NETWORKS AND LEARNING MACHINERY AND FURNITURE SECTORS IN ANKARA

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Introduction

As emerged in recent years, firms are seeking for new innovatory and sustainable directions to manage organizational learning and competences to innovate and improve their performance and competitiveness.

Many empirical studies also indicate that industrial districts' innovative performance is strictly linked with their capability, which is forming one of the district competitive assets, to absorb external knowledge since local systems allow the integration of external codified knowledge with local tacit one.

Moreover, we may further assume that the local production chains in specific areas create the expanding advantages of lowering the constant and flexible production costs of the production processes, raw materials, final products, etc.

We further claim that the biggest share of knowledge production and knowledge spillovers are facilitated in localized networks of similar and related firms in the regions.

By developing new relational connections, firms synchronously learn *how to learn* new and faster-diffusing knowledge with the help of different forms of specific regional norms, values and institutions.

One of the central ideas in this study is that the networks are important because they mainly value the learning processes.

In this sense, it could be stated that networks produce important public and private benefits.

This study examines how these concepts may be clarified for the developing districts of Ankara by focusing and showing relevant evidence on the internal networking processes by which regional development policies has been developed in different institutional mechanisms.

Indeed, it is this studies' contention that the economic realities of the district and impacts of its role on creating a *learning region* has been especially constituted upon different levels of learning fragmented between a different range and level of networking and proximities.

Regional Innovation Systems

"Regional innovation systems are places where close inter-firm communication, socio-cultural structures and institutional environment may stimulate socially and territorially embedded collective learning and continuous innovation" (Asheim and Isaksen, 2002: 83)

It is possible to claim that learning is a key strategic concept throughout sustainable innovation processes.

In this study, we transcribed the organizational aspects of learning in a reflexive manner by identifying the more complex interactions between the networks of firms and the other organizational aspects in the region.

Our research has primarily been focused on the issue of regional networks and institutions as mechanisms of knowledge generation and diffusion within regional innovation systems.

Networks and Proximities

As the forthcoming advantage of firms' capability and ability to make use of the advantages of regional innovation systems, we propose that local firms economically and socially have to be articulated to local and global networks that positively create the opportunities of reaching to different varieties of knowledge sources.

In this respect, networking literature provides us widely different approaches for analyzing extremely complex, regional business networks based on large relational data sets, from the viewpoint of linked firms. Sequentially, focusing on co-operation between economic actors in the region, we see that firms access to both external and internal information and knowledge resources by reducing the uncertainty and risks of knowledge diffusion through different methods of interactions.

One of the main sources of positive effects the setting of industrial districts conferred on individual firms is the geographic proximity between firms. With geographic proximity, it was easier for firms to enter into frequent face-to-face contacts, join-problem solving, mutual adjustments, as well as other kind of direct exchange relationships at low costs.

The link between proximity and innovation is strictly important in the name of knowledge acquisition processes as learning becomes an important outcome of this process by combining arbitrarily the existing experiences (tacit) leading to the creation of new concepts (codification)

LEARNING REGIONS

As networks provide the opportunity for firms to access the expertise (tacitness of knowledge) available in other organizations; we further propose that creating a learning region is highly dependent on the processes of accessing and the codification of agglomerated knowledge, of which efficiency of agglomeration and learning effect may further be increased through building up new organizational networks (or strengthening the present ones) at different levels of proximities; just as in the case of the development of industrial districts of Ankara.

The issue of creating learning regions is also on every countries' policy agenda. As one of the important generic notions that is statistically proven to affect the development of industrial regions, we may also claim that the knowledge necessary for innovation may be out-sourced (or in-sourced) within a firm's network relations.

By referring to the concept of learning regions and industrial districts, due to condensed vertical disintegration in the Ankara district, we have successfully elaborated the concept of supply chain networks in order to analyze relationships between suppliers and buyers with the existence of an experienced local production tradition and the institutions that support these traditional production processes and innovations within the region.

