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An overview on industry clusters and the impact of related variety on regional performance in turkey

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The paper has two objectives. The first objective is to summarize the evolution and current status of cluster policies in Turkey. The second objective is to contribute to the understanding of the role of clusters on regional economic performance through investigating the impact of related variety on regional economic growth in Turkey. The clustering projects in Turkey started in the beginning of 2000 where the national clustering projects are jointly funded by the EU and the Republic of Turkey. The empirical results confirm that related variety across industries is a significant driver of economic growth in Turkey indicating that in designing official clustering policies, it is necessary to take sectoral variety into consideration.

Industry Clusters, Turkey, Related Variety

1. Introduction

Foundations of cluster policies in Turkey started in 1960's during Turkey's planned development era led by the State Planning Organization (SPO) (Cansız, 2011). The 1980 export led economic growth and structural adjustment policies contributed further to the creation of regional production networks. The aim was to help firms become internationally competitive and the state started to employ various policy tools to support geographic agglomeration. Despite ongoing developments and efforts, Turkey lacked the presence of a systematic and complete scheme for a national cluster policy until the beginning of 2000s.

The initial approach to clustering in Turkey was in the form of Organized Industrial Zones (OSB) and Small Industrial Sites in the 1960s. The earlier examples proposed to bring together groups of firms operating in the same sector. OSBs proved to be a critical and efficient tool in terms of their impact on industrial production and the creation of regional employment where they are considered as a major foundation for clustering in Turkey.

From the early 1970's until the beginning of 2000's, Turkey did not have a clearly defined policy instrument and strategy for promoting industry clusters. This era included policies that consisted of infrastructural investments, R&D incentives for firms and legal regulations in order to develop a better environment for businesses.

In the 1990's, the Technology Development Centers (TEKMER) were founded within universities under the guidance of KOSGEB (Small and Medium Enterprises Development Organization). The technology centers played a significant role in the formation of cluster related policies in Turkey. The 1990 era is a period during which new incentives for technology adoption and usage were implemented.

Turkey started to form and apply new cluster policies in the beginning of 2000s. The first initiative is the Competitive Advantage of Turkey (CAT) project which later evolved to be the International Competitiveness Research Institute (URAK). The Ninth Development Plan of

Turkey (2007-2013) includes comprehensive covering of cluster-related policies. The plan explicitly states that new initiatives for network and cluster formation will be launched.

Clustering and sound cluster related policies are critical for regional and national economic development for a couple of reasons. One objective of clustering is to benefit from agglomeration economies. Economic growth is explained by a combination of input use and efficiency improvements. Advantages to foster economic growth can further be seen when the firms are located together (Solow, 1957; Marshall, 1920). Localization economies produce positive technical externalities when the firms are located close to the firms in the same industry. The benefits of localization economies are further enhanced with urbanization economies when different industries and externalities arise from urban size and density. Additionally, external economies available to all local firms stemming from a variety of sectors produce external overall benefits (Jacobs, 1969).

The objective of the paper is to present the overall developments in cluster related policies in Turkey. The emphasis is to briefly outline the national clustering projects most of which are funded jointly by the EU and the Republic of Turkey. The paper further aims to contribute to the understanding of the role of clusters on regional economic performance through investigating the impact of related variety on regional economic growth.

The paper is structured as follows. The following part summarizes the evolution of policies on industry clusters in Turkey starting from the beginning of 2000s when initial steps started to be made on a national basis. The third part presents the theoretical discussions about connections across clusters, variety of industries and regional economic performance. The fourth part presents empirical findings on the impact of related variety on regional economic performance in Turkey. The fifth part marks conclusions.

2. Policies on Industry Clusters in Turkey

The first initiative on cluster formation in Turkey was under the leadership of the Competitive Advantage of Turkey (CAT) project group. The CAT project started with supporting the cluster initiatives such as Tourism cluster in Sultanahmet (İstanbul), competitiveness and cluster analyses for the city of Bartın and Organized Industrial Region (OSTİM) in Ankara. After successful finalization of the Competitive Advantage of Turkey project, the project team continues to work as International Research Institute (URAK).

