SME NETWORKS AS NEW ENGINES OF ECONOMIC DEVELOPMENT AND INNOVATIVENESS

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ABSTRACT

SME NETWORKS AS NEW ENGINES OF ECONOMIC DEVELOPMENT AND INNOVATIVENESS

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This thesis is an attempt to search the relationship between development, innovativeness and networking. In recent regional development debates, regional networks of SMEs and regional knowledge potential have been emphasized as important components of development. In the context of the thesis, inter-regional networks of SMEs are analyzed as an alternative approach to the regionally bounded perspective. It is hypothesized that regional and inter-regional networks complement each other, and both of them play an important role in regional development and innovation processes.

The thesis acquires the indicators for the increasing importance of external networks and innovation capacity in the globalisation era. Hence, the study explains the relative importance of spatial proximity in different types of networks, the positive and negative contributions of external networks to regional networks, and the contributions of regional, national and global networks to innovation activities of SMEs.

The theoretical framework discussed in this thesis is based on the recent regional development models and contemporary networking and innovation studies. The main findings of this study contribute to this debate by modifying some of assumptions related to networking and innovation activities of SMEs. In the thesis, the method used for research is field survey, realized in three industrial regions. 131 SMEs have been involved in this survey in order to obtain a qualitative data about network and innovation behavior of SMEs in the sample regions.

Key Words: SME, regional development, innovativeness, SME networks, ICTs, and spatial proximity.

ÖZ

EKONOMİK GELİŞMENİN VE YENİLİKÇİLİĞİN YENİ ÖRGÜTSEL ALTYAPISI KOBİ AĞLARI

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Bu tezde hedeflenen gelişme, yenilikçilik ve ağsallık arasındaki ilişkinin araştırılmasıdır. Son dönemdeki bölgesel gelişme tartışmalarında bölgesel KOBİ ağları ve bölgesel bilgi potansiyeli gelişmenin önemli bileşenleri olarak vurgulanmaktadır. Tez kapsamında bölgelerarası ve küresel ağlar, bölgeye gömülü yaklaşımlara alternatif olarak analiz edilmektedir. Tezin temel hipotezi "bölgesel ve bölgelerarası ağlar birbirini tamamlamaktadır ve bu ağlar birlikte bölgesel gelişmenin ve yenilik süreçlerinin örgütsel altyapısını oluşturmaktadır".

Tez küreselleşme sürecinde bölgelerarası, küresel ağların ve yenilikçilik kapasitesinin artan önemini incelemektedir. Bu kapsamda farklı ağ tiplerinde mekansal yakınlığın göreli önemi, bölgelerarası ve küresel ağların bölgesel ağlara olumlu ve olumsuz etkileri, bölgesel, ulusal ve küresel ağların KOBİ'lerin yenilikçilik faaliyetlerine etkisi tezde irdelenmektedir.

Tezin teorik çerçevesi güncel bölgesel gelişme modellerine, ağ ve yenilikçilik çalışmalarına dayanmaktadır. Bu çalışmanın ana bulguları KOBİ ağları ve yenilikçilik süreçleriyle ilgili mevcut çalışmaların bazı kabullerini etkileyerek teorik tartışmalara

katkı sağlamaktadır. Tezde araştırma için seçilen yöntem üç bölgede (ilde) yapılan alan araştırmasıdır. Örnek bölgelerde KOBİ ağları ve yenilik faaliyetleri üzerine veri toplamak amacıyla 131 KOBİ ile görüşme yapılmıştır.

Anahtar Sözcükler: KOBİ, bölgesel gelişme, yenilikçilik, KOBİ ağları, BİTs, mekansal yakınlık.

To my parents

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LIST OF ABBREVIATIONS

SMEs	Small and Medium Sized Enterprises
ICTs	Information and Communication Technologies
R&D	Research and Development
EDI	Electronic Data Interchange
KOSGEB	Small and Medium Industry Development Organization
KOBINET	KOSGEB Small and Medium Sized Enterprises Network
TUBITAK	The Scientific and Technical Research Council of Turkey
SIS	State Institute of Statistics
TTGV	Turkish Technology Development Foundation

CHAPTER 1

INTRODUCTION

1.1 The Context and the Aim of the Thesis

The aim of the thesis is to redefine SME networks, which includes not only regional linkages but also national and global linkages, as new engines of development and innovativeness. The reason behind the subject is the newly emerged critical literature about the recent development models, which depends on the regional resources, regional actors and the interaction among them. Within these critical approaches, one question constitutes the main motive of this study: whether regionally embedded knowledge and network relations could respond to the global agenda and could increase the innovative capacity of SMEs, or not. Therefore, the main hypothesis of the thesis "existing development approaches, depending on regional networks and regional knowledge potential require the coexistance of regional and interregional networks in the development and innovation processes".

In the globalisation era, important changes have occurred in the conceptual base of regional development discourse. Before 1970s, regional development depended on income redistribution and welfare policies of the state. According to this traditional approach, economic growth requires exogenous resources, and central government interventions to lead the regional economic policy. After 1970s, it became impossible to continue state intervention policies, and endogenous growth approach started to affect development theories and models. In endogenous approach, regions are defined as meaningful level for development and SMEs are supposed as engines of regional growth.

