Transformational Leadership Digest

Strategies for Emerging Markets: Emerging Market Players in the Emerging Wind Power Industry

Context

Renewable energy sources such as wind power, solar power are steadily increasing their share in countries' energy mix. The pace is more rapid in emerging markets such as India and China where the power requirements are shooting up. Governments are also showing increasing interest to encourage private participation in renewable energy industries.

These are newly emerging industries, and interestingly, they are attracting more interest from emerging markets as compared to the advanced markets. The current energy infrastructure in emerging markets based on traditional energy sources is nowhere close to meeting the daily requirements. The deficit thus leads to a highly attractive market for renewable energy sources. However, the market attractiveness only partly explains emerging market interest in these new industries. Using data on the global wind power industry, this research finds that emerging markets are participating not only in the market activity but also in the industry's innovation activity.

Emerging industries are known to be knowledge-driven and innovation-intensive. Prior experience suggests that innovations are recombinations of existing knowledge. Access to advanced technologies, skilled labor, and geographical proximity to innovative firms and research universities spur innovation. Players in emerging markets are relatively at a disadvantage compared to established players in the developed markets due to limited access to these factors. Additionally, the demand uncertainty of emerging industries makes it difficult for emerging market players to commit resources to exploratory innovation.

Innovation by emerging markets in the inhospitable terrain of emerging industry is therefore puzzling. This research finds that emerging market managers can enter and succeed in emerging industries by fine slicing value chain activities and connecting to global innovation networks.

Assessment

Wind energy is generated by installing wind turbines either onshore or off shore. There is an increasing interest to install offshore wind farms due to higher wind speeds, less turbulence and fewer environmental constraints compared to onshore wind farms. The global wind power industry is experiencing a huge surge in the past decade. In 2007, the installed capacity of global wind power industry was 94000 Mega Watts (MW), adding 20000MW that year (with an investment of US$37 billion). In 2013, the global wind power installations added 35301MW

(with an investment of US$80.3 billion), taking the overall capacity to 318,117MW. The share of wind power as an alternative source of energy is steadily growing at the rate of 25% per annum and now accounts for 2.5% of global energy usage. At the end of 2012, there were 225,000 turbines operating in 79 countries. Some of the leading manufacturers are Vestas (Denmark), Goldwind (China), Enercon (Germany), Siemens (Germany) and Suzlon (India). Though the industry was dominated by the advanced market (and particularly European) firms in the initial period, since late 1990s, a number of emerging market manufacturers started posing a challenge to the incumbent industry leaders with their low-cost advantage. In particular, Chinese and Indian companies such as Goldwind, Sinovel (China) and Suzlon (India) have displayed highly impressive growth rates, both domestically and internationally, and have begun to challenge the more established players in the industry. Their initial competitive strategy was purely imitative with product catch-up as the primary goal and very little concern for innovation. However, after catching up with the advanced market leaders on product, there has been a strategic revision to focus on innovation.

Innovation: A multi-dimensional construct

Geographic discussion:

The factors that spur innovation, such as access to advanced technologies, skilled workforce, and geographical proximity to knowledge centers, do not operate in isolation. Firms are embedded in heterogeneous networks of people, technologies, and geographies. Uncovering the interrelationship of these networks offers an opportunity to uncover new pathways for research. This research identifies three dimensions of innovation, namely technological, geographic and social, and studies their interaction by taking a network perspective.

As shown in figure 1 left panel, a network consisting of three types of nodes, each node belonging to a dimension, models innovation as a multi-dimensional construct. The figure is based on wind turbine patents filed with the United States Patent and Trademark Office. As shown in the figure, inventor I1 is an expert in technology C1 and works from location L1. In other words, inventor dimension connects technology with geography. By projecting this network on the planes created by different dimensions, the dimensional interactions are modeled and studied. For example, the right side of figure 1 shows projection onto technology-geography plane resulting in a technology-geography network.

