Chapter 15
Regional Innovation Pattern:
A Case of Beijing Biopharmaceutical Industrial Clusters

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ABSTRACT

Beijing biopharmaceutical industrial base are currently still in its infancy, innovation network and collaborative innovation system within pharmaceutical industrial clusters still have many problems, and cluster-based technology innovation mechanism and pattern needs further exploration. This study focuses on Beijing pharmaceutical industry clusters, and industry cluster theory, learning theory, and regional innovation system theory apply to the practice of Beijing pharmaceutical industrial bases. The study discusses on the related concepts of technology learning, and establishes a technology learning network among industry clusters, and presents a technological learning system under the cluster network on the basis of existing learning theory. According to characteristics of biopharmaceutical industry, the study develops a basic framework of regional innovation for biopharmaceutical industry clusters, and proposes synergistic development strategies of Beijing north and south pharmaceutical industry clusters.

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INTRODUCTION

Several scholars have noted the importance of agglomeration, including economic geography, management and organization science (Krugman, 1991; Decarolis & Deeds, 1999; Gittelman, 2007; Erden & von Krogh, 2011). Marshall (1920) argued that agglomeration economies exist in many industries owing to industry specialization, labor pooling and the spillover of knowledge between firms and institutions. Firms in industries where major inputs include industry R&D, university research and skilled labor are more likely to cluster than firms in industries where knowledge spillovers from such sources are less important (Audretsch & Feldman, 1996). The biopharmaceutical industry consists of firms that develop and / or manufacture drugs for human therapeutics and/or diagnostic purposes, and that have at least one product that can only be produced by biotechnological methods; that is, techniques and technologies that use the principles of genetics, immunology and molecular, cellular and structural biology to discover and develop new products (Audretsch, 2001). The biopharmaceutical industry tends to be highly geographically concentrated, and similar to the high geographic concentration found in the biotechnology industry (Prevezer, 1997; Zucker, et al, 1998; Wu et al., 2008).

A reason of high geographical concentration in the biopharmaceutical industry is that clusters play an important part in drug development (Erden, & von Krogh, 2011). Drug development has shifted from being an activity of a single large pharmaceutical firm to a collective and collaborative activity involving different actors, such as dedicated biotechnology firms, large pharmaceutical firms, contract research organizations (CROs), public research laboratories, venture capital firms, research universities and regulatory institutions. Drug development consists of a less regulated phase of basic and preclinical research for new technology and compounds, as well as a highly regulated chain of clinical trials for developing a therapeutic compound for a specific medical indication or need. This 'basic' versus 'applied' research distinction allow firms to focus and specialize in different parts of the value chain. Yet, specialization also increases the interdependency between firms and other institutions; efficient and effective drug development requires interaction within and between phases (Cooke, 2005). Research has shown that clusters foster cooperation; knowledge flows between firms, and other institutions within clusters are less costly, more reliable and easier to coordinate (Maskell & Malmberg, 1999). However, it is not only vertical interactions between players in the industry (i.e. interactions between upstream suppliers and downstream buyers in a value chain) that impact drug development; the spillover of knowledge and information between competing firms also has a significant effect. In clusters, knowledge spills over more easily among firms and other organizations because of employee membership of professional associations, informal social relationships between scientists,