In recent development approaches, such as innovative milieu, regional innovation systems, learning regions, *'knowledge'* and *'innovation'* became core issues, and SMEs are defined as innovative agents. According to this discourse, knowledge creation is not only a firm issue. It is generated among technology using firms in the regional environment. When technology and knowledge become regionally generated issues, the learning processes and regional network relations of SMEs play an important role in the long-term dynamism and sustainability of the region, as the engine of development.

However, many experiences show that cumulative knowledge, specialized structure of region and regional institutional capacity prevent the region from entering new development trajectories. Therefore, institutional 'lock-in effect' may cause the region to fall into the trap of rigid specialization. Moreover, the firm involved in regional networks might suffer from finding new knowledge sources and perceiving the need to change, as existing regional relations could not give response to contemporary conditions (Raco, 1999, Glasmeier, 1994, Harrison, 1992, Schmitz, 1999, Staber, 1996, 1997).

In the light of these regression stories, development that depends on regional capacity and regional knowledge alone have started to be criticized with the end of 1990s (Staber, 1997, Glasmeier, 1999). According to these critics, regional embeddedness and strong regional networks have been defined as a weakness of clusters for generating radical changes and for being competitive and innovative in the globalization era (Schmitz, H, 1999). Moreover, it is emphasized that regional development models have shown highly bounded perspective that depends on the regional conditions and potentials, but the effects and consequences of external relations have not been considered adequately in these approaches.

This critical approach does not reject the regionalisation discussions, which have grown at the end of 1980s with the globalization process (Cooke, 1990; Thrift and Amin, 1994). Within the globalised economy, firms and regions have been competing in an increasingly complex and contingent environment due to the increasing global competition, technological evolution, and flexible structure of organizations. In this competitive environment, significance of place specific tacit knowledge and regional network relations sustain its importance in the success of region (Keeble, Lawson, at all, 1999). On the other hand, globalisation with the help of new information and

communication technologies (ICTs) has created a world without boundaries. It has formed new types of entrepreneurs that are interconnected in networks. In the context of weakening nationally bounded policies and strategies, the regions and the firms have found themselves in a highly competing world market. In this network space, the meaning of time, space, production processes and relations are also transformed. As a response to new global conditions, the need for external knowledge came into agenda, and innovative relations could be defined in neither the boundaries of firm nor the boundaries of region.

It is also emphasized that there are two sides of the coin: benefits of regionally embedded collaboration and benefits of integrating to global network system. Coexistence of different levels of networks requires the definition of open knowledge and networking systems, including different types and different levels of network relations. Besides place specific tacit knowledge, external codified knowledge is required as the response to the contemporary conditions. Bell and Albu (1999) have also indicated the importance of open knowledge systems in which regions are increasingly interacting with the external environment and gain competitive advantage through the global inter-regional networking. Moreover, Camagni (1991) has advocated that linking to international and global networks is fundamental in order to stay innovative in the long term. Network relations among firms from different regions, and shifting from regional embeddedness to network embeddedness have also been important debates of recent era. Moreover, Fuellhart (1999) has emphasized in his research that "with respect to innovation and technology based information, interregional networks are more common", and Staber (1996) has found in his research that inter-firm relations tend to extent beyond the boundaries of region.

This thesis is an attempt to analyze different types and geographical levels of networks and their affects on development and innovative capacity of SMEs and regions. Derived from this aim, the study is built around two main themes. The first one is *'networking'* that is the main concept of contemporary regional development studies. In the globalisation era, the significance of different geographical levels of networks has increased. Indeed, the increasing global linkages also redefine regionally embedded network relations and interaction of global and regional networks gain importance in the development process. The second main theme is the conceptualization of '*innovativeness'* as the core concept of recent development

studies. The aim is to identify the relationship between networking and innovativeness in development processes of different regions. In order to analyze this relationship, three regions Ankara, Bursa and Denizli are selected for the case study. SMEs from these regions are analyzed in order to examine network relations in regional, national and global levels and innovative activities. Consequently, these discussions could be translated into research questions.

1.2 Research Questions of the Thesis

Some recent studies emphasize that in addition to local relations, external relations are needed for innovative capacity. Both of them are necessary and they complement each other in economic development. The firm has to strengthen its linkages with regional and interregional networks in order to take advantages of synergetic effects as well as network externalities (Gioutzi & Stratigea, 1999; Capello, 1993). In the light of these studies, the research questions of the thesis are formulated as follows:

- What is the relative importance of proximity in different types of networks?
- What are the positive and negative contributions of external networks to regional economic development and regionally embedded networks?
- What are the contributions of regional, national and global networks to innovative capacity of SMEs?

