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Automotive Industry in Istanbul and Eastern Marmara Region:

An Innovative Cluster?

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Summary

Innovativeness being the main driver of the competitiveness of a region has been created by different actors such as firms, research centers, universities and other public or private institutions interacting on various levels. Spatial concentration accelerated these interactions and the potential of innovativeness increased in these clusters by sharing inputs, benefiting from labor pools and dispersing knowledge. Both government intervention and local characteristics determine success of the clusters.

This study has focused on the automotive industry which is clustered in Istanbul and Eastern Marmara Region in Turkey. Not only automotive industry but also other related industries have been clustering in this region since an important petroleum refinery, Tüpraş was established there in 1960. The region also includes TUBİTAK Marmara Research Centre, universities, industrial zones, public institutions and two techno-parks which are specialized on the automotive industry.

The aim of this paper is to understand whether automotive cluster in this region is innovative. For this purpose local dynamics which affect evolution of the cluster are explained and characteristics of innovation of automotive firms in the region are clarified by a recent survey[*] held in 2008. The provinces in which the survey is done are Istanbul, Bursa, Kocaeli and Sakarya.

Key Words: Automotive, Turkey, Istanbul, Eastern Marmara Region, cluster, innovativeness

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[*] The area survey titled "Explaining Interrelation of Innovativeness and Competitiveness Considering Sub-Regions" prepared by Erkut&Albayrak, is supported by ITU Research Fund. (2008 - 32458)

Introduction

Cluster concept has become more important at both academic and policy making level in recent years. In relation to the objective of increasing competitiveness of a region, recent regional development plans or policy documents included Porter's cluster approach as the most popular tool.

For Porter (2000), cluster is "a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities". Porter has described three different ways for cluster growing processes. These are increasing productivity of companies, driving the direction and pace of innovation and stimulating the formation of new businesses. In this way local competition dynamics define clusters species and encourage the firms to be innovative.

Clusters are not only agglomeration of some firms or institutions but also networks of relations that include local ties and reflect local business culture. Clusters have some specific characteristics which are; "agglomeration in same region, specialization, multi-actor structure, competitiveness and cooperation, critical mass, cluster life cycle and innovativeness" (Andersson vd, 2004). From a broader view, cluster has emerged as a result of complex relationships at local level. "Regional agglomeration enhanced learning by facilitating close interactions among firms and supporting the institutions needed to produce and apply knowledge and skills" (Wolfe, 2009).

Innovativeness being the main driver of the competitiveness of a region has been created by different actors such as firms, research centers, universities and other public or private institutions interacting on various levels. Spatial concentration accelerated these interactions and the potential of innovativeness increased in these clusters by sharing inputs, benefiting from labor pools and dispersing knowledge. Both government interventions and local characteristics determine success of the clusters. In this perspective Porter's cluster approach based on Marshall's explanations about agglomeration economies (Motoyama, 2008). As all of the firms located in the same area, externalities have been gained. Before Porter; Marshall described three reasons why such localized economies of scale might exist. These reasons are information spillovers, local non-traded inputs and a local skilled labor pool (McCann, 2006).

In Schumpeterian theory innovation is defined as main source of economic growth and the importance of links between organizational, managerial, social and technical innovation are emphasized (Simmie, 2001). Innovation is also classified in four groups by OECD Oslo

Manuel (TUBITAK, 2005). These are product, process, organization and marketing methods. In this context not only high tech sectors but also some medium – low tech sectors might have innovative potential (Maskell, 1998).

Some studies focused innovativeness at the regional level. With the changing global production systems in recent periods some regions has created productive industrial districts by using their local relationships and benefiting from social structure. "The third Italy" in Becattini's studies is well known example for innovative industrial districts. In this region small firms have been concentrating in a specific place in order to minimize their cost and benefit their relationships. This organizational structure is defined as a key factor for the success (Estall and Bennett, 1991; Eraydın, 1992). There is not only physical but also close cognitive and organizational proximity. But uniqueness of regional experiments about innovativeness has been also expressed in the literature. Innovativeness may grow out of local dynamism and success of cluster or it may accelerate progress of the region and strengthen cluster's structure. But the question is "which comes first?" (Simmie et all, 2002).

