Do industrial clusters drive innovation?

By Professor Muammer Ozer

***Professor Muammer Ozer**, Director of the Doctor of Business Administration (DBA) programme and Professor of Management, challenges the notion that industrial clusters necessarily promote innovation, and highlights the role of network ties with supplier and buyer firms in this process. This article is based on "The Effects of Geographic and Network Ties of Firms on Firms' Exploitative and Exploratory Product Innovation" by Muammer Ozer, City University of Hong Kong, and Wen Zhang, China CITIC Bank, Shanghai, published in the Strategic Management Journal, 2015.*

Massive amounts of investment have been put into industrial clusters over the past several decades, often in the hope that they will stimulate the development of new technologies and accelerate discovery and innovation. These clusters typically feature core industries which share markets, development of technologies, and pools of skilled workers. They may also feature dense networks of buyer-seller relationships which, as we shall see, can have significant impact on innovation patterns.

Industrial clusters are not a new phenomenon.

Industrial clusters are not a new phenomenon. In the early 1800s, Manchester was the quintessential city of the first industrial revolution, spawning new machine technologies and a new system of industrial organisation, aka the factory system. Berlin in the 1890s was the Silicon Valley of its day, promoting electrical innovation in transport systems and factories. And from the 1900s onwards, Detroit or "Motown" as it came to be known, pioneered a prototypical manufacturing culture for the industrial assembly of motor cars.

In the modern-day, Silicon Valley remains the exemplary industrial cluster, continuing to spawn a flow of startups, generation of ideas and solutions and the emergence of new industrial fields over a period of some seventy years. Many attempts have been made to emulate the success of Silicon Valley around the world in an array of industrial parks, science parks, and regional clusters, generally under the rubric of advancing innovation in the economy.

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In parallel, universities have played a crucial role in fostering innovation as centres for knowledge creation and diffusion. Indeed, at Silicon Valley, Stanford University helped kick-start the high-tech innovation phenomenon. Stanford's decision in 1951 to open the Stanford Research Park on its land gave numerous firms the opportunity to settle in a stimulating and prosperous environment. Over the years, the number of leases to companies has sharply increased, from just seven in 1955, to 150 in 2018. Following the example of Stanford Research Park, several successful science parks have been established around the world such as Sophia Antipolis

in France in the 1960s, Tsukuba Science City in Japan in the early 1970s, and Zhongguancun Science Park in China in the early 1980s. Today, there are over 400 science parks worldwide, and the number is still growing. Meanwhile, most tertiary institutions aim to produce innovative research which has impact in the wider community.

Do industrial clusters really work?
Well, it depends…

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Strategically, industrial clusters are aimed at driving innovation, creativity and new ideas.

Major academic work on industrial clusters is usually traced back to Alfred Marshall, a prominent British industrialist and economist, who coined the phrase "innovation in the air" to describe the benefits of industrial clusters for discovery and innovation. He summarised it like this: "if one man starts a new idea, it is taken up by others and combined with suggestions of their own; and thus it becomes the source of further new ideas."

Industrial clusters attract firms because they can benefit from favourable policies and have easy access to such resources as capital, skilled labour, specialised equipment, and other supplies. They can stimulate industrial development in a geographic region and enhance the region's overall competitiveness. Accordingly, governments around the world build industrial districts, regions, or zones to advance their economies and labour markets. However, do they really work? Or, are these clusters following a simple bandwagon effect that leads governments and companies alike to back them in the mere hope of fostering discovery and innovation?

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These were some of the initial questions that motivated us to have a more in-depth look at the true effects of industrial clusters. Needless to say, we were, at the beginning, very hesitant as to whether we could make any meaningful contribution to such an established literature stretching back to the 1920s. However, the more we read about it, the more confused, and at the same time, intrigued we became with the topic. The literature presented a completely inconsistent and inconclusive picture, with some research showing positive effects, others showing no effects at all, and yet others even showing their negative effects.

"What is going on here?" was our natural reaction. "How could this be possible?" "How could this rich literature that goes back to Marshall's day be so inconclusive about the true benefits of industrial clusters, while governments and companies alike have already made up their minds and bought into the idea?" These questions, and the desire to resolve the inconclusive picture that the literature portrayed, set the foundations for our study that has yielded a truly impactful and authoritative research in the field.

Focusing on the type of innovation

Our answer to the inconclusive findings was very simple. Our initial

thinking was that the benefits of industrial clusters are likely to depend on the type of innovation. In our paper, we distinguish between small-step exploitative innovation that builds on a firm's existing knowledge base to improve its existing processes and products, and big-step exploratory innovation that involves a shift to a different knowledge domain with the aim to adopt or create new processes and products.

