Chapter 1.24
Understanding Innovation Processes

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INTRODUCTION

Knowledge integration is a process whereby several individuals share and combine their information to collectively create new knowledge (Okhuysen & Eisenhardt, 2002). Here we are interested in knowledge integration in the context of innovation project teams tasked with developing a new product or organizational practice. Knowledge integration is crucial in relation to innovation, since innovation depends on the generation of new ideas (new knowledge) that leads to the development of new products or organizational practices. Knowledge integration, rather than simply knowledge per se, is important for innovation because it is not simply the possession of new knowledge that will create success in terms of improved practice or new products, but rather, the ability to integrate knowledge across groups and organizations (Gibbons et al., 1994). This is especially the case in relation to radical innovation, which depends on involvement of an increasingly dispersed range of professional groups and organizations (Powell, Koput, & Smith-Doerr, 1996). For example, in the medical domain there are an increasing number of breakthroughs in scientific and technical knowledge that could drastically change medical practice. Achieving such breakthroughs, however, does not necessarily result in performance improvements in medical practice. Major pharmaceutical companies take, on average, 11 years and a minimum of one-third of $1 billion to bring a drug to market, and over 90% of development processes fail (CMR International, 2000). Similarly, in relation to major transformational IT innovation projects in organizations, many do not just fall short of meeting cost, functionality, and scheduling targets, but actually fail outright (Johnson, 1995).

While there are many reasons for such failure, one important reason relates to the problem of integrating knowledge, because breakthroughs leading to radical innovation are highly disruptive (Christensen, Bohmer, & Kenagy, 2000) and potentially "competency destroying" (Henderson, Orsenigo, & Pisano, 1999). For example, the development of the new drug or the new IT system will often cut across established institutionalized

domains and structures for the production of knowledge, and therefore require radical shifts in relationships among professional and functional groups. New developments made possible by breakthroughs in science may not align well, for example, with existing professional regimes and medical practices (Christensen et al., 2000).

In this article then, we consider the issue of knowledge integration in the context of innovation projects and relate it to social capital, since understanding the process of knowledge integration involves exploring the "micro-social interactions among individuals" (Okhuysen & Eisenhardt, 2002). It is helpful to explore these micro-social interactions through the lens of social capital since social capital refers to the social networks and the assets that can be mobilized through these networks that enable social action generally and knowledge sharing more specifically (Nahapiet & Ghoshal, 1998). In other words, given that the development of new products and practices typically involves teams of people from different backgrounds (i.e., multi-disciplinary project teams) working together, exploring how individual team members share and combine their respective knowledge in order to generate new ideas to support innovation is important. Specifically, we will consider how different approaches to creating and using social capital leads to different levels of knowledge integration, which in turn influence the innovation achieved, which can be either incremental or radical.

BACKGROUND

The Concept of Knowledge Integration

To reiterate, in this article we are interested in how a project team, tasked with developing a new product or practice, shares and combines the information of the different team members and of other stakeholders who have relevant information in order to create new knowledge that supports innovation. While the Okhuysen and Eisenhardt definition (above) suggests that knowledge integration is a simple process, the reality is that sharing and combining information is often very difficult. This is because knowledge is dispersed (Tsoukas, 1996) and ambiguous (Dougherty, 1992), as well as being potentially competency destroying (Henderson et al., 1999) in the sense that new products or practices may make obsolete the knowledge of particular groups who may then resist involvement in the knowledge integration process and so limit progress.

Teams will differ in terms of what they achieve in relation to knowledge integration. To simplify this we can identify two extremes in the way that knowledge can be taken to be integrated in the context of a project team tasked with developing a new product or service—"mechanistic pooling" (Knights & Wilmott, 1997) versus "generative" (Cook & Brown, 1999) knowledge integration. Mechanistic pooling occurs when each project member works independently on a set of clearly defined tasks or processes with which he/she is familiar and uses his/her existing knowledge to consider the potential of the new scientific/technological breakthrough on the particular problem domain, be this a new drug to help treat cancer or a new IT system to support information integration within an organization. In such circumstances, the new drug or IT system is perceived as simply fitting independent pieces together, like a jigsaw puzzle. This mechanistic pooling of knowledge is likely to result in a new product or service that may have higher performance than current products or services, in which case it may replace what currently exists. However, the innovation is likely to be incremental and is unlikely to lead to any radical change in practice, because radical change is likely to require a more generative and interactive approach to knowledge integration (Newell, Huang, & Tansley, 2004).

Generative knowledge integration occurs when there is joint knowledge production achieved