The UNDP in collaboration with the small and medium enterprise development in Southeast Anatolia (GAP-GIDEM) project implemented further several clustering initiatives. Adıyaman textile, Şanlıurfa organic agriculture and Diyarbakır marble clustering initiatives are several examples.

The first EU funded project on Clustering in Turkey is the “Establishment of Fashion and Textile Cluster” (2005-2006). The General Secretariat of Istanbul Textile and Apparel Association (İTKİB) as the main beneficiary of the project aimed to increase networking among SMEs in the textile and clothing sector, at local, national and European levels.

The second EU funded project on clustering is the “The National Clustering Policy Project” launched in 2007 and ended in 2011. The project is a major step in defining Turkey’s strategies concerning clusters and is one of the most comprehensive studies that analyze the current condition of clusters and cluster policies in Turkey by providing strategic recommendations for the near and far future. The main objective of the project is to create a National Clustering Policy by means of producing a Clustering Policies White Book for Turkey.

The aim of the project is to improve the international competitiveness of the SME’s by fostering the interaction between Turkish and European clusters and has three components. The first component is to improve the capacity of institutions, the second component is the development of a strategy document and the third component is cluster mapping and analysis.

The project produced roadmaps for 10 clusters in Turkey. Identified clusters are, Mersin processed food, Ankara machinery, Konya automotive parts, Eskişehir-Bilecik-Kütahya ceramic, Manisa electronic, Ankara software, Denizli-Uşak home textile, Muğla yacht building, İzmir organic food and Marmara automotive parts.

As a product of the Development of a Clustering Policy Project, the “White Book” prepared a report to comprehensively reflect the findings of the project. The White Book forms a profound framework for Turkey in the context of clustering and will improve the efficiency of future research on the subject by serving as a comprehensive model for new business clusters to be formed in Turkey.

The third project co-financed by the European Union and Republic of Turkey is the SME Networking Project launched on July 2011 and will run through 2013. The objective of the project is to improve networking and cooperation between the developed and the underdeveloped regions of Turkey through developing and piloting cluster-based inter and intra-regional networking and cooperation strategies. The project runs in five areas (Gaziantep, Çorum, Kahramanmaraş, Samsun and Trabzon) in collaboration with regional chambers of commerce and industry.

The SWOT analysis conducted by the Under secretariat of Foreign Trade of Turkey summarizes the present and the future of clustering issues and policies in Turkey (Appendix 1). The analysis briefly suggests that while Turkey is relatively rich in terms of resources that favor the success of present and future cluster policies, structural deficiencies inherited from the past form the major obstacles in the way, which is a call for handy but costly structural reforms in the future if Turkey wants to succeed in cluster policies.

The success of cluster policies should further be analyzed in terms of the presence of related industries localized in the same geography. Presence of variety of firms in a region contributes on knowledge exchange as well as innovation performance of the firms. Close interactions across firms with technical similarities induce synergy and knowledge spillovers. Geographical proximity as well as technological similarities is significant factors in understanding regions’ economic performance. The following part draws our attention to the significance of related variety in understanding the role of clusters in enhancing the economic performance of the regions.

3. The Significance of Related Variety for Regional Success

Literature on agglomeration economies suggests that there is a close relationship between the regions’ economic performance and sectoral composition of economic activities. Advantages of clustering can be summarized within the following four points. The first point is related to internal increasing returns to scale. The advantage occurs in a single firm due to production cost efficiencies realized by serving large markets (Krugman 1991). The second point is related to localization economies, where positive (technical) externalities are enjoyed by firms locating closer to other firms that are in the same industry. The third point is urbanization economies, where locating closer to firms belonging to different industries brings positive externalities arising from urban size and density. The fourth is related to what is called Jacob’s externalities, where external economies available to all local firms stem from the existence of a variety of sectors (Jacobs 1969).

Jacob’s externalities arise from pooling of labor market and intermediate goods, the creation of specialized suppliers and the emergence of knowledge spillovers (Feser, 2002; Henderson, 2003; Frenken, *et al.*, 2007). Most important knowledge spillover effects come from outside the core industry. As a result, variety and diversity of geographically proximate industries rather than geographical specialization promote innovation and growth.