Thereby there is a need for more case studies about innovative regions and sectors. Describing local characteristics with an evolutionary perspective is important to understand development process of cluster. The present research has focused on describing and understanding innovativeness dynamics of the the automotive industry which is clustered in Istanbul and Eastern Marmara Region in Turkey. This paper is structured as follows: Firstly innovative clusters are explained. Second part deals with evolution of automotive industry in Turkey and definition of current automotive clusters. Characteristics of innovation of automotive firms in the case study area are clarified in the third part.

Innovative Clusters

Although importance of distance has been decreasing in relation to globalization, geography is still regarded for industrial location (Boschma and Lambooy, 1999). Development of telecommunication technologies and transportation facilities encourage the firms to move new places to reduce production cost but firms tend to agglomerate some specific places where provide innovative environment to industrial activity. In this way potential of innovativeness become more preferable feature than traditional location advantage (Audretsch, 1998).

The innovative capacity of clusters has influence on competitive advantage of the industry. To reach innovativeness and to create competitiveness at the regional level is possible with the support of the local business environment. The investment of innovative activity in an

industry is related to the market conditions and competitiveness characteristics. Management of researches and activities, increasing knowledge and skills, accessibility of this knowledge, networks and face to face relationships between firms and other actors have been providing a worthwhile bases to innovative activities (Enright, 2003).

Geographical proximity has been presenting an opportunity to create collaboration and more effective communication for the firms in the cluster. But some studies put forward that knowledge spillover does not grow out of physical proximity (Breschi and Lissoni, 2001). On the other hand Maskell (2001) argues proximity in the cluster creates a climate which helps firms to ease the sharing of tacit knowledge. In this way it can be said that firms still tend to agglomerate in specific places.

Besides location and geographical features every region has unique social system which is effective on cluster performance. This social system has emerged as a result of historical background of the region and can not be regenerated in different region. Firms and other related actors create an "organizational proximity which include cognitive, social and institutional dimension" (Boschma, 2005). Lorenzen (2007) has described the social environment which firms located in determined innovation of firms. From value chain to family relationships every social level has many opportunities for local firms to produce innovation and learning. These are summarized in the Table 1.

Table 1: Social relations and its learning effects (Lorenzen, 2007)

Social relation	**Learning effect**
Value chains	In depth user-producer (vertical) learning
Alliances	Knowledge build jointly (horizontally)
Flexible specialization	In-breadth learning
Inter-firm project networks	Experimentation and customization
Industry- schools/Universities -relations	Research and education
Professions, clubs, associations	Informal know-how trade, socialization, gossip
Families, friendships	Advice, passing on of information

Historical Trajectory of Automotive Industry in Turkey

This study has focused on local characteristics which are affective on the innovativeness of automotive firms. Innovativeness has been encouraged for the last thirty years in Turkey. A lot of incentives are given by governments in order to developed innovativeness of the industries and automotive industry has benefited these incentives very effectively (Albayrak, 2009).

Automotive industry has been developing for sixty years in Turkey. Policies about automotive sector in Turkey can be summarized in five different periods which are given in Table 2. The first period includes starting private investment experiments until 1961. Automotive industry has been developing in Turkey since 1954 when Turk Willy's Overland Ltd started production for military forces. In 1955 Türk Otomotiv Endustrisi AS (i.e. Turkish Automotive Industry) and in 1963 Istanbul Otobus Karoserleri AS was established in Istanbul. In that period Devrim (i.e. revolution) Automobiles was designed and produced as the first Turkish Automobile in 1961 in Eskisehir but only four cars were produced. Because of lack of interior demand, production was given up.