Our main point of view on the issue of complex relations between local firms and other institutional factors supports the thesis of organizational learning through inter-organizational relations and their knowledge creation processes on spatial aspects. On the locus of a region's tradition, we may claim that the region’s capability to use and produce new knowledge is also valid at the level of the development of new technological opportunities and particular products.

We claim that such learning organizations must be based on possible embedded coalitions (cooperations) at the intra-firm level and regional level. This dynamic regional development status may strongly contribute to creating “learning regions” that cope up with some other aspects of necessary organizational innovations in the institutional arrangements.

In such “learning regions”, we note that the strong organizational relation between the learning and the absorptive capacity provides us a good reasoning for the factors that influence the density of firms to enter new embedded relationships in a regional network. But, this dichotomy still creates the difficulty of analyzing with whom to relate under different proximity levels.

We propose that organizations tend to create stable, preferential relationships characterized by different proximity levels and by the rich exchange of information within these formation networks. Over time, while emerging embedded network relations of district firms, and while the value of information increases in the level of regional networks, firms can not simply manage their technological learning activities within the firm's organizational boundaries.

Consequently, we argue that the coordination of external relations in the network becomes highly important for the successful development of new products and processes; and of course for the coordination of successful learning.

We claim that the evolution of interorganizational relations derives from the joint interaction of a variety of strategic technological learning (learning how-to-learn) between firms regarding how firms face strategic choices under different circumstances (like different proximity levels) in order to manage economic and relational change across different technological settings and agents to cope up with its organizational boundaries in the network.

Therefore, we assume that different technological settings provide us a clear point to study learning and proximity modes particularly in the face of technological change. In this iterative process, Thus, firms that are more likely to be embedded in the emerging regional networks in districts, bring about new cooperative and collaborative organizational ties and different channels of organizational how-to-learn policy.

Finally, in this article, we strongly support the idea if organizational learning is also a crucial regional activity of some embedded group interactions, hence, organizational learning clearly becomes a process embedded in dense regional networks built upon such institutional and organizational set-ups.

We simply try to identify paths to maximize organizational learning through a regional approach. Hence, our final perspective presumes that firms which are better at organizational learning will, at least locally, exhibit better indices of learning than others in the market.

MODEL AND HYPOTHESES

In this article, we develop network and econometric models by specifying the mechanisms through which the existing regional network enables organizations to learn by exchanging knowledge and also discuss how the newly created ties can increase the strategic knowledge basis of the same network, enhancing its potential to learn how-to-learn.

In this sense, we conducted exploratory field interviews with 97 managers of manufacturing firms which employ 25 or more employees in the machinery and furniture sectors in 2007 and 2008.

Hypothesis 1:
Some networks are more likely to be condensed (centralized) and strongly show a higher degree of local interconnection (higher degree of absorptive capability); so that this structure can help firms to learn and transfer technical and organizational knowledge to other local firms.

First, we calculate the “centrality degree (closeness centrality)” of a network structure as a key analytical concept in the tradition of social network analysis. Moreover, each of 97 manufacturing firms are asked to list up only to 5 (five) prime buyers and consequently 5 (five) suppliers from the web of its relations. In turn, this, particularly and practically, made it possible to produce meaningful results from the analysis of relations employing common centrality measures.

Hypothesis 2 :
In a geographically co-located network, organizational proximities between agents will positively effect innovative capabilities and develop technical skills; such as, according to the closeness centrality degree in a geographically dispersed network will also positively create the same cyclical “spillover” and “learning” effect in the same network.

Hypothesis 3 :
Various types of capabilities affect the probability of innovative activities.

THE ANALYSIS AND RESULTS

First, we tried to discover the structure of linkages in the sense of business relations. By graphing the links, we further assume to classify these links according to their proximity powers with respect to their customer and supplier relations.