The answer to these questions is firstly based on a review of the literature about regional development approaches; industrial districts, innovative milieu, regional innovation system (Tödtling and Kaufmann, 2001; Staber, 1996; Plammer and Taylor 2001; Morgan, 1997; Maskell and Malmberg, 1999; Cooke, et. al. 1997). Besides these regional approaches, relations among economic growth, innovativeness and networking are scrutinized. For this reason, firm specific literature about networking and innovative behavior of SMEs is examined (Rominj and Albu, 2002; Koschatzky, 2000; Oinas, 2000; Muller, 2000; Arndt and Sternberg, 2000; Franke, 1999). It is possible to take out some clues from firm behavior in innovation processes and network relations in order to highlight regional development theories. These dimensions are taken as guidelines in the field survey to distinguish the effects of interregional networks and global relations in regional development and innovative

capacity. After the review of theoretical frame and existing empirical studies, these questions are examined in the field survey.

1.3 Design of the Case Study

'Innovation' and *'networking'* constitutes the main concepts of recent development studies as the important components of development. In this study, these concepts are analyzed according to different geographies of Turkey. Three regions are selected for the case study because they represent different development processes, in which they differ with their regional networks and innovation experiences.

In Turkey some metropolitan regions have dominated the manufacturing industry and the tendency of polarization of manufacturing in these centers still continue. However, in recent years some new industrial regions have emerged from the metropolitan areas and the share of these regions has increased in the national manufacturing activities. In this changing industrial geography, the position of sample regions are analyzed comparatively in terms of employment growth, export capacity, emergence of dominant sectors and innovation capacities. The relative position of sample regions in industrial geography of Turkey provides the necessary background to understand the production environment of selected regions in the country conditions. Moreover, unique regional stories have been evaluated in order to define the behavior of sample SMEs in different levels of network relations.

Ankara, Bursa and Denizli that have experienced different industrialization processes are selected for the case study. Ankara as the capital of Turkey is mostly specialized on services since the foundation of republic, and the manufacturing sectors have played secondary role in the regional economy. Among manufacturing sectors engineering industries, machinery, defense industry, electronic and software have developed in recent years. Although the innovative capacity in Ankara is high, the growth capacity is low compared with new growth regions. In other words, Ankara represents the *innovative regions with low growth capacity* in this study. Bursa, as the second sample region, is the traditional center of textile and automotive industry. This region is at the later stages of economic development according to new growth regions. Moreover, Bursa seems to be most promising in terms of manufacturing and export activities in the country. Both growth rate and innovative capacity are high, and therefore, Bursa represents the *innovative growth regions* in this thesis. On the other

hand, Denizli has been considered as the miracle of export times in the country. With rapid growth in employment and export, Denizli became the leading industrial region in the country in the 1990s. However, the innovative capacity of this region is not as improved as its growth capacity. Thus, Denizli stands for a *growth region with low innovation capacity*.

In the case study, two steps are realized for the collection of data for these regions. The first is to evaluate existing regional development studies about sample regions and to collect the related SIS data on sample regions. The second way is to organize a field survey among sample SMEs.

Analysis of the survey data shows that SMEs in different sizes, sectors and regions show different behaviors in network relations and innovation activities. Although all sample firms realize network relations in different geographical levels, importance and dominance of different levels change from region to region. Furthermore, although most of the sample firms more or less introduced the innovation to production processes, the degree of innovation activities, and the degree of relationship between networking and innovation also differentiate among sample SMEs.

1.4 The Content of the Thesis

This thesis consists of seven chapters. After the introduction, Chapter 2 puts the discussion into the context in order to answer the question of whether recent development approaches could response to the new global agenda or not. For this reason, evolution of regional development models is briefly summarized, and the increasing role of innovativeness, the role of regional knowledge and learning systems in regional development are more deeply scrutinized in order to highlight the transformation process. In this discourse, SMEs are defined as the main agents of regional development and innovativeness. Finally, the new discourse in regional development is critically evaluated.

In Chapter 3, inter-regional networks and their contribution to innovative and competitive capacity are examined in two steps. In the first step, the increasing importance of interregional networks in development is analyzed. Within this concept, ICTs are handled as an important infrastructure of interregional networks. On the other hand, the coexistence of regional and interregional networks in the globalisation

era is analyzed in the light of existing experiences. In the second part of this chapter, the relationship between networking and innovativeness is scrutinized. In detail, specific characteristics of innovative SMEs, different types of innovation networks as external sources of innovation and the spatial range of innovation networks are analyzed. For this conceptualization, theoretical discussions and existing empirical studies have been re-handled. As a conclusion of this chapter, some of the theoretical assumptions are re discussed.

After having studied the theoretical framework, Chapter 4 looks at the methodology and design of the case study. In this chapter, the aim and the context of the thesis and the hypothesis have are explained. The choice of the sample procedure according to firm size, sector and region are explained. Next, the detailed information about the procedures for data collection in sample regions is given.

Chapter 5 discusses the industrial development and transformation processes in sample regions. Before discussing unique stories of regions, analysis of industrial regions are realized relative to the geography of Turkey in terms of employment growth, export capacity and increasing industries. In this perspective national innovative capacity is also scrutinized. After having discussed the position of sample regions in the industrial geography of Turkey, Ankara, Bursa and Denizli as the sample regions are analyzed comparatively. In this analysis, the development of industry, historical background of dominant sectors, innovative capacity, regional collaborative environment and integration degree to global networks are studied in the light of existing development studies.