Table 2: Automotive sector policies in Turkey (Adapted from Tezer, 2010)

	Years	Major Characteristics of Periods
1.	Until 1961	Starting period / First production experiments and starting private investment
2.	1961-1983	Import substitutions period for industrialization
3.	1983-1995	Export based industrialization and preparation to perfect (atomize) competition
4.	1996-2002	European custom union and perfect (atomize) competition
5.	Since 2003	Priority of technology management and innovative approach

In the second period, industrialization policies were based on import substitutions approach between 1961 and 1983. While interior markets were protected by high customs tariff and restriction of import in specific sectors, local manufacturers were encouraged to develop their technology and product range. The second attempt for designing Turkish automobile is Anadol was produced as the first mass Turkish automobile production by Otosan A.S. between 1966 and 1982. After finishing the production the company started produce automobile with foreign license and older experiments were transferred to new production.

Until 1983 Bursa was main location for automotive investments. Not only main production but also manufacture of automotive parts and components has been developing since 1970s. Other important provinces are Ankara, Istanbul, Kocaeli, Sakarya and Izmir. In that period the sector started institutionalize. In this way Turkish Automotive Manufacturers Association (OSD) and Association of Automotive Parts and Component Manufacturers (TAYSAD) were founded in Istanbul.

Since 1980's, by the impact of globalization and economic restructuring, the role of public authority in the economy has been decreased. Privatization, opening local markets to foreign products and encouraging foreign direct investments affected both automotive and other industrial sectors. In order to integrate global production systems as well markets, firms started to change their production and investment strategies. While Bursa and other provinces

that are surrounding metropolitan cities kept their importance, some other Anatolian cities such as Eskisehir, Adana and Aksaray attracted foreign investments with the support of the government during this period. Besides new investments, protections and regulations decreased and local markets opened up competition. In that era industrial policies were based on export priorities by encouraging competition. Integration of global financial systems and development of interior financial markets have supported this process. In this period BILTIR laboratory was founded in Middle East Technical University to make some tests needed in the automotive manufacturing.

With the custom union between Turkey and Europe in 1996, Turkey has more advantage to attract foreign investment. Importance of European countries as a wide market for the industry has highlighted some places which are close to harbors. New investments agglomerated in Marmara Region, especially in Kocaeli and Sakarya. Moreover "Automotive Part and Components Industrial District" (TOSB) was established in Kocaeli at Istanbul Border in 1999 and TAYSAD relocated in Gebze (Kocaeli).

During 2000s, industrial structure became stronger and R&D investment has gain importance as a central government's policy. In 2003 "Gebze Industrial District (GOSB)'s techno park and in 2004 Automotive Technologies R&D Company (ITU-OTAM) were founded. Another new techno park (ULUTEK) was established in Bursa in 2005. These R&D investments focused on Kocaeli, Bursa and Istanbul provinces in Marmara Region. This region is not only a main automotive manufacturing area in Turkey but also an important market for the industry.

Development of the automotive industry in Turkey is presented in Table 3. According to OSD (Turkish Automotive Manufacturers Association) records 16 main firms are in Turkey. Eleven of them are in Istanbul and Eastern Marmara Region. Not only automotive industry but also other related industries have been clustering in this region since an important petroleum refinery, Tüpraş was established there in 1960 (Albayrak, 2009). This region is defined as an automotive cluster by some reports (EC, 2007). The region also includes TUBİTAK Marmara Research Centre, universities, industrial zones, public institutions and two techno-parks which are specialized on the automotive industry. Decentralization policies of Istanbul has affected whole region and new industrial investments have been directed especially to Kocaeli and Sakarya which are very close to Istanbul. Bursa is also another focal point for the industry.

Table 3: Development of automotive industry in Turkey (main firms and supporting institutions to years and provinces)

	Ankara	Izmir	Sakarya	Kocaeli	Bursa	Istanbul	Eskisehir	Aksaray	Adana	Tekirdag
1954	TURKTRAKTOR									
1963			OTOKAR	**TUBITAK MAM**						
1964		BMC								
1966	MAN			ISUZU	KARSAN					
1968						MERCEDES				
1971					O.RENAULT TOFAS					
1974						**OSD**				
1978						**TAYSAD**				
1983							FORD			
1985								MERCEDES		
1986					**UIB**					
1987						**ODD**			TEMSA	
1990				**GOSB**						
1992	**ODTU-BILTIR**									
1994			TOYOTA							
1997				HONDA HYUNDAI						
1998				**GEPOSB TSE QUALİTY CAMPUS**						
1999				**TOSB TAYSAD**						
2001				FORD						
2002										HATTAT
2003				**GOSB TECHNOPARK**						
2004						**ITU-OTAM**				
2005					**ULUTEK**	**OYDER**				
2008			TEMSA							
Number of main firms	2	1	3	4	3	1	1	1	1	1