Figure 1 - The supplier network of firms in machinery sector in the Ankara district

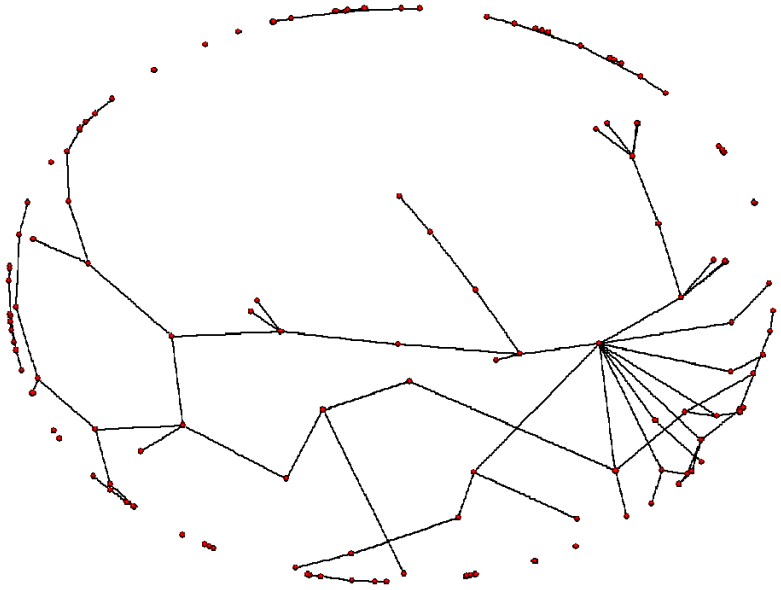

Figure 2 - The supplier network of firms in machinery sector in the Ankara district – according to the frequency of relations

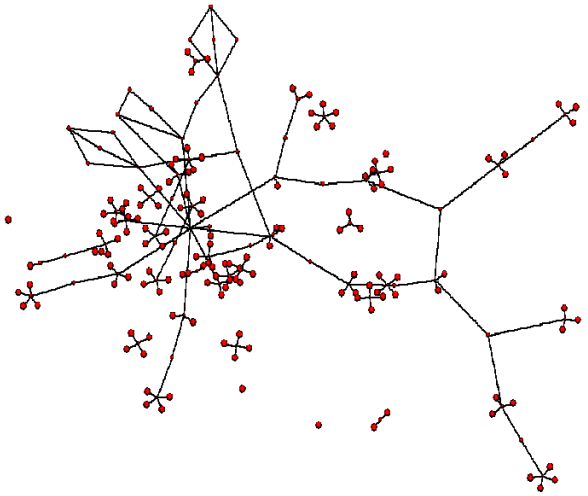

Table 1 – Some basic network statistics obtained for the machinery firms' supplier network in the Ankara district

Number of Vertices	Density	Closeness Centrality	Clustering Coefficient
195	0.0044642	0.00004	0.381598

Figure 3 - The buyer network of firms in machinery sector in the Ankara district

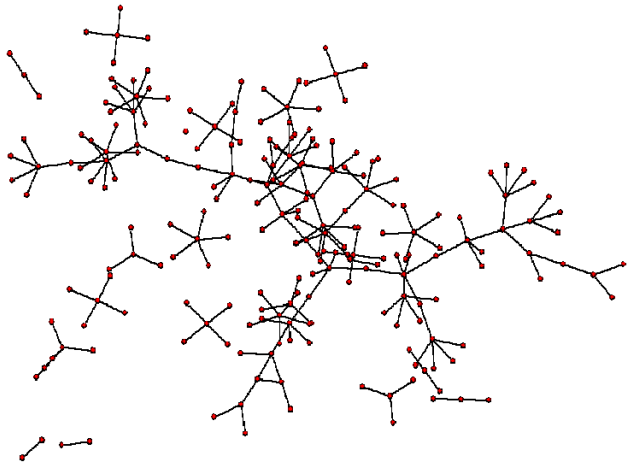

Figure 4 - The buyer network of firms in machinery sector in the Ankara district – according to the frequency of relations