Variety in an economy is a significant source of economic growth due to spillover effects within a sector and also between sectors (Jacobs 1969; Glaeser *et al.*, 1992; Van Oort, 2004;

Frenken *et al.*, 2007). A region specializing in a certain variety of sectors that complement each other experiences higher growth rates (Frenken *et al.*, 2007).

Studies on related variety and regional growth confirm that technological relatedness is a major driver of economic growth. Franken (2007) for Netherlands, Boschma and Iamarinno (2009) for Italy and Great Britain and Gülcan, Kuştepelı and Akgüngör (2010) for Turkey confirm that variety is a significant driver of regional growth. Existing empirical research on Turkish regions show that there is a statistically significant relationship between agglomeration and productivity (Doğan, 2001; Kıymalıoğlu and Ayoğlu, 2007; Filiztekin, 2002).

The aim of this part of the study is to present the impact of variety in regions on regional economic growth. It is demonstrated by previous studies that variety per se is not sufficient in explaining regional economic growth. The regions that diversify into similar industries tend to perform better. Thus, related variety has a positive impact on regions' economy. The study tests the hypothesis that related variety is positively related to regional economic growth.

The data includes the 4 digit ISIC Rev 3 manufacturing sector employment data for 81 NUTS level 3 regions in Turkey. The data set covers the period of 1992-2001. The period after 2001 does not cover employment variables at the 4 digit level. It is therefore not possible to expand the data set for the period after 2001. We use employment data to calculate indices for related variety and unrelated variety by means of entropy measure. To test the hypothesis that related variety matters in regions' economic development, we use the regions' GDP growth. The dependent variable is regressed over "related variety" and "unrelated variety" variables. Appendix 2 presents the entropy calculations.

4. Empirical Results on the Impact of Variety on Regional Economic Performance in Turkey

Figures 1 and 2 show the related variety map of Turkey and regions of Turkey ranked according their development levels. The two maps visually show that related variety is high in the regions where economic development is high. Entropy measure for related variety decreases as the regions become poorer with respect to socio-development index.

Table 1 presents the panel regression results where GDP growth is regressed on population density, employment density and variety measures. The analysis confirms that technological relatedness is a major driver of economic growth. Panel regression results for 81 NUTS level 3 regions in Turkey show that population density, related variety and wage growth are positively related to growth in regional income. It is seen that variety is a key driver of regional growth. The more the variety, the better it is for regions' economic growth. Understanding the process of the creation of variety of sectors within a region is important in creating road maps for cluster development. In sectoral studies and roadmaps, it is therefore necessary to take variety and technological relatedness into consideration. New sectors, new firms are always better in terms of economic growth; but more important is that they are technologically related.

5. Conclusions

Turkey's 2023 objective includes exports of 500 billion dollars, a goal where cluster-based export support policies will have to prove crucial. The developments regarding clusters and cluster policies in the recent years have produced promising results and much attention on the subject. Turkey has obviously been late in forming a systematic and unified national approach in forming clusters, but the issue has been handled much more professionally in the last decade both in the public and private sectors and universities. As the White Book (2008) suggests, there is still much more to be researched into and to be done in terms of clustering if

Turkey seriously aims to compete globally in high value-added sectors, and even though not easy, the Development of a Clustering Policy Project and the White Book are two promising examples and constitute solid frameworks on what must be done at present and in the future. Through relevant structural reforms and decisive governance, Turkey has the potential to lead its economic environment to a structure where clusters in various sectors efficiently serve to increase productivity and help businesses successfully compete and lead in global markets

Figure 1. Related Variety Map of Turkey (Manufacturing Sector in 2001)

