



Conceptualizing multiple clusters in mega-city regions: The case of the biomedical industry in Beijing



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ABSTRACT

This paper introduces a unique industrial configuration that has emerged in Beijing, where three economic clusters in the biomedical industry, originally established as industrial/research parks, have developed parallel to each other. This configuration of multiple co-located clusters of the same industry, which has not been discussed before, raises the question of whether the industrial/research parks are competing for the same resources, or whether they are complementary to each other and can collectively be viewed as a new type of industrial configuration. The paper conceptualizes a framework of multiple clusters in mega-city regions that distinguishes between collaborating and competing clusters and presents initial empirical evidence for the Beijing case. As such, this research aims to unravel the phenomenon of multiple clusters in mega-city regions and to understand the complex spatial interrelationships that exist within and beyond multiple co-located clusters in the same industry.

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1. Introduction

Debate about industry clusters has become widespread over the last few decades. A cluster is a localized economic context in which many firms from a value chain simultaneously compete against each other and also collaborate to gain economic advantages. Since Porter's (1990) study on 'the competitive advantage of nations', cluster strategies have become popular approaches to fostering economic growth among policymakers and economic development practitioners worldwide (Lagendijk and Cornford, 2000).

Academic interest in clusters has proliferated. Studies since the 2000s have investigated the potential benefits of clusters in terms of their contribution to metropolitan competitiveness, the key role of clusters in the generation and effective transmission of innovations, and the networks of internal interactions and external linkages by which clusters generate synergies and introduce new

knowledge (e.g. Bathelt et al., 2004). And yet, only a few studies have explicitly investigated interrelationships and networks – whether local, national or international – between industrial clusters (e.g. Hsu and Saxenian, 2000; Chen, 2004; Blundel and Thatcher, 2005; Zhou, 2008; Lu and Cao, 2012; Conlé and Taube, 2012; Lu et al., 2013; Bathelt and Li, 2014).

There is, in particular, very little work about multiple clusters within a single city. This is somewhat surprising, not least because there is clear evidence that metropolitan areas and mega-city regions have become the bases of multiple industrial clusters. The co-location of two or more clusters in a metropolitan region is, in fact, quite common: it occurs in both world city regions, such as New York, London and Toronto, and much smaller urban areas, such as Wuppertal or Nürnberg in Germany. Montreal's metropolitan region alone, for instance, is home to seven organized cluster initiatives (Montreal Clusters, 2014). While not all of these may qualify as 'true clusters', similar co-agglomerations do exist and support each other through urbanization economies, especially related to labor market effects (Crevoisier, 2001).

There have been no studies at all of two or more clusters that are situated within a single city region and are also *within the*

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same industry. And yet, this situation may not be as unusual in the world's largest cities as one may think. As urbanization processes in developing countries continue to accelerate, such cases could become more prominent in countries like China and other developing economies with strong states (Wong, 2004), where cluster development often occurs through the planned establishment of multiple industrial or research parks. A configuration of multiple clusters in the same industry that are located in the same city-region and yet socially and spatially separated requires a very large urban context. We would not expect this kind of development in small urban environments because the separate infrastructures, research networks, labor markets and input-output linkages required for such a configuration would be too costly to establish and maintain.

We understand a cluster, in what follows, as an agglomeration of firms in an industry along with their suppliers and service providers that are linked through traded and untraded linkages and create their own labor markets, research networks and on so on (Bathelt and Taylor, 2002). To be able to identify multiple clusters in a city region, it is not enough to identify spatially distinct agglomerations of firms in different parts of the city; they must also be socially separated. This does not mean that there are no linkages between these clusters, but that each has its own labor market dynamic and linkage network and could potentially exist without the others.

In this paper we hope to initiate a debate about multiple co-located clusters in the same industry by investigating a specific industrial configuration that has evolved in Beijing, where three economic clusters in the biomedical industry have developed, originally established as industrial/research parks: Zhongguancun Life Science Park (ZLS Park), Beijing Economic & Technology Developing Area (Yizhuang Park) and Beijing Bioengineering & Pharmaceutical Industry Base (Daxing Park). These three planned developments in Beijing can be viewed as industrial clusters because each is characterized by an agglomeration of firms in the same industry, a substantial infrastructure of suppliers and service firms and an institutional environment that includes universities and specialized research facilities which support their reproduction.