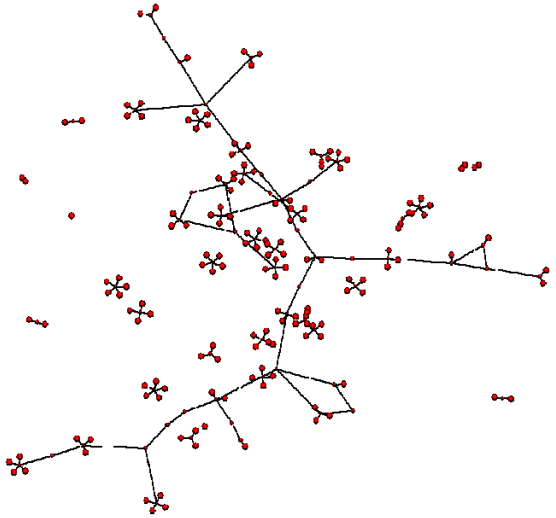

Table 2 – Some basic network statistics obtained for the machinery firms' buyer network in the Ankara district

Number of Vertices	Density	Closeness Centrality	Clustering Coefficient
222	0.0040153	0.00010	0.271488

Figure 5 - The supplier network of firms in furniture sector in the Ankara district

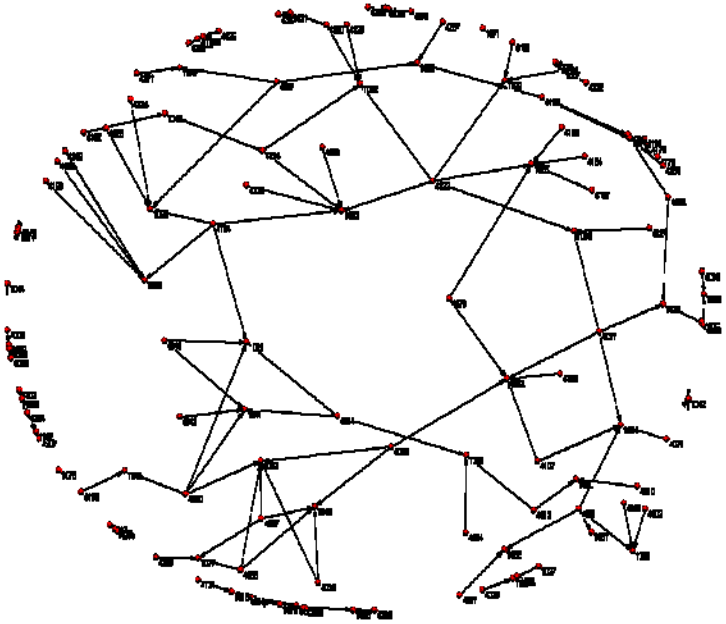

Figure 6 - The supplier network of firms in furniture sector in the Ankara district – according to the frequency of relations

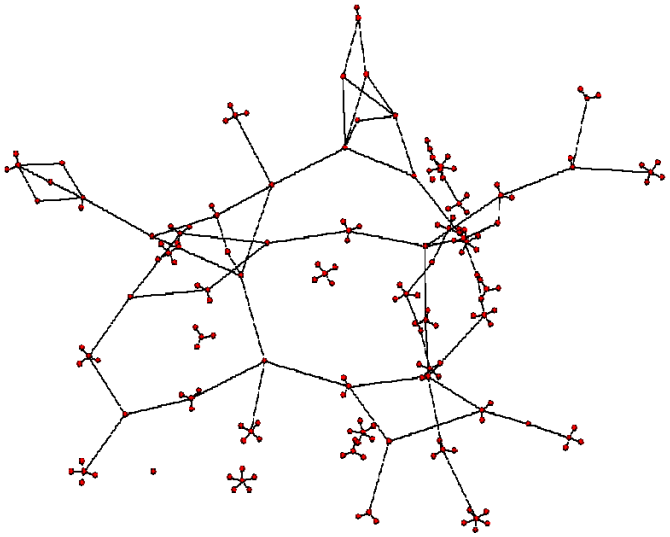

Table 3 - Some basic network statistics obtained for the furniture firms' supplier network in the Ankara district

Number of Vertices	Density	Closeness Centrality	Clustering Coefficient
181	0.0055249	0.00016	0.584783