We also thought that the benefits of clusters are likely to depend on whether the firms had any network ties with other firms in their cluster, and if so what type of partner. As a result, we studied how such ties might moderate the relationship between industrial clusters and innovation. And instead of studying network ties in aggregate, we differentiated between different types of firms and studied the moderating effects of network ties with suppliers and buyers, especially given that vertical relationships have been known to play an important role in both strategic and innovation management.

Finally, we studied the moderating roles of different network ties across exploitative and exploratory innovation. This expands our current understanding of how industrial clusters work to influence innovation and addresses several calls for further empirical research on how to overcome any potential negative effects of these clusters on innovation.

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The benefits of industrial clusters

Our empirical study, which is based on the manufacturers of finished products in an industrial cluster in Shanghai, showed that while cluster membership enhanced firms' exploitative product innovation, it surprisingly hindered their exploratory product innovation. Industrial clusters can improve exploitative product innovation through several mechanisms. First, cluster firms will likely have the opportunity to observe their rivals at close hand, and learn more about alternative new product features, designs, and marketing efforts. Second, it has long been noted that people from both rival and non-rival firms engage in informal information exchanges, which can enhance firms' product innovation through improvements in their existing products and manufacturing processes. Since geographic proximity can facilitate such interactions through social and industry events in the cluster, firms will likely have ample opportunities to interact with other firms in their clusters and thus to learn from them. Third, from a "communities of practice" perspective, cluster firms will likely identify themselves with a joint cluster enterprise, engage in mutual industry events, and develop shared concepts, tools, language, and norms of business conduct. Hence, they will likely enjoy a sense of belonging, mutual trust, and reciprocity, which will further facilitate knowledge sharing and thus enhance innovation.

What about 'big-step' innovation?

As cluster firms become increasingly exposed to the same types of information, their competitive perceptions will likely become increasingly homogenous over time.

As we have seen, governments and companies alike buy into industrial clusters in the hope that they will spur innovation. So why should they actually hinder exploratory product innovation? We found, that as cluster firms become increasingly exposed to the same types of information, their competitive perceptions will likely become increasingly homogenous over time and hurt their exploratory product innovation, which requires heterogeneous and unique knowledge. Moreover, due to their enhanced cluster identity, cluster firms will likely utilise similar innovation routines and practices at the expense of using unique product innovation processes. Such homogenous knowledge and practices will likely turn their clusters into "blind spots" and prevent them from utilising new and diverse knowledge commensurate with market and technological changes outside their clusters. Thus, ironically, cluster membership will likely hinder exploratory product innovation.

In sum, the results showed that cluster membership was positively related to exploitative but negatively related to exploratory product innovation. Our results also showed that network ties with both suppliers and buyers strengthened the effects of industrial clusters on exploitative product innovation.

Network ties with suppliers and buyers

Network ties with buyer firms promote positive effects on exploratory product innovation.

Further analyses showed that network ties with any firm in the cluster, regardless of whether it is a supplier or buyer firm, improved focal firms' exploitative product innovation. On the other hand, we found that only network ties with buyer firms, but not those with supplier firms, promoted positive effects on exploratory product innovation. This result is important, as it shows how to reduce the potential negative influence of industrial clusters on exploratory product innovation. Buyer firms usually operate in worldwide markets and deal with a variety of customers across the world, likely becoming exposed to heterogeneous knowledge in the process. When focal firms form network ties with buyer firms in their clusters, they are likely to be able to access these different knowledge sources, potentially engendering exploratory innovation.

Future directions

Choose your partners with a great deal of care, and understand the implications of getting into different sorts of alliances.

This study is certainly just one attempt to explain the inconclusive findings reported in the literature. There is much more that needs to be studied in this area. For example, we studied product but not process innovation. Since industrial clusters and network ties might exert different effects on process innovation, future research could study such innovation. Second, we focused on firms' network ties with other firms in their clusters. Future research could study both intra- and cross-cluster as well as both intra- and cross-regional network ties. Third, we studied inter-firm network ties. Since intra-firm network ties are also important, we urge further research to study both intra- and inter-firm network ties. Finally, to end on a cautionary note, any networked firm faces the risk of having its proprietary knowledge leaked by a partner. This suggests that it is important to choose your partners with a great deal of care, and understand the implications of getting into different sorts of alliances.

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