Chapter 6 shows the results of field survey, which is realized in Ankara, Bursa and Denizli. In the light of the evolution processes of these regions, the relation between networking and innovative capacity of SMEs is analyzed as a comparative analysis in Ankara, Bursa and Denizli. In this context, dynamics of employment growth in sample SMEs are analyzed first. Next, the data is evaluated in three sections: innovativeness, networking and the relationship between innovativeness and networking. In the first step, innovative capacity of SMEs according to innovation indicators and the density of innovation activities are studied. In the networking analysis, different types and levels of networks, contributions of using ICTs to network relations and interaction between regional and global networks are analyzed in order to reveal the role of spatial proximity in network relations. Then, contribution of different types and levels

of innovation networks to innovative capacity of SMEs are analyzed according to data of field survey. As a conclusion of this chapter, Ankara, Bursa and Denizli with reference to the findings of field survey are compared.

The last chapter concludes the thesis giving a general evaluation of the study and a brief summary on the findings stated in the thesis. Moreover, empirical findings are tied to the theoretical frame. Finally, a group of suggestions is made for regional development policies, strategies and models.

CHAPTER 2

THE INCREASING ROLE OF REGIONAL NETWORKING AND INNOVATIVENESS IN DEVELOPMENT MODELS

The conceptual base of regional development approaches has significantly changed during the globalisation process. Before 1970s, the conceptual base was built on income redistribution and welfare policies. In this traditional approach, economic growth requires exogenous resources, government interventions and infrastructure investments, directed by state led regional economic policy. 1970s crises could be seen as an important turning point in the development theories. In the beginning of 1970s, the increase in oil prices, the breakdown of Bretton Woods' agreements, the slow down in the growth of the western, the decline in foreign aid could be considered as important clues of crisis. Development strategies also altered with the affects of the transformations in economic and political space. While earlier development theory had tended to stress the positive relationships between equality, state intervention and growth, in the 1970s the emphasis was on the elimination of price distortions, the privatization of all public firms, the acceptance of private foreign investments and the global competitiveness.

After 1970s, it became impossible to continue state intervention policies and endogenous growth approach started to affect economic growth and development models. In endogenous approach, regions are considered as meaningful level for development and SMEs are supposed as engines of development. This alternative approach has been dependent on the mobilization of the endogenous resources and potential of region as an important components of economic growth (Amin, 2000).

Regions are rediscovered as main sites for labor markets, consumption, entrepreneurial coalitions, technological innovation and growth. Regional endogenous development theory combines the three main dimensions of development: the economic dimension, the socio-cultural dimension, which reflects cultural needs and communitarian identities, and the political dimension (Mouleart and Sekia, 2003). In addition, endogenous development approach emphasizes the economic externalities and increasing returns, associated with spatial clustering of small and medium sized enterprises (SMEs). Consequently, the common sides of endogenous development could be summarized under some headings: the economic externalities, increasing returns, spatial proximity and agglomeration of SMEs. Thus, regional development approaches have not considered the affects and consequences of external relations, as they have shown highly dependent structure to the regional conditions and potentials.

Within the regional development models, firm is considered as interactive units and a part of regional networks, the importance of which has been strongly emphasized. At the same time increasing role of knowledge and innovativeness in the regional development have been highly discussed in recent decades. Within this perspective, knowledge creation is not firm issue and it is generated among technology using firms in the regional environment. When technology and knowledge become regionally generated issue in endogenous approach, the learning processes and regional network relations play an important role in the long-term dynamism and sustainability of innovativeness in the region.

Within the thesis, networking and innovativeness are taken up as important components of development, and their interaction constitute the main interest areas. In the regional development literature, networking has been considered as the regionally embedded relations and innovativeness has been depended on regional learning and knowledge creation and dissemination processes. There are many studies and experiences of industrial districts from advanced parts of the world, as well as examples from peripheral countries, which show the significance of regional networks (Cooke and Morgan, 1998, Maskell and Malmberg, 1999, Glasmeier, 1994). Moreover, regional development models, from industrial districts to learning region, are emphasized the increasing importance of regional networks and innovativeness.

After 1980s, strong relation between globalisation and localization (regionalisation) had started to be discussed (Cooke, 1990; Thrift and Amin, 1994) and the literature

about critics of endogenous development depended on regional networks and regional knowledge has emerged in the end of 1990s (Staber, 1997, Glasmeier, 1999). Within this context one question as the main interest area of this Chapter gain importance *"Can regionally embedded networks be response to the new global agenda?"* In the 1990s, some studies on the industrial districts show internal assets and regional network relations have not been enough to sustain competitive capacity in the globalisation era. Moreover, collective structure and regional embeddedness have been seen as a weakness of clusters for generating radical changes (Schmitz, H, 1999). Within this context, main restrictions of regionally embedded networks in the globalisation conditions are discussed in this Chapter. In the recent years, the need for increasing global linkages and the need for external knowledge came into agenda and innovation relations could not been defined in neither the boundaries of firm nor the boundaries of region. Therefore, it is necessary that increasing importance of both regional and global networks and their interaction should be included in the regional development approaches.