Figure 7 - The buyer network of firms in furniture sector in the Ankara district

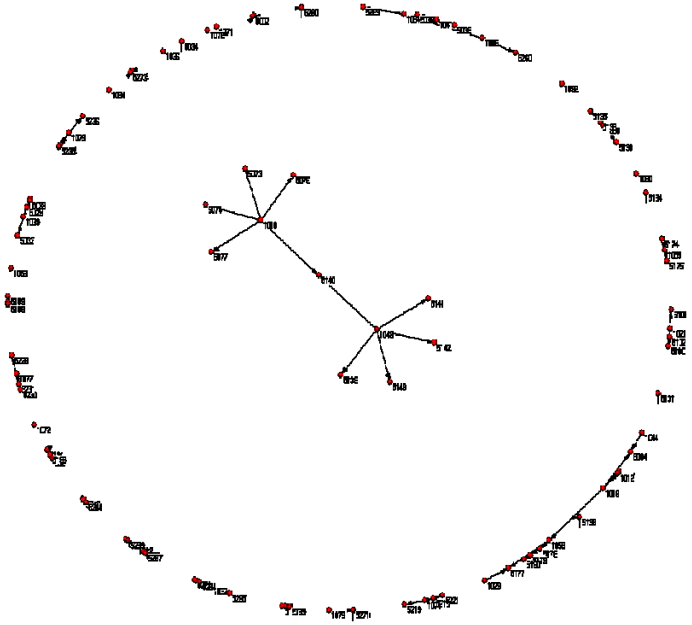

Figure 8 - The buyer network of firms in furniture sector in the Ankara district – according to the frequency of relations

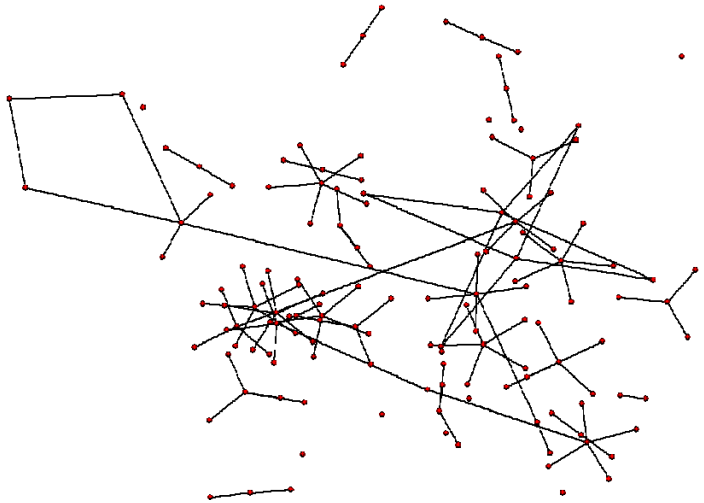

Table 4 - Some basic network statistics obtained for the furniture firms' buyer network in the Ankara district

Number of Vertices	Density	Closeness Centrality	Clustering Coefficient
141	0.0054826	0.00026	0.128992

At first glance, we can explain for both sectors that there is hardly a statistical proof for the existence of supplier and/or buyer clusters in the Ankara district.

The result is obtained because, as we claim, proximity powers are a necessary and effective condition for organizations to build up new inter-organizational relations. In most cases, however, we assume that proximity powers may not be sufficient to account for the formation of a new relationship between two specific firms. Indeed, an agent (firm) confronted with the need to build a new relationship may cope with an uncertain environment, facing another type of uncertainty resulting from the identification of an appropriate partner.

We may also argue that, as we have acquired arguably very low levels of centrality degrees, the locus of our network research may not be the exact way of describing the role of knowledge in networks. It seems to us that if institutions and regional infrastructures were somehow improved by knowledge spillovers in the area, it could be easily “absorbed” by the other niches in the networks.

Moreover, we believe, however, depending upon the different levels of proximity; but, free from any level of network centrality; some aspects of knowledge diffusion and different kinds of learning mechanisms have to be necessarily set-up before external knowledge can efficiently be utilized by the firms.

Furthermore, we claim that the possibility for knowledge transfer and knowledge sharing between the firms in the industrial district is solely connected to organizational proximities and learning capabilities of the firms. Moreover, what we mean here is that one way of making knowledge such transfer and sharing more knowledge efficiently; for an explicit learning and capability development process; firms need to codify knowledge and diffuse knowledge in the network.