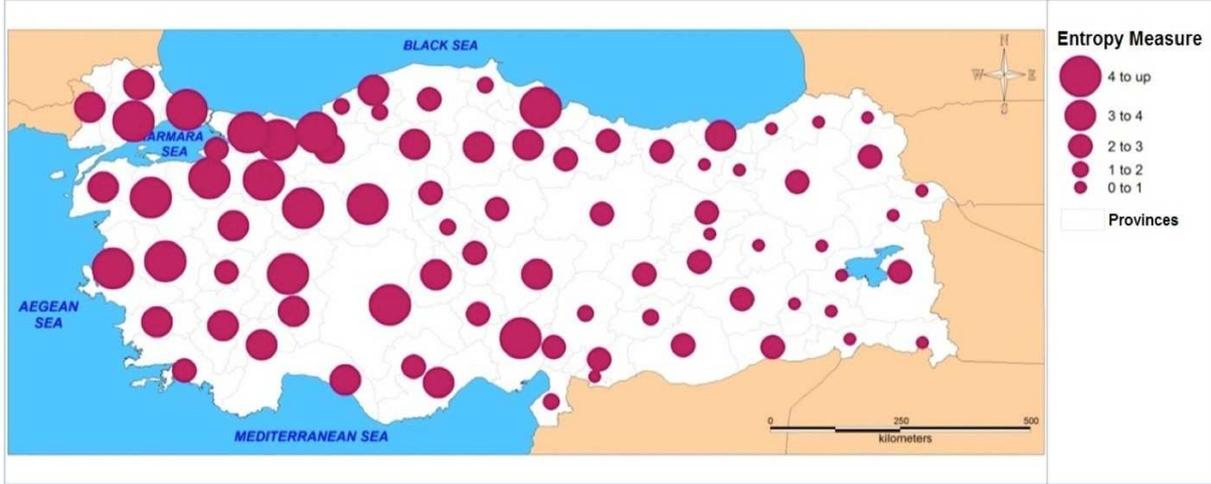


Figure 2. Map of Regions According to Socioeconomic Development Index

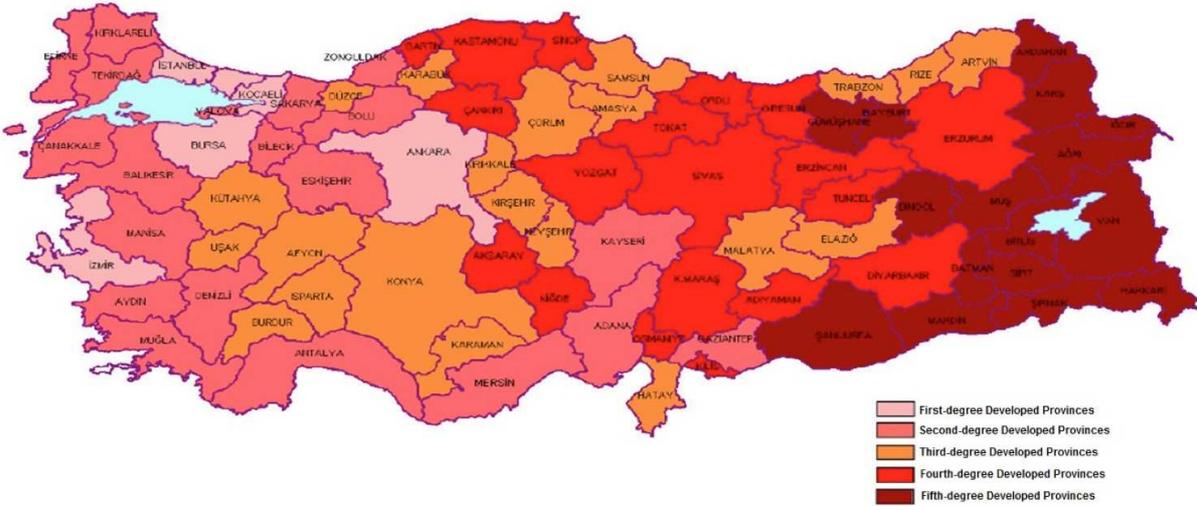


Table 1. Regression results for 81 NUTS Level 3 Regions in Turkey (1992-2001)