Figure 1: Multidimensional networks

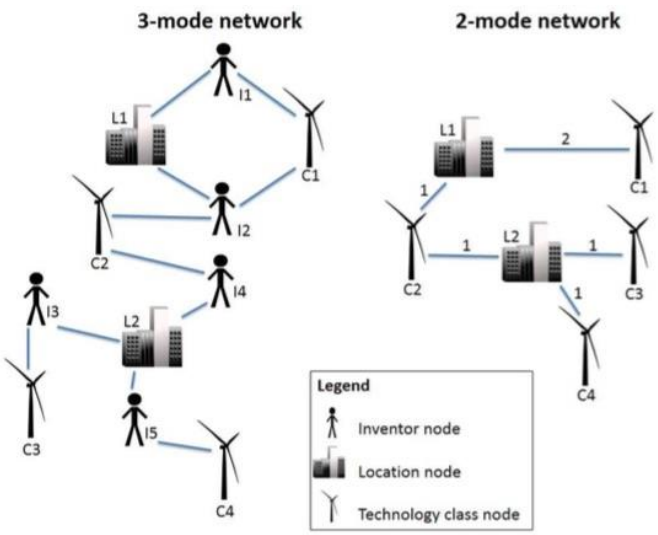
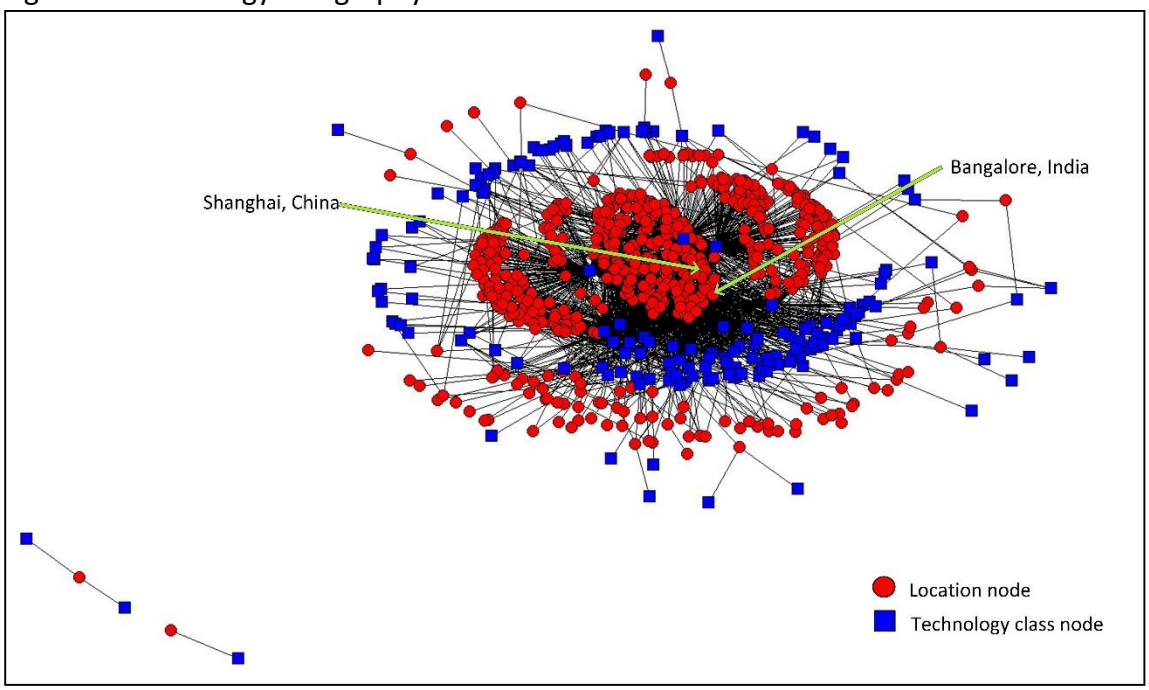


Figure 2 shows one such technology-geography network for the wind power industry in 2011. The more central a location is in this figure, the more innovative it is in the industry. Two emerging market locations, Shanghai (China) and Bangalore (India) are highlighted. These locations filed their first wind turbine patent in 2004 and 2006 respectively but have become quite central by 2011.