Since there is no research about multiple co-located clusters in the same industry, numerous questions about the nature and origin of such development have yet to be answered. Such questions form the basis of our analysis in this paper. In particular, we address the following research questions: do the three industrial/research parks have a similar structure and are they set up as rivals that compete for the same resources? Or do they perform complementary tasks and can be viewed as a new type of industrial configuration? We initiate a theoretical debate about multiple co-located clusters within the same industry by comparing two types of cross-cluster relationship which are differentiated according to the nature of linkages within and between the respective clusters, namely *collaborating* and *competing* co-located clusters.

In the empirical part of the paper, we present qualitative evidence from our ongoing research in the Beijing biomedical industry. In particular, information will be drawn from telephone interviews with biomedical firms that aimed to identify research, input-output, labor market and knowledge linkages within, between and beyond the three clusters under consideration. This study also draws from prior empirical research conducted over the past decade (Zhao, 2006, 2008, 2010, 2012). By focusing on the linkage structures between firms, we aim to understand three clusters that exist in one mega-city region and the complex inter-relationships between them. Our primary goal in this part of the paper is to identify whether the type multiple-cluster configuration in the Beijing biomedical industry is closer to the ideal type of competing or collaborating clusters by looking at the cluster

structures that have emerged and the linkages that have developed between them.

Our analysis will be structured as follows. Section 2 introduces the theoretical and empirical background of cross-cluster relationships and multiple-cluster structures, which then serves as the basis for the distinction between collaborating and competing co-located clusters, discussed in Section 3. In Section 4, the methodological basis of the study is discussed, while Section 5 describes the context of biomedical clusters in Beijing. Section 6 presents the empirical evidence that allows us to identify three collaborating clusters in Beijing. Finally, Section 7 concludes our argument and spells out some of its implications.

2. Theoretical and empirical background

This section discusses the general phenomenon of multiple clusters and inter-cluster relationships. While this topic has not been analyzed systematically in conceptual or empirical terms, numerous studies provide hints as to how to proceed.

2.1. Cross-cluster linkages

While most studies of clusters have only focused on linkages *within* clusters, a limited number of studies have investigated the linkages and networks *between* clusters that are located in adjacent regions or in different cities and different countries. Some empirical work has shown, for instance, that similar industrial clusters are sometimes located in relative geographical proximity in neighboring regions. One example of such a spatial structure can be found in the 'Third Italy': Veneto, Emilia-Romagna and Tuscany are close-by administrative regions with a similar industry focus and structure which have strong textile clusters that compete in the global market and share similar business cultures and social networks (Asheim, 2000). Similarly, Delgado et al. (2010) found in their longitudinal study of clusters in the US that agglomeration tendencies in adjoining regions increase the likelihood that these regions develop similar or related clusters.

Most studies on the topic of cross-cluster linkages have focused on connections between agglomerations in different regions or countries, often over large distances. Examples have been found of both competition and collaboration between clusters in different regions and countries. For example, Blundel and Thatcher (2005) describe how the yacht manufacturing cluster in Southern England gradually declined over time as its market was eroded by other yacht manufacturing clusters in France, Sweden and Germany. By contrast, it has been found that the information technology clusters located in the Beijing, Yangtze River Delta and Pearl River Delta regions are connected with each other through firms engaged in inter-cluster collaboration (Zhou, 2008). Close network linkages and a specific spatial and social division of labor also exist between information technology clusters in Taiwan and Mainland China. Clusters in Taiwan, such as Hsinchu, focus on research and development (R&D), while clusters in Mainland China, such as Shenzhen, receive crucial technologies from Taiwan and focus on the manufacturing and assembly of final products (Hsu and Saxenian, 2000; Chen, 2004; Lin et al., 2011; Wang and Lin, 2013; Lu et al., 2013). Conlé and Taube (2012) found in their study of the emergence of clusters in China that different types of biotechnology clusters are linked with each other and exchange knowledge and technologies. They present evidence of numerous examples of linkages between China's most important domestic biomedical firms, located in different clusters across the country.

Some initial evidence also reveals how leading clusters establish networks with similar clusters in other countries based on foreign-direct investment linkages. Recent studies have, for

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