Case Study

The aim of the case study is to understand whether automotive cluster in this region is innovative. For this purpose local dynamics which affect evolution of the cluster are explained and characteristics of innovation of automotive firms in the region are clarified by a recent survey held in 2008 (Erkut and Albayrak, 2008 and 2010).

The provinces in which the survey is done are Istanbul, Bursa, Kocaeli and Sakarya. Main characteristics of provinces are given in the Table 4. In order to define the sampling frame, records of Trade and Industry Chambers were used. 200 interviews were made in 2008 during June and July. One of senior executive replied the questionnaire on behalf of the firm. Distribution of number of questionnaire by provinces is given in Table 5.

Table 4: Main characteristics of provinces

	Population (2000)	Population (2008)	Urban population share (2007 / %)*	GDP per capita (2001 / $)	Export share (%2007)*	Import share (%2007)*
Istanbul	10.018.735	12.697.164	22,5	8.752	55,6	58,2
Kocaeli	1.206.085	1.490.038	1,8	17.612	5,5	11,2
Sakarya	756.168	851.292	1,2	6.023	3,3	1,2
Bursa	2.125.140	2.507.963	4	7.163	8,5	4,5

** Province's share in Turkey (81 provinces)*

Table 5: Population and sample of the research

Provinces	Total Number of Automotive Firm [1]	Number of questionnaire
İstanbul	340	79
Kocaeli	117	37
Sakarya	65	24
Bursa	435	60
Toplam	957	200

Essential interest of questionnaire is about innovativeness of firms. Each firm evaluated his innovativeness performance in nine categories in Table 6. According to the result firms are more innovative considering "quality of new product and services" and less innovative considering "number of patent". The firms which are in Bursa have higher score than other firms which are in other cities.

One of the assumption is "urban facilities and urban services have affected innovative performance of firms". The importance of urban facilities and urban services were asked to

[1] Istanbul Chamber of Industry, Kocaeli Chamber of Industry, Adapazarı Chamber of Industry and Trade, Bursa Chamber of Industry and Trade

the firm and their assessments were reduced into six groups of closely related variables by principle component analysis (PCA). These groups and variables are shown in Table 7. In the most of groups the firms which have been in Kocaeli and Bursa have higher scores.

The first group has shown the effect of universities and technical schools. According to the results technical schools are more effective than universities for innovativeness of the firms. The second group is about life quality and infrastructure. Istanbul has the highest score on quality of transportation infrastructure and Kocaeli has the highest scores on quality of telecommunication infrastructure and quality of education facilities.

Table 6: Innovativeness of firms

	Provinces				
Innovation	Istanbul	Kocaeli	Sakarya	Bursa	Total
Innovativeness level of firm	3,4	3,9	3,6	3,8	3,6
Number of new product and services	3,2	3,6	3,8	3,8	3,5
Process and methods	3,4	3,6	3,7	3,8	3,6
Share of new product	3,5	3,3	3,6	3,9	3,6
Ability to provide new products to the markets	3,2	3	3,4	3,7	3,4
Quality of new product and services	3,9	4,1	4	4,2	4
Marketing methods	3,3	3	3	3,8	3
Number of patent	2,5	2,6	2,3	2,8	2,6
Innovation of management	3,2	3,4	3	3,7	3,4

Scores: 1: not innovative to 5: very innovative

Institutions such as technology development centers, techno parks, fairs and chambers are in the third group. Fair has the highest score in this group. Relatively high scores on technology development centers and techno parks are in Kocaeli. Bursa also has the highest scores on fairs and chambers. The fourth group is about other supportive relationships for the firms. This group includes various variables such as venture capital firms, public research centers or social clubs. The most effective variable in this group is professional service firms.