Two-way random effects			
Regressions/Independent variables	GDP GROWTH		
	1	2	3
Intercept	0,135 (0,761)	0,963* (8,871)	0,259 (1,579)
Population density	0,207* (5,215)		0,187* (5,076)
Employment density	-0,036 (-1,556)	0,005 (0,240)	
Related variety	0,088*** (1,834)	0,095*** (1,871)	0,097** (2,036)
Unrelated variety	0,041 (0,629)	0,087 (1,249)	0,004 (0,077)
Wage growth	0,177* (2,837)	0,110*** (1,722)	0,144** (2,283)
F	8,295	2,629	9,636
DW	2,249	2,200	2,236

* Significant at the $\alpha \leq 0.1$ level

** Significant at the $\alpha \leq 0.05$ level

*** Significant at the $\alpha \leq 0.01$ level

Appendix 1. Turkey's Cluster Policies: SWOT Analysis

Strengths:

- SME's are the driving force of the Turkish economy.
- Presence of "natural" business agglomerations.
- Present support mechanisms and infrastructure favoring the SME's.
- High quality universities supported by Techno parks.
- Dynamics groups in Turkey who can lead the process.
- Size of the domestic market (Turkey is the 17th largest economy in the world).
- Young and educated population.
- High interest in clusters and clustering (has to be transformed into a common vision).
- Presence of institutions ready to take up the role of local stakeholders in clustering.

Weaknesses:

- Lack of coordination between support mechanisms and the present institutions.
- Insufficient cooperation between firms, state institutions and universities.
- Firms' high expectations about their direct and individual attempts.
- Lack of collective culture on synergy and business partnership.
- Partially insufficient infrastructure and transport system.

- Insufficiencies in terms of levels of institutionalization in state and private entities.
- Lack of structure required for primary clustering processes.
- Inefficiencies in making use of vocational education.
- Insufficient spending on R&D by the SMEs.
- Fragile state-private cooperation.
- Varying interpretations of clustering (The interest in clustering is high, whereas the concept has not been well-understood in general yet).

Opportunities:

- Opportunities for exchange between information actors and innovativeness in order to achieve higher R&D.
- Clusters and clustering provide the required elasticity and adaptation in a changing economic environment.
- Clusters serve as convenient tools to increase innovativeness and competitiveness.
- Clusters improve the competitive advantages of small enterprises; help them in understanding and opening to international.
- Cluster makes easier the cross-regional cooperations.
- SME's within clusters reach higher market shares as a result of economies of scale.
- Clusters bring resources together and increase efficiencies.
- Clusters can improve the image of the industry and might serve as a source of attraction for foreign direct investment.
- Clustering is also useful in agriculture and services sectors as it is in manufacturing.
- Turkey's strategic position in the global market.
- The process of joining the EU is an opportunity both in terms of finance and policy adaptations.
- Focusing in exportations creates opportunities for making international connections.

Threats:

- Uncertainties in the locations of potential local stakeholders and in their capacities.
- Serious trust issues in the business environment.
- Lack of informed agents in the state and in the private sector.
- Reluctance in agents to take leading responsibility of a cluster policy.
- Strong vertical hierarchical structures in particular industries and various levels of the public sector.
- Rapidly changing conditions of the economic environment.
- Global economic crises.
- Lack of a predictable legal and political environment.
- Lack of managerial abilities in institutions, in various business cultures and in heterogeneous groups.

Source: Undersecretariat of Foreign Trade (2008). The White Book: Development of a Clustering Policy for Turkey, Ankara.

Appendix 2. Entropy Measures

All four digit sectors i fall exclusively under a two-digit sector S_g , where $g=1, \dots, G$. The two digit shares P_g can be derived by summing the five-digit shares p_i :

$$P_g = \sum_{i \in S_g} p_i$$

$$H_g = \sum_{i \in S_g} \frac{p_i}{P_g} \log_2 \left(\frac{1}{p_i/P_g} \right)$$

Related variety as the weighted sum of entropy within each two-digit sector is given by:

$$RV = \sum_{g=1}^G P_g H_g$$

Unrelated variety as the two-digit level entropy measure is given by:

$$UV = \sum_{g=1}^G P_g \log_2 \left(\frac{1}{P_g} \right)$$

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