The aim of this chapter is the evaluation of the increasing role of regional networks, knowledge and innovation in development models. Within these development discussions, SMEs as an important agents and spatial proximity as an important concept of regional networks are studied. Moreover, the restrictions of regionally embedded network relations and the need for global networks in the innovative capacity and development are examined.

2.1 Regional Networks, Knowledge and Innovation as the Important Factors of Recent Development Models

Territorial development models have evolved since the 1970s and they have been called as industrial districts, high-tech industrial spaces, innovative milieu and learning region within the time (Eraydın, 2001). In these development models, regional networks and regional knowledge creation have been emphasized explicitly or implicitly since the industrial districts. However, in the recent development models, the significant role of regional networks and innovation activities has definitely stressed. Within this section, the evolution of development models is analyzed as regards to increasing importance of regional networks and innovativeness.

The economic crisis of the 1970s was seen as the second industrial divide and considered as the end of Fordism and the emergence of the new form of industrial organization, which was so called flexible specialization (Glasmeier, 1999, Scott, Storper; 1987). Therefore the theory of flexible production reverts to the model of *industrial district*. In the industrial districts small firms from the same or interconnected branches of industry with especially dense interrelations tent to locate close to one another to take advantages of external economies in labor markets and infrastructure (Scott and Storper, 1987; Storper, 1993). Industrial districts depend on not only external economies but also joint action concepts because besides regional agglomeration, regional production organizations and locally embedded relations are crucial (Eraydın, 2000).

Clustering / spatial agglomeration is one of the common features of industrial districts. Krugman (1998), who brings clustering into mainstream economics, identifies three reasons for clustering; labor market pooling, supplying intermediate inputs and services, technological spillovers (rapid diffusion of know-how and ideas). These reasons are an example of regional externalities as the resources of increasing returns. Therefore, firms in these districts take advantage of economies external to the firm but internal to the region, within which positive external economies come from their geographical proximity. The close proximity of firms within a particular industry provides opportunities for entrepreneurs to specialize and to secure their scale (Keeble and Wilkinson, 1999).

However, external economies are not sufficient to explain the reasons of clustering. Besides external economies, joint action is critical element to explain development and competitiveness of in industrial districts. While external economies are incidental, the joint action are consciously maintained, and combination of them changes between clusters and over time. On the other hand, collective action based on trust and reciprocity may foster individual success and being together has helped small firms to overcome growth constraints.

Both external economies and joint action require spatial proximity, which ease the interaction and cooperation of firms. However spatial proximity is neither a sufficient nor a necessary condition for creation of collective structure. Moreover, joint action necessitates existence of effective trust and regional network relations (Schmitz, H, 1999; Schmitz and Nadvi, 1999). And for the constitution of joint action, besides

spatial proximity, organizational, institutional and technical proximity are also required (Maskell and Malmberg, 1999, Kirat and Lung, 1999, Porter, 2000).

Industrial districts could be considered as the hybrid mode of organization, combining cooperation and competition, formal and informal institutional relations. Main characteristics of industrial districts could be summarized as collective pool of knowledge, local labor potential, production for the same end market, informal links through cooperative and competitive relationships, broad product range and high specialization, low transaction cost (Sternberg, 96). Under these conditions historical and socio-economic factors become so important to understand industrial districts (Mouleart and Sekia, 2003).

Innovative milieu theory (GREMI Group), high-tech industrial spaces (Storper, 1993), regional innovation systems (Cooke, et. al. 1997), learning region (Florida, 1995) extend the flexible production theory and also industrial district model. While industrial district model was built on processes of regional integration, technological leadership, institutional support and local human resources, more recent models, in addition to these features, have emphasized knowledge, learning and innovation as the important dimensions of regional development (Plummer & Taylor, 2001). The advantages of agglomeration are depended on shared knowledge base, regional networks and learning, and collective share of knowledge (Storper, 1997; Malmberg, 1997). In more recent development models, these advantages of agglomeration have been discussed again within proximity dynamics debate (Kirat and Lung, 1999) like being in industrial districts.

With the entrance of knowledge, learning and innovation concepts into the debate effects of institutional and evolutionary approach became more obvious in the 1980s. Main concepts of evolutionary perspective have taken place in the territorial development literature to describe districts as “collective learning systems” (Staber, 2001; Morgan, 1997). Unlike Californian School, which are based on transaction cost and cost minimization (Scott and Storper, 1987; Storper, 1997), evolutionary approach depends on increasing returns and "untraded interdependencies" with regards to institutional structure and historical perspective.