The fifth group is about availability of labor. The results have highlighted the importance of qualified labor, executive managers, scientist and engineers. Kocaeli has the highest scores on quality of R&D relationships between firms and universities. The last group is about linkages among collaborators. All variables in this group are effective on innovativeness. Customers and suppliers are very important for innovativeness of firms. These are rated most highly in Bursa.

Table 7: Urban facilities and urban services that affect innovativeness

Main groups of variable	Provinces				Total
	Istanbul	Kocaeli	Sakarya	Bursa	
Universities and technical schools					
Universities	2	2,9	2,5	2,4	2,3
Technical schools	2,8	3,4	2,8	3,3	3
Life quality and infrastructure					
Quality of transportation infrastructure	3,9	3,8	3,3	3,5	3,5
Quality of telecommunication infrastructure	3,6	4	3,6	3,7	3,7
Life quality of region	3,3	3,5	3,5	3,5	3,4
Quality of education facilities	3,2	3,9	3,6	3,7	3,6
Institutions					
Technology development centers	3	3,3	2,6	3,2	3
Techno parks	2,6	3,5	2	3,1	2,8
Fairs	3,5	4	3,2	4,1	3,7
Chambers of industry and trade	3,2	3,5	3	3,7	3,4
Supportive relationships					
Venture capital firms	2,4	2,6	2,3	2,5	2,5
Entrepreneurs networks	2,6	2,9	2,5	3,1	2,8
Business support centers	2,7	2,9	2,2	3	2,8
Public research centers	2,5	2,8	2,1	2,6	2,5
Private research centers	2,5	2,9	2,2	2,8	2,6
Professional firms	2,8	3	2,6	3	2,9
Social clubs and associations	2,6	2,7	2,3	3	2,7
Qualified labor					
Availability of qualified labor	3,3	4,1	3,3	4,1	3,7
Availability of executive managers	3,1	3,9	3	3,8	3,5
Availability of scientist and engineers	2,9	3,8	2,8	3,3	3,2
Availability of telecommunication experts	2,5	3,2	2,7	3,1	2,8
Quality of R&D relationship between firms and universities	2,8	3,5	2,8	3,2	3
Linkages					
Customers	3,5	4	3,5	4,1	3,8
Other firms / competitors	3,4	3,5	3	3,9	3,5
Suppliers	3,6	3,9	3,4	4	3,7
Banks	3,2	3,3	2,6	3,5	3,3

Scores: 1: not effective on innovation to 5: very effective on innovation

The sources of innovation were asked to the firms and the results were presented in Figure 1. According to the results main innovation sources are “demand of customers” and “fairs”. “Suppliers” and “colleagues” are following them. In this way relationships among collaborators become more important than others. Although several supportive regulations and reforms have been done in order to encourage innovativeness in recent times, “public institutions” and “universities” are not rated too much.