In the Ankara district, in both manufacturing and furniture sectors, we especially have faced that machinery producers in the district embody technical knowledge in their own production systems.

In our econometric approach, the factors, which affect the innovation performance, are determined.

In this study, innovation (INNO) is a compound of product (PRT) and process (PRS) innovations. Firms are asked about the Product (PRT) and process (PRS) innovations realized in the past 5 years.

The firms by assigning zero (0) to no innovation activities and one (1) either product or process innovations, and by assigning one (2) to the firms which realized both (INNO).

87.5% of the firms surveyed declared that they realized product innovations, 71.7% for process innovations, 60 % for both.

Table 5 - The Frequency Table of Innovation Variable

INNO	Total	%	Machinery	%	Furniture	%
0	5	5	1	2	4	11
1	33	35	22	37	11	31
2	57	60	36	61	21	58

We constructed our general model as:

$$Y = \alpha_0 + \sum_{j=1}^{7} \alpha_j CAPABILITY_j + u_i$$

Y=0,1.

Here, CAPABILITY variable is defined as firm capabilities by Ronde and Hussler (2005).

These are customer capabilities (CONSCOMP1/CONSCOMP2), supplier capabilities (SUPCOMP1/SUPCOMP2), financial capability (FINCOM), technical capability (RDCOMP), organizational capability (AWARE).

Ever since our dependent variable is categorical, LOGIT model is used in estimation.

Table 6 – Total Sample for Innovation, Product Innovation, Process Innovation

	Total					
	inno1	mfx	prt	mfx	prs	mfx
supcomp1	0.035	0.008	-0.017	-0.001	0.047	0.007
	(0.77)	(0.78)	(0.26)	(0.26)	(0.91)	(0.91)
conscomp1	-0.030	-0.007	0.166	0.005	-0.053	-0.008
	(0.72)	(0.72)	(1.58)	(1.33)	(1.12)	(1.14)
supcomp2	0.206	0.046	0.299	0.009	0.314	0.047
	(2.49)**	(2.61)***	(2.03)**	(1.57)	(2.92)***	(3.33)***
conscomp2	0.061	0.014	0.022	0.001	0.007	0.001
	(1.33)	(1.33)	(0.34)	(0.35)	(0.13)	(0.13)
fincom	0.102	0.023	0.241	0.007	0.019	0.003
	(1.42)	(1.43)	(1.74)*	(1.40)	(0.23)	(0.23)
rdcomp	0.543	0.121	0.950	0.029	0.612	0.093
	(1.87)*	(1.91)*	(1.48)	(1.28)	(1.79)*	(1.87)*
aware	0.088	0.020	0.056	0.002	0.112	0.017
	(2.10)**	(2.13)**	(0.90)	(0.76)	(2.28)**	(2.44)**
Constant	-6.537		-7.231		-5.777	
	(3.19)***		(2.05)**		(2.54)**	
Observations	82		81		79	

*Absolute value of z statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%*

Table 7 - Machinery Sector / Innovation, Product Innovation, Process Innovation

	Machinery					
	inno1	mfx	prt	mfx	prs	mfx
supcomp1	0.018	0.003	0.005	0.000	0.065	0.006
	(0.31)	(0.31)	(0.07)	(0.07)	(0.92)	(0.94)
conscomp1	-0.000	-0.000	0.369	0.006	-0.081	-0.007
	(0.01)	(0.01)	(1.76)*	(1.09)	(1.23)	(1.29)
supcomp2	0.299	0.054	0.237	0.004	0.404	0.037
	(1.99)**	(2.26)**	(1.17)	(0.90)	(2.12)**	(2.52)
conscomp2	0.153	0.028	-0.021	-0.000	0.027	0.002
	(1.27)	(1.21)	(0.12)	(0.13)	(0.23)	(0.23)
fincom	0.104	0.019	0.393	0.007	0.000	0.000
	(1.03)	(1.02)	(1.85)*	(1.04)	(0.00)	(0.00)
rdcomp	0.837	0.150	0.335	0.006	0.875	0.079
	(1.98)**	(2.10)**	(0.52)	(0.42)	(1.74)*	(1.85)
aware	0.112	0.020	-0.037	-0.001	0.141	0.013
	(1.58)	(1.63)	(0.41)	(0.40)	(1.80)*	(1.93)
Constant	-8.889		-6.911		-7.019	
	(2.66)***		(1.52)		(1.95)*	
Observations	50		49		50	