The theory of *regional innovation system* is promoted by the evolutionary and institutionalist theory. The endogenisation of regional institutions is considered as a

core issue and this institutional endowment increases success and competitiveness of region (Maskell and Malmberg, 1999; Amin and Thrift, 1994; Bellusi, 1999). Therefore, in this approach, regional economic success is encouraged by institutions and network relations, which are also necessary for innovation and knowledge creation (Hudson, 1999). The theory of regional innovation systems focuses on the institutional basis of learning and innovation. In this approach innovation is a creative, social and economic process, depending on regional networks, rather than a result of only research activities.

Networks of regional agents constitute the institutional base of regional innovation systems. Relations with different type of R&D institutions, and cooperation with customers, suppliers and partners through formal and informal regional networks are considered as the main sources of learning process and innovative activities (Cooke, et. al., 1997). It could be concluded that both industrial districts and regional innovation systems bring overemphasis on regional agents and regional networks. Within these contemporary development approaches, regional embeddedness, tacit knowledge, regional institutional environment and production culture have been strongly emphasized.

Innovative milieu theory, improved by GREMI group in mid 1980s, considers firm as a part of milieu with innovative capacity. In other words innovative milieu was described as "a set of informal social relationships on a limited geographical area enhances the local innovative capability through synergy and collective learning processes" (Camagni and Capello, 1998). It could be concluded that again spatial dimension of knowledge and learning is emphasized in this model as promoters of regional development. In the theoretical and empirical studies, the GREMI group seeks to analyze the relationships between firms and their regional environment and to study the modes of organization. Moreover, they emphasized that the innovative capacity of agents of milieu depends on the capacity of regional learning. Learning enables them to perceive the changing environment and to adapt their behavior accordingly (Mouleart and Sekia, 2003).

According to GREMI group, distinction between industrial districts and innovative milieu depends on dynamic regional elements of the milieu, regarded as regional networks and collective learning processes that increase regional creativity, and

innovative capacity. Therefore, Capello (1999) shows the schema of transformation of industrial districts and the emergence of innovative milieu;

- Specialized areas emerge from simple geographical proximity,
- Geographical proximity and specialization provide continuity over time for know-how,
- Dense regional network relations and supportive institutions generate high trust in the milieu and encourage informal and tacit knowledge transfer of innovation.

Many writers encourage the Capello's definition about this transformation and advocate that regional networks, the free flow of knowledge, synergy and innovative capacity evolve the industrial district into innovative milieu (Capello, 1999, Keeble and Wilkinson, 1999; 299, Castells, 1997). In this approach importance of regionally embedded networks relations and collective learning has been strongly emphasized.

Learning region integrates innovation systems literature, institutional-evolutionary economics, learning processes and regional institutional dynamics. In this model region performs as collector of knowledge and ideas, and provides the innovative environment. This situation requires a physical and communication infrastructure in region, which facilitates the movement of goods, people and information on a just in time basis (Florida, 1995). Therefore, learning region built economic advantage through their ability to mobilize and to control knowledge and ideas within the boundaries of region. Furthermore in some discussions learning region has been regarded as one type of synthesis which include common items with regional innovation systems, industrial districts and innovative milieu (Mouleart and Sekia, 2003).

At the end of this review, regional network relations and innovation dynamics could be defined as important components of recent development models. Table 2.1 represents the comparison of recent development models as regards to these components. In these models, innovation, networks and development have been considered as the regional issues and they are generally discussed within the boundaries of the region.

Table 2.1 Role of Innovation and Networking in the Evolution of Regional Development Models

	Models			
	Industrial Districts	Innovative Milieu	Regional Innovation Systems	Learning Region (Synthesis)
Innovation Dynamics	Capacity of actors to implement innovation in a system of common values	Capacity of firms to innovate through the relationships with other agents of milieu	Innovation as an interactive, cumulative process of R&D (path depended)	As for RIS but stressing coevolution of technology and institutions
Regional Development	Territorial view based on spatial solidarity and flexibility of districts, this flexibility is an element of innovation	Territorial view based on agent's capacity of innovating in a cooperative atmosphere	View of the region as a system of learning by interacting and by steering regulation	Technological dynamics and socio-economic and institutional dynamics
Regional Network Relations	The network is a social regulation mode. It enables a coexistence of both cooperation and competition Subcontracting relations and other localized transaction linkages	Knowledge sharing relations, collective learning The role of support space: strategic relations between the firms, its partners, suppliers and clients	The network is an organizational mode of 'interactive learning' Cooperation with different type of R&D institutions and with customers and suppliers	A strong focus on interaction between economic and socio-cultural life. Networks of agents (embeddedness)

Sources: Adapted from Moulaert and Sekia, 2003, p.294.

In the four common models, innovation is important component of regional success. In industrial districts capacity of agents to implement innovation is the main innovation dynamic. This view has been slightly changed in innovative milieu model and capacity of firms to innovate through the relationships with other actors of milieu become important. Regional innovation system and learning region models similarly define innovation dynamics, as an interactive, cumulative process of R&D in the region. In these models, importance of R&D for innovativeness explicitly emphasized. Moreover, coevolution of technology and institutions gain significance (Table 2.1). While in industrial districts flexibility and solidarity are considered as the bases of regional development, in recent development models, knowledge creation, interactive learning systems and innovativeness constitute the spirit of regional development (Table 2.1).