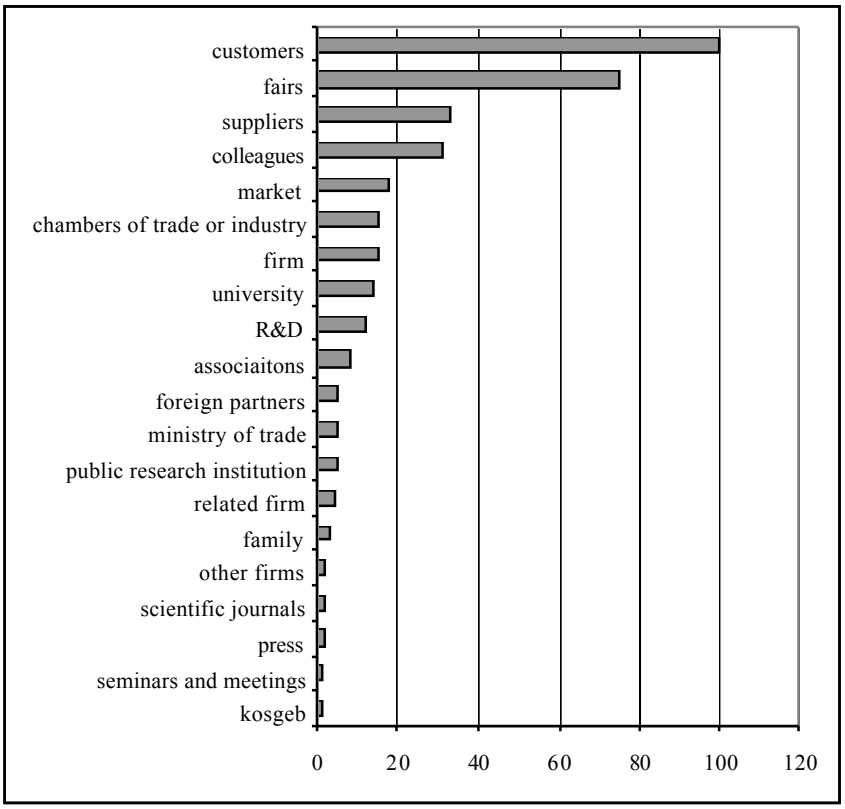

Figure 1: Sources of innovations

Considering the location of collaborators and competitors of the firms the finding of the research indicates that Istanbul has intense linkages within the city (Figure 2). Firms which are located in Kocaeli and Sakarya have strong linkages with firms located in Istanbul (Figure 3, 4). Considering international linkages Kocaeli has the highest percentage among other provinces (Figure 3). Considering the location of competitors Bursa includes the highest number of competitor within the city (Figure 5).

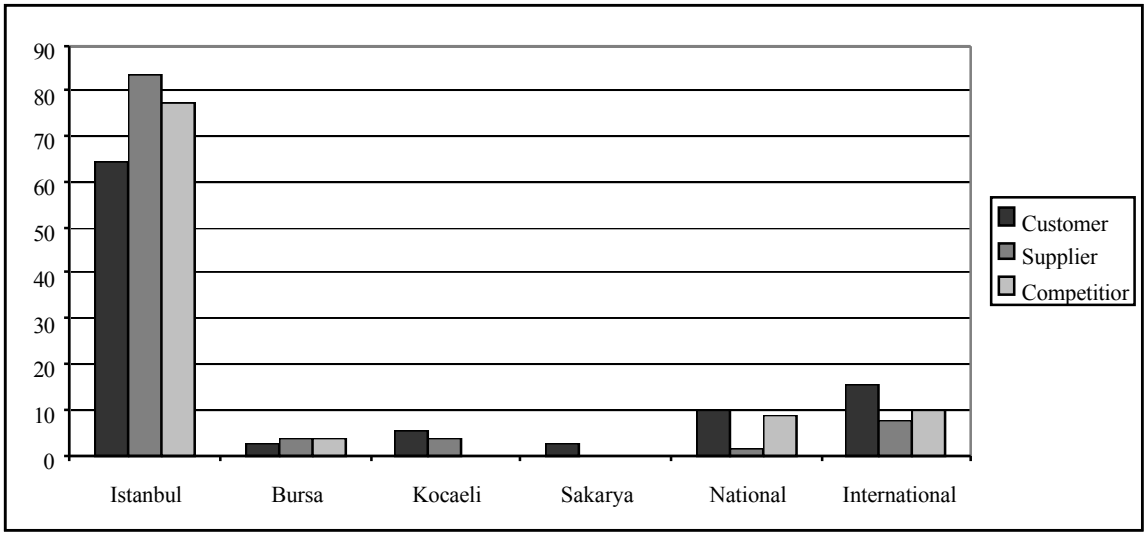

Figure 2: Automotive firms in Istanbul, by customers, suppliers and competitors.