*Absolute value of z statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%*

Table 8 - Furniture Sector / Innovation, Product Innovation, Process Innovation

	Furniture					
	inno1	mfx	prt	mfx	prs	mfx
supcomp1	-0.090	-0.022	-3.328	0	-0.208	-0.039
	(0.68)	(0.68)	(0.01)	0	(1.39)	(1.39)
conscomp1	-0.097	-0.024	-17.586	0	-0.049	-0.009
	(1.40)	(1.40)	(0.01)	0	(0.57)	(0.57)
supcomp2	0.142	0.035	29.191	0	0.410	0.077
	(1.12)	(1.12)	(0.01)	0	(1.77)*	(1.97)**
conscomp2	0.035	0.009	14.998	0	0.011	0.002
	(0.53)	(0.53)	(0.01)	0	(0.14)	(0.14)
fincom	0.104	0.025	48.484	0	0.001	0.000
	(0.84)	(0.85)	(0.01)	0	(0.00)	(0.00)
rdcomp	0.047	0.012		0	0.450	0.084
	(0.09)	(0.09)		0	(0.61)	(0.60)
aware	0.086	0.021	7.811	0	0.114	0.021
	(1.29)	(1.30)	(0.01)	0	(1.29)	(1.42)
Constant	-4.131		-1,031.078		-4.829	
	(1.35)		(0.01)		(1.16)	
Observations	31		16		28	

*Absolute value of z statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%*

CONCLUSIONS AND FURTHER PREDICTIONS

The aim of this paper was an empirical exploration and exploitation of the ideas under the relative importance of networks, proximity, and strategic learning. We use a synthesis of organizational science (network theory) and regional science (systems of innovation) accounting for innovativeness of firms.

Moreover, our research model has enabled us to present the causations on the influence of proximity on innovativeness also by taking into account of other important predictors like capability, product innovation, process innovation, etc.

Following the discussion of our main findings, we consider that knowledge and skills, learning processes are vital in understanding the importance of networks.

Besides, the strategy for the capability of integrating strategic knowledge (tacit knowledge) is the focal point of our research in terms of learning and knowledge creation. However, we still pretend that network learning can not solely be promoted without the analysis of extended regional research data. In other words, proximity matters, especially for innovative performance. This is one of the most important findings of our analyses.

But; while investigating the local innovative links with buyers and suppliers, our network research scheme turned out to have *neutral* impacts on innovative and economic performance without other predictors are taken into account.

Hence, these results strongly confirm the assumption of ours that; by facilitating role of local linkages for the transfer of technical knowledge with the impact of knowledge spillovers in the specialized districts. We may also state that, *any* level of sectoral (or regional) knowledge accumulation is an important source and aspect for the innovative and economic performance.

We claim that an emphasis on localized learning and the existence of mutual relations among agents is simply not sufficient for understanding the scale at which regional innovation system can fully be explained. Indeed, as for the Ankara's districts, (also with the qualitative analysis of the survey conducted), we may argue that the specific regional institutions and other institutional arrangements should generate the appropriate practices so as to develop industrial facilities build upon a *learning region* policy.

Furthermore, in the presence highly qualified knowledge generating actors, by investigating the knowledge flows between the different actors within and abroad the region, we elaborate that the research on innovative networks necessitates detailed further research on managing the exchange of knowledge resources in the Ankara region.

As being the most significant sectors in the region, the machinery and furniture sectors must highly be supported for the improvement of their innovativeness according to the constitution of inter-firm networks and their capability and innovation capacity indices.

Moreover, these sectors must be economically and politically supported as they are highly flexible and skillful in organizational and strategic technological learning.