Impact of Innovation Cluster Effects on Firm’s Performance in Uzbekistan

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Abstract

In this research we investigated the innovation cluster effects, where we tried to find relationship between firm’s overall performance and its participation in innovation clusters. Specifically, we looked at such parameters of firm’s performance as labor productivity and return on sales. Using linear regression model (OLS) based on data for 382 firms in Tashkent region we found positive correlation between indicators of innovation cluster effects and firm’s performance. We also conducted a qualitative analysis by interviewing 25 firms in Tashkent region of Uzbekistan in order to find the aspects related to efficiency of being in clusters.

Key words: Cluster effects, Uzbekistan, innovation, firm performance

1. Introduction

Researchers have a fundamental interest in questions related to geographical concentration of firms. In late 1990s it has been already confirmed by several researches that geographic closeness of suppliers, partner companies, clients, competitors, universities and other research institutions have a positive economic effect on firms in that specific location. These firms have a higher productivity, have a better innovation performance, and have higher wages. It is due to localized knowledge flow and spillovers. Innovation clusters in this context becomes a significant object for study, because they can explain cooperative innovation behavior. (Chesbrough, 2006; Immarino and McCann, 2006; Lundvall, 1992; Audretsch and Feldman, 1996; OECD, 2006). Innovation clusters accelerate innovation in firms, which in result with high probability will increase the efficiency and competitiveness of the firm and thus it will indirectly effect on overall performance of the company. But in the same time performance of the firm can be presented in different forms and it is important to understand weather those changes in performance were because of participation in innovation clusters or not. Previous researches mostly based on analyses of reasons for innovation cluster formations and description of their main properties, but still there is lack of studies on finding direct relations between participation in clusters and company’s performance, with qualitative confirmations of results.

Attempts carried out by expert interviews to connect cluster effect with the efficiency and competitiveness of the participating companies in most cases have limited and largely debatable results. All this determines the need for additional research, empirical test and check of results.

2. Literature review

Porter (1998) defined clusters as “... geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition. They include, for example, supplier of specialized inputs such as components, machinery and services, and providers of specialized infrastructure. Clusters also often
extend downstream to channels and customers and laterally to manufacturers of complementary products and to companies in industries related by skills, technologies, or common inputs. Finally, many clusters include governmental and other institutions – such as universities, standard-setting agencies, think tanks, vocational training providers, and trade associations – that provide specialized training, education, information, research and technical support.”

Porter (1998) mentions that in industrial clusters firms and institutions are in close proximity to each other and have a particular field and area and maintain an interactive relationship, where they influence and support each other, as a result production efficiency is achieved and externalities are created through a fine division of labor.

We can perform clusters by four main elements. Clusters facilitate agglomeration economies arising from spatial proximity (Furman et al, 2002). Clusters also can be in form of sectoral concentration, where most of the firms belong to a particular industry or technology field. Interaction among regional stakeholders is the main aspect to find the difference between pure agglomerations and clusters. And last element is a high level of stickiness of specific knowledge (Gertler and Wolfe 2008, LeSage and Fischer 2012). Such kind of ‘embedded knowledge’ is generated from norms, habits and so called routines in the process of collaborative experience (Moodyson and Johnson 2007, Bathelt et al. 2004).

Clusters can influence not only on company’s performance but also on innovation performance. Khan and Gani (2004) conducted the research on example of textile cluster in Pakistan about the importance of cluster in acceleration of technological innovation and on entrepreneurship. Although clusters decrease the risks of failure for firms and are beneficial in short run, (Beal and Gimeno, 2001) benefits of clustering and agglomeration are decreasing over time and sometimes can reduce the level of involvement into the innovation activity. Most of literatures on cluster effects are focused on industrial clusters, we make an attempt to study regional clusters, despite of their industry belonging.

Capability to innovate is considered as a critical for the firm in achieving its competitiveness (Conner, 1991). Innovations offer more valuable, rare, differentiated and inimitable products and lead firms to better financial performance (Zahra et al., 2000).

The results of reviewed literature show that the high level of cooperation is associated with more competitive sector. Maggioni and Riggi (2006), using panel data for Italian companies stated that participation in the innovation cluster for small and medium enterprises are positively correlated with external knowledge sources networks, which in the end gives positive impact on productivity. However due to presence of internal R&D, large companies do not have same links (Maggioni and Riggi, 2006). In our research as sample we take into consideration all companies with no regard on its size, just focusing on its regional borders.

3. Methods

Our research method consists of two main steps.

The first step. We will try to find innovation cluster effects by constructing two models. In the first model we will use labor productivity by GVA as a firm’s performance. In the second model we will use return on sales as a measure for firm’s performance. The main reason to choose such parameters are based on the followings: these parameters are not widely used, particularly with relation to innovation clusters; labor productivity is one of the most effective ways to measure the company’s overall efficiency; return on sales is used by wide range of investors in estimation of company’s efficiency and overall performance.

