatly benefited from technology transfer. However, we note that others face more difficulties in their attempt to achieve technological catch-up (Ponosovariv and Toivanen, 2014). We believe, in line with Argote et al. (2003), that there is a need to further study how and why some factors influence organizational learning, especially in emerging countries facing obstacles to making technological progress.

Over the last two decades, Iran has made significant progress in science and technology development. As a developing country, Iran aims to capture knowledge, imitate best practices, learn from partners, innovate in various sectors, and consequently reduce the technological gaps between it and developed countries (Ghazinoury et al., 2014). Guided by a “national technology strategy” which combines both “national technology policy” and “firm technology strategy” (Ghazinoury et al., 2009), the next step for Iran will be to turn its traditional economy into a knowledge-based economy. There are a limited, but growing, number of empirical studies on Iranian technology development. We identified 39 articles on knowledge and organizational capabilities in various sectors in Iran (see Appendix A), but technological knowledge, R&D, and innovation in Iran require further study (Ghazinoury and Ghazinouri, 2009). More specifically, investigations are needed into the challenges faced by firms operating in Iran and Iranian firms collaborating with external

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partners. Soofi and Ghazinoory (2011) argued that technological knowledge gained in one industry can benefit other industries, and highlighted positive spillovers from the chemicals, chemical products, rubber, and plastics industries to other related sectors. The construction industry is becoming increasingly global (Ngowi et al., 2005). Technology transfer in this sector contributes to the technological development of emerging nations (Van Egmond, 2012). Construction projects implemented in developing host countries are considered to be of potential benefit to the latter (Bessant and Francis, 2005). Local firms can learn advanced design and new construction technologies from foreign firms (Ling et al., 2005; Ling et al., 2009). Chatterji (1990) believes that emerging nations must implement policies that promote technology transfer between foreign and local firms so as to reinforce the capabilities of the latter and reduce their dependence on foreign businesses.

The construction industry is characterized by complicated projects with unique designs, complex environments and unpredictable working schemes, etc. (Ochieng and Price, 2009). Knowledge management in this sector is also considered to be very challenging: Difficulty to transfer knowledge (Osabutey et al., 2013), poor absorptive capacity (Gann, 2001; Eapen, 2012), a low degree of innovation (Barlow, 2000), and poor project performance (Rwelamila, 2012). Those issues are particularly prevalent in developing countries (Ling and Hoi, 2006; Zhi, 1995). Significant differences with developed countries have been well documented (Lizzarralde et al., 2013).

However, we observe that the construction industry, one of the most significant sectors in Iran, did not appear to be benefiting from the diffusion of new technologies. This sector represents a large part of Iran’s employment (3.9 million people) and investments (40% of total annual investment) (Tabassi et al., 2012), and studying it is important because Iran is located on a very active seismic region which is part of the Alpine-Himalayan belt where 130 major earthquakes have occurred over recent centuries (Tabassi and Abu Bakar, 2009). Poor construction design, lack of standard materials, disorganized supervision, poor workmanship, and in fine the low quality of Iranian buildings have been identified as the causes of the large number of fatalities in past earthquakes. Jafari and Love (2013) argued that “quality failures remain an endemic problem within the construction industry” (p. 1244). We believe it is important to identify the barriers to technological change in the Iranian construction sector, and that answering such questions could help the construction sector close the existing technological gaps and consequently increase the resistance of future buildings to recurrent earthquakes.

To resist them better, and so avoid future tragedies, radical changes and innovations are needed in the Iranian construction sector. Abernathy and Clark (1985) define radical innovations as those that diverge from conventional technological trajectories and offer a high degree of technological newness to an industry, to its firms, and to their customers (Garcia and Calantone, 2002). While satisfying clients’ wants and needs, firms also need to control the costs of radical innovation to remain competitive. Modular innovation (Clark, 1985; Henderson and Clark, 1990; Ethiraj and Levinthal, 2004) can contribute to cost and time saving by assigning the manufacturing of technological modules to external partners. Modular-based innovation requires the development of strategic alliances to obtain missing evidence about new knowledge and capabilities (Emden et al., 2006; Harrison et al., 2001; Cheshbrough, 2003). A few studies have focused on transition economies seeking to develop alliances (Hitt et al., 2004; Hitt et al., 2000; Young et al., 2011).

As a specific form of strategic alliance, joint ventures enable mutual and reciprocal learning, but developing a radical innovation within a joint venture may be very risky, since it combines the risks of failure of both the radical innovation and of the joint venture. These two types of risk are usually studied separately in the existing literature, so we need to develop knowledge in this area by studying the development of radical modular innovations within joint venture strategic alliances. The assimilation of external knowledge is an important but insufficiently studied aspect of absorptive capacity (Cohen and Levinthal, 1990), which requires further study (Lane et al., 2006). Having access to external knowledge does not necessarily mean that an organization will assimilate that knowledge efficiently (Hamel, 1991). To increase the likelihood of efficient knowledge absorption in strategic alliances, the existing literature typically sees a “learning dyad” as involving firms playing the roles of teachers and ‘students’ (Lane and Lubatkin, 1998). Our intention is to study two-way learning between two organizations playing these roles in joint ventures. We are particularly interested in studying two-way learning between firms that have different degrees of absorptive capacity.

In such two-way learning, we consider flows of both tacit and explicit knowledge to transfer entire bodies of knowledge. Joint ventures appear to be a relevant type of strategic alliance for the transfer and absorption of know-how embedded within organizations (Kandemir and Hult, 2004). The transfer of tacit and explicit knowledge is characterized by different challenges: articulation, transfer, learning, use of performance indicators, communication, ‘stickiness’, costs, path-dependency etc.

Our aim is to answer the following research question: “What are the challenges of radical innovation, the barriers to technological change, and the difficulties involved in the transfer of tacit and explicit knowledge between two organizations with different degrees of absorptive capacity, which are involved in a joint venture in the Iranian construction sector?”

The article proceeds as follows. We first present a theoretical framework related radical modular innovation, absorptive capacity, and consider the nature of knowledge transfer in alliances. We then discuss our case study method, and subsequently present an in-depth case study of the construction of a new roof of the Mashhad stadium in Iran. We conclude by discussing the challenges of radical innovation, the barriers to technological change, and the difficulties of transferring tacit and explicit knowledge.

2. Theoretical background

Our theoretical background considers Iran’s current technological development and the need for radical and modular innovation in its construction sector. A joint venture appears to be a relevant form of strategic alliance to develop mutual and reciprocal learning for transferring knowledge about radical innovations. More specifically, a joint venture can enhance the absorption of the tacit knowledge on both sides.

2.1. Alliances in radical modular innovation

Radical changes are needed to support the transition of Iran toward a knowledge-based economy, and to address quality failures in its construction sector, including the development of modular innovation, and of international strategic alliances.

2.1.1. Radical innovation

The improvement of the quality of building works requires a significant effort in innovation to support radical changes in construction. Studying the Iranian construction and housing industry, Akhlagh et al. (2013) argued that innovation strategies could impact its performance. They further argued that a proactive strategy has a positive impact on industry performance because it encourages flexibility, innovativeness, a greater perception of opportunities, and better anticipation of market changes. Abernathy and Clark (1985) defined the difference between incremental and radical innovation. Radical innovations are characterized by a clear divergence from existing technological trajectories (Abernathy and Utterback, 1978; Anderson and Tushman, 1990). An innovation is considered as radical according to the degree of its technological newness — newness to firms, to the industry and to the
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