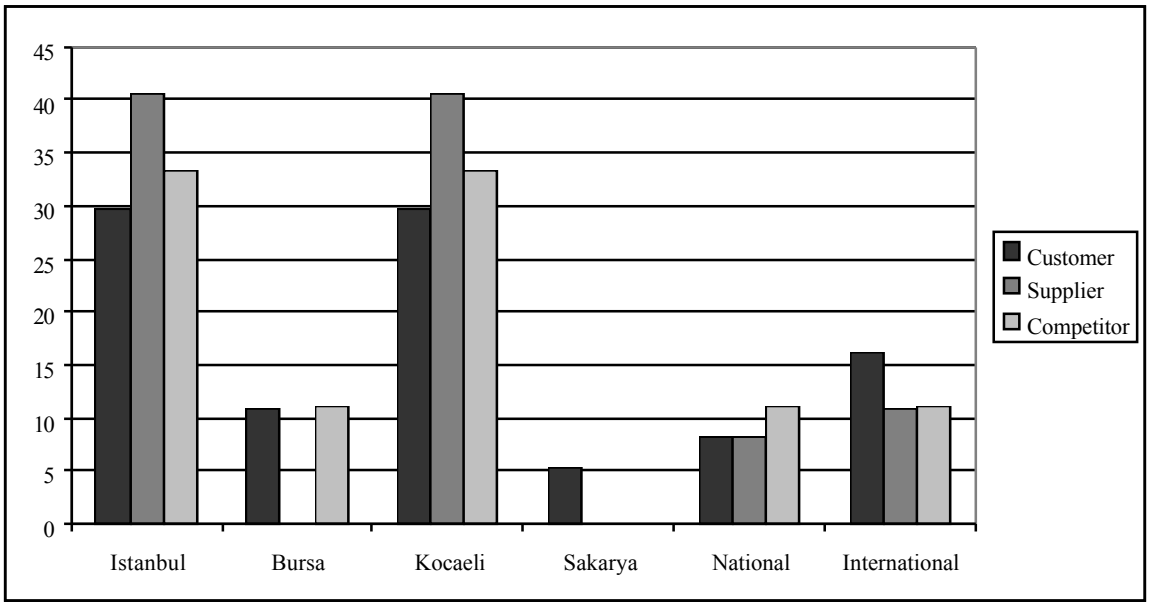

Figure 3: Automotive firms in Kocaeli, by customers, suppliers and competitors.

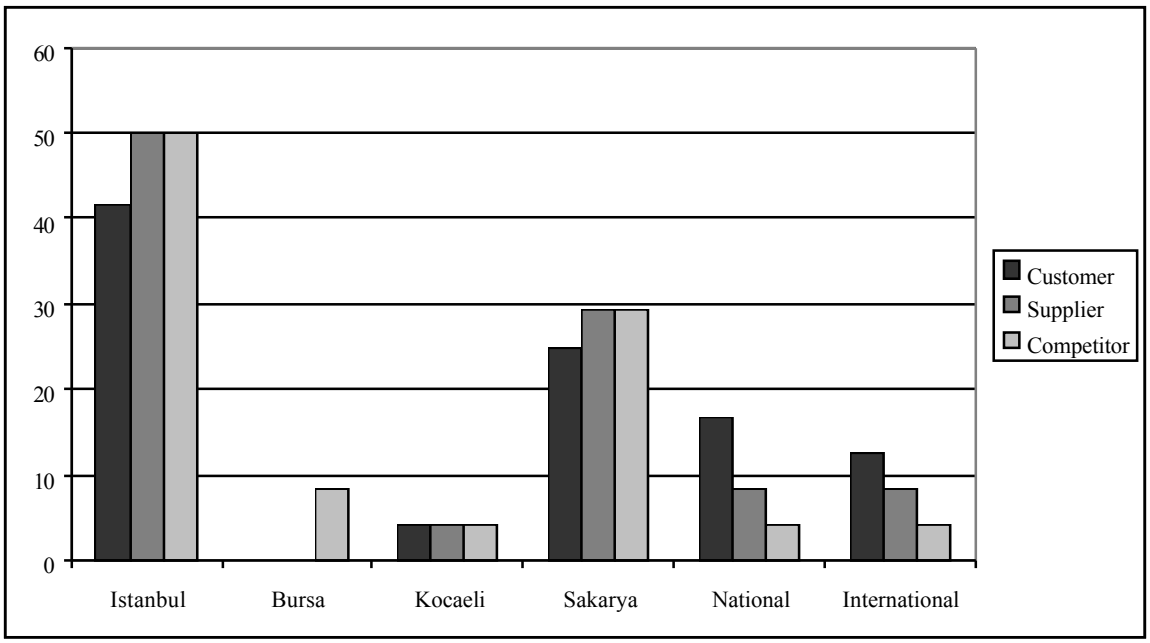

Figure 4: Automotive firms in Sakarya, by customers, suppliers and competitors.