Figure 2: Technology-Geography network in 2011



Findings and implications:

Innovation at the geographic level is an agglomeration of innovations by firms located there. From a geographic perspective, the number of different technologies active at a location shows

the breadth of innovation activity happening at that location. Whereas, depth of innovation captures how well certain technologies are known at that location. This research measures innovation breadth and depth at a location to examine how they impact its centrality in the innovation network. The research finds that both breadth and depth have negative curvilinear effects. However, breadth has a much larger impact than depth suggesting that innovation activity in an emerging industry is far more sensitive to breadth than depth. In other words, *how many* technologies are known at a location is more important for emerging industry innovation than *how well* they are known at that location.

A location develops depth in a technology by innovating in a narrow technological range over and over again. It takes time to develop. This research argues that breadth has the potential to develop earlier than depth. Taken with the findings, it means that entry barriers are lower for locations entering emerging industry innovations. This is good news for emerging market locations that are often late entrants to innovations in general. The late entry may not necessarily hold them back in terms of generating innovations in an emerging industry. By focusing on breadth-building strategies, these new locations may be able to compete effectively with traditional innovative locations in the advanced economies. The result helps to explain Shanghai and Bangalore's rapid ascendance in the emerging wind power industry.

Locations that may not be experts in certain technologies but support a wide variety of technologies can successfully enter and sustain innovations in an emerging industry implying more participation by emerging markets and a wider innovation geography of the industry. The implication can be extended to firms in emerging markets, both domestic firms and multinational subsidiaries – their innovation strategies should exploit the breadth of technological knowledge available at new locations. Thus, emerging industries may not be such an inhospitable terrain for emerging markets after all.

Inventor-level discussion:
Another way to analyze the network in figure 1 is by modeling the multiplex relationships of inventors as a result of dimensional interactions, as shown in figure 3 right side, and figure 4. Multiplex relations spanning different planes bring in heterogeneous knowledge to the focal inventor, which is critical for innovation. However, managing these multiplex relationships also entail coordination costs to communicate and correspond with other inventors. Complex systems require more coordination which challenges inventor's coordination capacity. Unless appropriately managed, complexity and the resulting coordination costs undermine precision in decision-making and eventually challenge performance.

Firm needs to take a call on whether it wants its inventors to be connected to many other inventors in a few key networks, or few inventors in multiple networks. Given that how-many has a larger effect than how-well on emerging industry innovation, the participation by latter type drives innovation much more. This research is currently extending the above finding to emerging market firms in the wind power industry.

Figure 3: Multiplex inventor networks

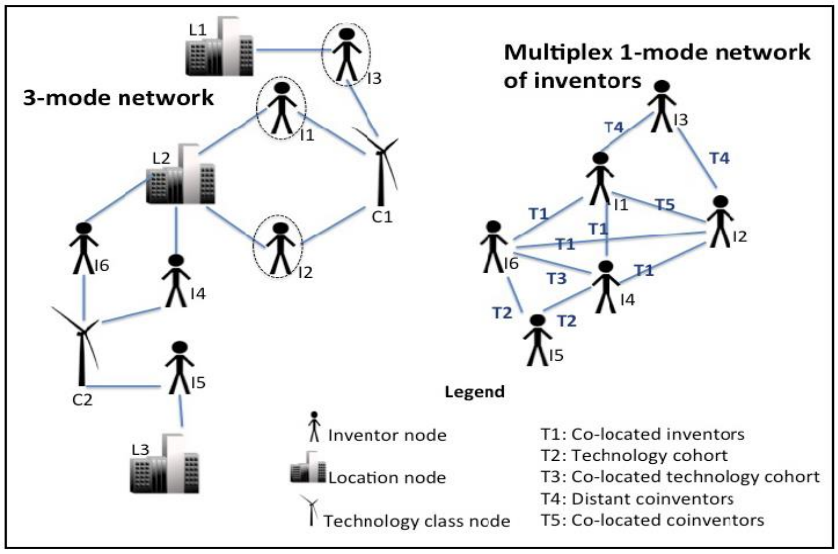


Figure 4: Multiplex networks of wind power inventors in 2011