Within the evolution process of development models, the emphasis has shifted from firm to region. "Region" has been strongly emphasized as operational scale of development. Therefore, regional development models have emphasized regional networks, regional knowledge and regional innovation activities increasingly.

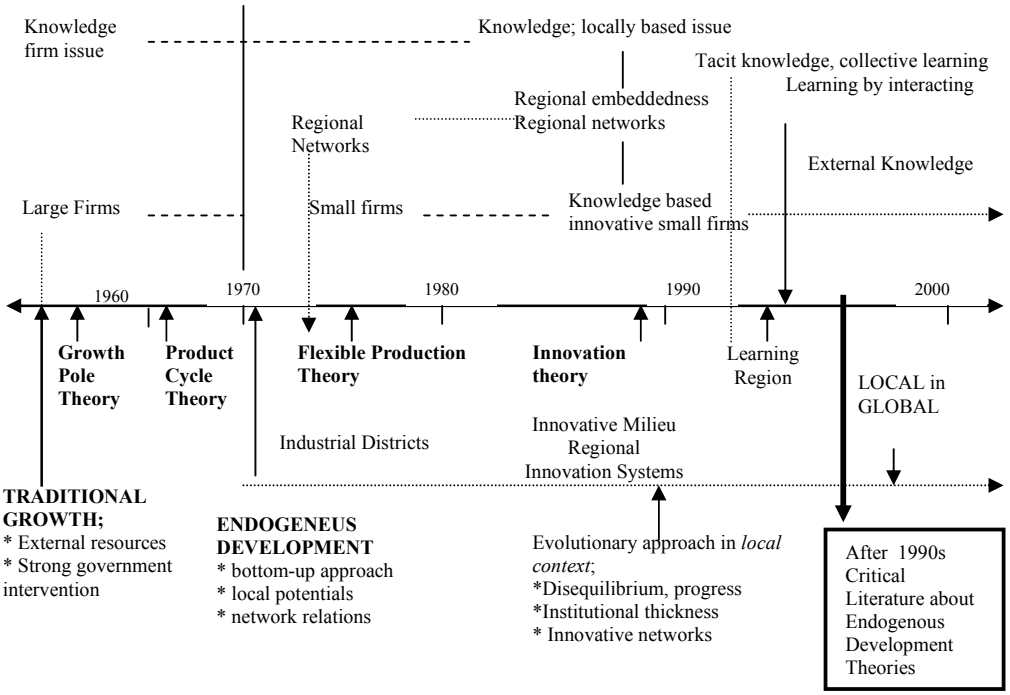

Figure 2.1 The Increasing Role of Regional Networking, Knowledge Creation and Innovativeness in Development within the Time.

It has also been discussed that in 1970s, development and knowledge creation were firm issues and technological progress was achieved by the process of capital accumulation in the firm, especially in large firms (Bell, Albu; 1999). After the emergence of industrial districts, signals shift from firm to territory in development in the 1980s. Regional networks of small firms have been defined as the promoters of development. Moreover in this process knowledge creation and innovativeness gain importance as the significant components of development. The learning processes and regional network relations became crucial components for the long-term dynamism and sustainability of competitiveness in the region, as technology and knowledge became regionally produced issues. Dynamic and innovative capacity of SMEs has been seen as important factors of knowledge creation (Figure 2.1).

In the historical perspective, with the increasing importance of regional networks, the main emphasis has shifted from firm to region, however in recent years there is a tendency to transform from regional level to global level in the networks. In globalisation era, these development models, which mainly depends on regional resources and regional networks, involve a paradox. On the one hand, transformation in technology has diminished the role of space. It is not necessary to locate near large markets to serve them and to use global resources. Therefore, geographic space are described as constituted by a dynamic global flows rather than static structure of locations. On the other hand, the increasing role of regional cooperative environment has been discussed in the global economy (Porter, 1990; Porter, 2000). In this transformation, the role and importance of spatial proximity in development has also changed. However, these tendencies could not take place in regional development models yet.

2.1.1 The Role of Spatial Proximity in Regional Networking, Knowledge Creation and Innovativeness

In the recent development discussions, regional networks, knowledge creation and innovation activities have been increasingly emphasized. Moreover, in these models, it has been accepted that successful innovation depends on accumulated knowledge, which is generally created through regional networks and learning processes. Within these discussions, the spatial proximity and face to face relations have kept their core position.

For development, knowledge is seen as key asset for competing firms and knowledge creation as key process. Main focus is on processes of knowledge sharing and interactive learning as a route of corporate and regional economic success (Hudson, 1999; Malmberg and Larsson, 2000). In other words, long-term industrial competitiveness is related to the ability of firms continuously to upgrade their knowledge base and performance, rather than exploitation of cheap resources and economies of scale. (Maskell and Malmberg, 1999; Amin, 1999; Sternberg, 1999). Moreover, in the recent development models, human capital becomes an important component, because knowledge and learning networks as the main promoters of development require human intellectual and creative capabilities (Strenberg, 1996; Florida, 1995).