For independent variables we will use several indicators which in our opinion are related with
innovation cluster formation and can help to find the innovation cluster effects. These measures are the followings:

1. Participation in regional clusters. This variable is the main variable to find the correlation and to confirm the hypothesis. To measure the participation in regional clusters we used binary variable, which defines 1 - as participation in regional innovation cluster and 0 - otherwise.

2. Location within the urban agglomeration – close distance to urban agglomeration can push companies to cooperate in order to effectively use local infrastructure.

3. Specialization coefficient – in general companies can have two strategies, weather to specialize on specific field or to operate in diverse spheres and industries, which can have its impact on innovation cluster effects, as well as on overall performance.

4. Belonging of the firm to main industry of the region - we have chosen textile industry as a main industry of the region based on statistical data from State Statistics Committee of the Republic of Uzbekistan.

Firm size and firm age have been chosen as control variables. Firm’s size has been measured by using the number of employees and the firm’s age has been calculated by defining the period of operation time of the firm in the market from its time of founding.

The second step. The purpose of our further study in the second step of our research is based on analysis of in-depth interviews with firms from our sample. The purpose of these interviews is to discover additional factors that cannot be detected by statistical methods. Thus, we can also take into consideration the agents of clusters with whom the company has no explicit technological links.

4. Data sampling and hypothesis

During our research we have created the data base of 413 enterprises with different economic activities of Tashkent region in Uzbekistan for 2010 and 2012 according to the information from the statistical and financial reports, which allows us to assess the effects of innovation clusters. The number of objects of the study was subsequently reduced from 413 to 382 during the data preparation, in order to identify obvious errors in the database and to avoid false values.

Based on theory and research data availability, there has been determined the criteria to choose companies for our sample. The following features has been assigned as criteria, in aggregate:

1. Participation of enterprises in regional business associations, is considered as one of available ways to evaluate the cooperation.

2. The presence of common projects with universities, research institutes and other companies located in the region in companies. The choice of this criterion is explained by the fact that the internal innovation capacity of the firm and its capacity for external cooperation in the literature is explained as complementary properties that affect to the firm’s innovativeness.

3. The presence of R & D expenditure in company. Advantages of this feature are associated with the ability to measure it. The enterprises which independently conduct researches, recognized as the most attractive partners to participate in the cluster interaction. On the analysis of our sample, we found that about 15% of industrial enterprises have these properties and can be potentially be part of a particular innovation cluster of the region.

For identification and assessment we have proposed the hypothesis

Hypothesis. There is a positive correlation between firm’s performance efficiency and firm’s participation in regional innovation clusters.
5. Results

We built different specifications of a linear regression model. Summary results of Ordinary least squares regression analysis are shown in Table 1.

All of the linear regression models were tested on meeting the Gauss-Markov terms. Ramsey test results gave us the reason to accept the hypothesis, which is statistically correct, and it shows that we have an appropriate model and no missing values. All variable are statistically significant. Results of the regression analysis show that participation in innovation clusters positively correlated with indicators of the performance of the company, in other words, in our sample, we found an innovation cluster effects. Thus we have confirmed our hypothesis. However, the coefficient of determination indicates that the proportion of explained variance in the dependent variable is small. These results are understandable for innovation clusters at the early stage of formation, which is consistent with empirical studies (Andersen et al., 2004; Bortagaray and Tiffin 2000; Ketels et al., 2006) in this area.

The results show that the participation of the company in innovation clusters has a positive effect on the indicators characterizing the performance of enterprises, in particular, on productivity of the gross value added and its rate of growth, and of return on sales. In particular, the average rate of growth of GVA for 2010 to 2012 for potential participants of innovation clusters is 27.9% higher compared to other companies of the sample.

For the second step of our research we have conducted 15 interviews independently and used interview materials (10 interviews) of PhD researchers from our research group in Tashkent State University of Economics.

Table 1.
Linear regression: Company performance (n=382)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>P-value</td>
<td>Coefficient</td>
<td>P-value</td>
</tr>
<tr>
<td>Location within the urban agglomeration</td>
<td>0.441**</td>
<td>0.007</td>
<td>0.074**</td>
<td>0.019</td>
</tr>
<tr>
<td>Companies belonging to theregional innovation clusters</td>
<td>0.458**</td>
<td>0.019</td>
<td>0.112**</td>
<td>0.001</td>
</tr>
<tr>
<td>Firm age</td>
<td>0.020</td>
<td>0.732</td>
<td>0.023**</td>
<td>0.036</td>
</tr>
<tr>
<td>Firm age square</td>
<td>-0.001</td>
<td>0.731</td>
<td>-0.001**</td>
<td>0.037</td>
</tr>
<tr>
<td>Specialization coefficient in 2012</td>
<td>0.206</td>
<td>0.089</td>
<td>-0.002</td>
<td>0.932</td>
</tr>
<tr>
<td>Firm size indicator</td>
<td>0.118</td>
<td>0.381</td>
<td>0.015</td>
<td>0.542</td>
</tr>
<tr>
<td>Indicator of firm belonging to industry</td>
<td>-0.444</td>
<td>0.246</td>
<td>0.029</td>
<td>0.669</td>
</tr>
<tr>
<td>Constant</td>
<td>4.902***</td>
<td>0.000</td>
<td>-0.059</td>
<td>0.385</td>
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<tr>
<td>F</td>
<td>2.78</td>
<td>3.55</td>
<td></td>
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<tr>
<td>Prob&gt;F</td>
<td>0.008**</td>
<td>0.001***</td>
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<tr>
<td>R square</td>
<td>0.056</td>
<td>0.063</td>
<td></td>
<td></td>
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<tr>
<td>Number of observations</td>
<td>338</td>
<td>374</td>
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</table>