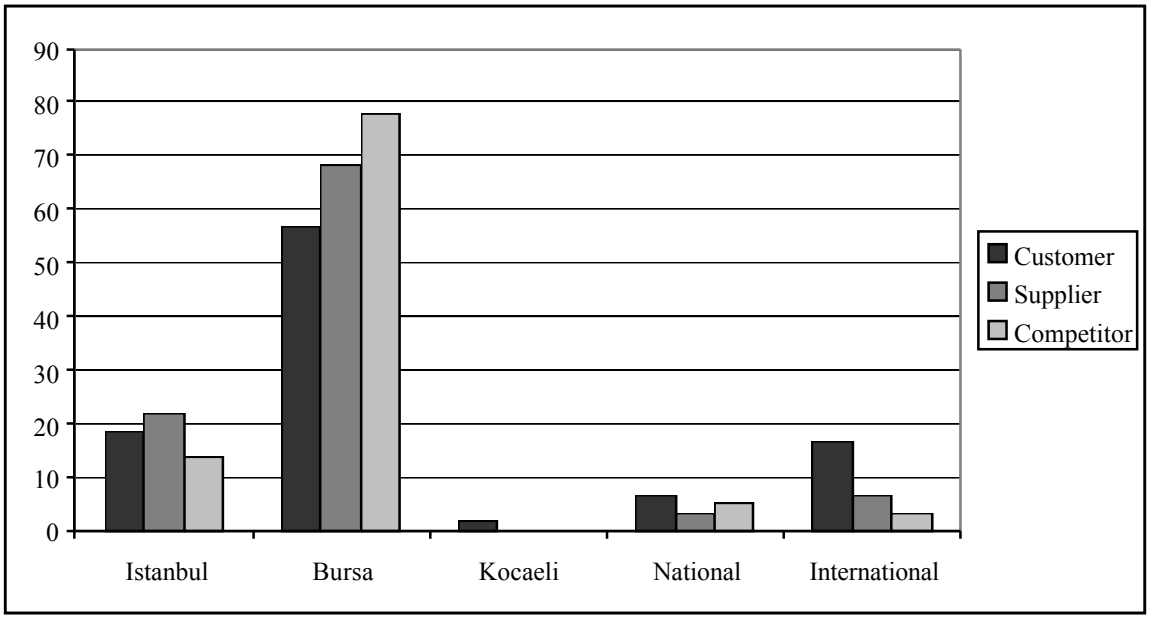

Figure 5: Automotive firms in Bursa, by customers, suppliers and competitors.

Conclusion

In this study, innovativeness of firms which are agglomerated in a specific region and local characteristics that impact the innovativeness of firms are investigated. The results show that provinces have some similar features besides they have some differences:

- Bursa has more innovative firms than other provinces.
- The lowest rated innovativeness type is "number of patent" in survey area.
- Considering the contribution to innovativeness, accessibility of qualified labor is one of the most important features.
- Proximity to customers, suppliers and other related industries and linkages with the collaborators is important for innovativeness.
- Customers are defined as the most essential source for innovativeness.
- Effects of the universities are very few on contrary to the expectations. Therefore there is a need to make further researches in order to explain collaboration between universities and firms.
- As a result of the study it can be seen that Kocaeli and Sakarya has strong linkages with Istanbul. However, Bursa is defined as an industrial center with innovative potential.

The findings of this research indicate that further research is needed, focusing on the description of the related and supporting industries for the automotive sector and to evaluate these sectors according to their competitiveness and innovativeness potential.

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