***P<.01
**P<.05
6. Discussion of results from qualitative analyses

Based on the results of quantitative analysis, we confirmed that textile related industry can become one of the main emerging innovation clusters in Tashkent region. One can expect that the companies busy in other activities will also collaborate with the companies of the core cluster. The author has independently conducted 15 interviews for the period from September 2010 to June 2012, as well as there have been done ten interviews in research team in a collective project. Respondents were representatives of large, medium and small enterprises as well as universities, research institutes, institutions of regional and municipal authorities, business incubators, technology parks, technology transfer centers. Analysis of the results of interviews led to the following conclusions about the innovation clusters in Tashkent region, including innovation cluster effects:

1. The more active co-operation, the higher is the efficiency of participants of innovation clusters in analyzed sectors. However, the existing potential for cooperation is much greater than the extent of its use. Obsolete fixed assets and modernization needs of the industry motivate companies to seek solutions to the problem. One of options in this case is outsourcing of production functions and purchasing of engineering services, which are often available only in cooperation, including cooperation with competitors.

2. Among the characteristics of the interaction with market participants, respondents emphasize the importance of stable and long-term cooperation with customers and suppliers. However, the relationship with both customers and competitors in general has a form of information exchange.

3. Informal contacts, which are formed on the basis of social networks that contribute to successful long-term relationship is much stronger than the formal structures (eg, strategic alliances, non-profit partnership). A wide range of informal cooperation mechanisms and social networks affect both the mature and potential members of the cluster. In particular, relationship between universities and industry enterprises are formed by graduates through meetings at specialized conferences and exhibitions, through participation in joint projects.

4. Flexibility in choice of partners and joint projects between firms can strengthen the innovation cluster effects. All respondents noted the role of business associations in the region in building a professional community, access to information, to establish personal contacts.

5. At the stage of cluster formation mechanism inducing firms to cooperate is in most cases internal stimuli. While such elements as venture capital funds, technology parks, business incubators, have little influence on its formation and development. This result differs from the conclusions of foreign studies. Explanation could be the fact that the main consumers of these services and clients of venture capital are small companies, whereas the participants of regional cluster which we have identified are mainly large and medium companies.

6. The evidence from successful clusters show, that incorporating into them of small and medium enterprises is necessary; in order to increase the flexibility and speed of response of the cluster to external changes, thereby increase its competitiveness. Development of an innovative environment and institutions of networking is also necessary step in the formation of clusters. One of these elements of the environment could be the creation of urban investment center which provides interaction with investors, carrying out common measures for the development of the business climate. In general, nowadays according to participants the close cooperation of organizations is practiced in unfavorable institutional environment.

Thus, our study demonstrated that mature regional innovation clusters in the industries of Tashkent region are not yet available, but still there are evidences of the formation of innovation clusters with high growth potential. They are formed around large and super-large enterprises in core sector of the
region, within metropolitan areas with little involvement of new and small businesses and with secondary role of the education sector.

7. Conclusion

It is shown that the identification of members of regional innovation clusters and evaluation of innovation cluster effects are associated with a number of problems:
• a lack of objective statistical indicators that reflect different features of the cluster, which leads to inconsistencies in the methods of identification of participants and assessment of effects;
• mismatch between the administrative boundaries of regions with the boundaries of the cluster, leading to difficulties in collecting the necessary data on the inter-sectoral and inter-regional level;
• dynamism of cluster formations, which predetermines the backlog of statistical monitoring from the speed of recombination of interconnections between firms in the cluster.

Based on the empirical analysis of Uzbekistan companies it has been found that there is a stable positive relationship between companies belonging to innovative clusters and performance indicators of their activity, which is seen as a signal of the existence of innovation cluster effects. It is shown that for enterprises of Tashkent region statistically impossible to estimate all the effects, due to stage of the life cycle, which is characterized as a "forming".

It has been found that the probability of participation in innovative clusters in some stage of formation in Uzbekistan in general affected by the same factors that characterize the internal features of the enterprises, as in developed countries.

Conclusions of quantitative analysis were partially supported and expanded on the basis of interviews with potential participants of one of the emerging innovation clusters in Tashkent region (in textile sector). In addition, it has been found that to analyze the innovation clusters and to evaluate the innovative cluster effects it is important to use expert surveys for statistically unobservable, but considered by respondents as extremely important factors. Those factors which characterize the quality and stability of the relationships between members of the cluster, and indicate self-identification of firms as members of innovation clusters.

References

Thought within Industrial Organization Economics: Do We Have a New Theory of the Firm? Journal of Management; 17, (1)