Although the boundaries of the firm is important for knowledge creation, the increasing complexity of the knowledge base requires the collaborative long-term relationships between firms (Hudson, 1999). It is generally accepted that new knowledge necessitated for innovation emerges through interactive learning processes in region. Collective learning is generally defined as "a social process of knowledge accumulation, based on a set of shared rules and procedures, which allows individuals to coordinate their actions in search of problem solution" (Capello, 1999, 357). In other words, regional collective learning can be understood as the emergence of basic common knowledge across geographically proximate firms. Effectiveness of learning and generation of localized knowledge depend on collective understanding and the quality of regional networks (Hudgson, 1999).

In this process, the transfer of knowledge between institutions or firms differs from other forms of currency. Knowledge is held by both the donor and the recipient so it is rather shared than being transferred. Under this condition regions have been seen as important nodes of knowledge accumulation. Creation and dissemination of knowledge depends on regional networks and collective learning processes. According to many writers (Keeble and Wilkinson, 1999; Capello, 1999), collective learning requires regional processes, which depends on spatially proximate agents;

- flows of highly-skilled workers in region,
- intense regional networks within supplier and customer,
- mechanisms of regional spin-off.

The main mechanisms for knowledge share and learning in region include interrelationships between suppliers and customers, formal and informal links between firms, inter-firm mobility of workers in localized markets, spin-off mechanisms from existing firm. Moreover, knowledge creation and learning process require mobility of human capital, however it is less mobile inter-regionally than it is intra-regionally. Therefore spatial proximity is seen necessary in interactions of agents in order to share of common knowledge. From this perspective, regional network relations become crucial for creation regional shared knowledge and regional learning processes (Plummer & Taylor, 2001).

Network relations among several actors embedded in the same regional environment contribute to creation of knowledge. In the geographical proximity, face to face contacts depending on high degree of mutual trust and understanding are important for creation of regional tacit knowledge (Amin, 2000), which is important as a source of regional development. Shared tacit knowledge is unique to product areas and is emerged from a rich history of regional interaction between firms and institutions (Lawson and Lorenz, 1999, Hudson, 1999). As a result of this, spatially embedded tacit knowledge is seen as one of the strongest spatially differentiated factors of production and cannot simply be purchased and transferred and can not easily be replicated elsewhere.

Tacit knowledge has been considered as an informal knowledge, better produced through face to face relations, mutual trust and understanding, constructed around shared regional cultures. However codified knowledge is produced through formal ways and R&D activities. Therefore, while codified knowledge could be easily available and could be easily transferred from different regions and nations, tacit knowledge has been lacked into the region. It has also been discussed that tacit knowledge could be disseminated only by means of regional networks due to its spatially sticky structure (Amin and Cohendent, 1999, Antonelli, 1999, Asheim and Cooke, 1998). Due to the spatially embedded characteristics, tacit knowledge has been considered as the main concept of development in the recent development models.

Recent development models emphasize that in the recent era of globalisation, the role of regional networks and regional learning become more important (Lundvall, 1992; Maskell and Malmberg, 1999) and generate new knowledge, new technology. In addition, this regional creation of knowledge contributes to innovativeness of firms. In the related literature there are the common view about significance of innovation as the most important engine of long-term success, competitiveness and growth of firms and regions (Simmie, et. al., 2002). According to the evolutionary approach (Nelson, 1994) with the changes in the perception of knowledge and learning, innovation process has transformed considerably during the last decades. With the criticism of linear innovation models, broader viewpoint with respect to innovation process, which also includes social and relational perspective, comes into agenda. The new type of innovation is stemmed from spatially proximate related actors and is a result of regional networks that involves often several actors from the region. Therefore the

new perception of innovation fits into new regional development models and explains the regional success, which depends on regional network relations.

Moreover, empirical studies about innovation also shows that innovativeness positively impact upon the performance of firms and regions (Sternberg, 1999, Camagni and Capello, 1998, etc.) Moreover, the innovation theorist goes further this thought and suggest that "..not to innovate is to die". The study of Arndt and Sternberg (2000) shows that in all industrialized nations the long-term growth of regions stems from their ability to continually innovate and improve their knowledge base in networks as learning processes.

In the related models and related development studies, regional network relations are defined as the necessary bases of knowledge dissemination and innovation activities. Moreover, in these models SMEs are defined as the main agents of regional networks and innovation activities.

2.1.2 SMEs as Important Agents of Regional Development and Innovation

Since the 1970s, in theoretical debates, SMEs are defined as the main agents of economic growth and development. Role of SMEs, in the early industrial regional studies, was the employment generation and flexible structure due to low capital accumulation. Within the time, role of SMEs in the development models has been evolved. In recent development models, learning capacity and knowledge creation become more important capabilities of SMEs than employment generation. Moreover, in recently empirical studies, with the increasing role of regional networks, small firms have been defined as the engines of technological change and innovative activities (Camagni and Capello, 1998; Sternberg, 1999; Keeble and Wilkinson, 1999; Amin, 1999). Camagni and Capello (1998) also emphasize dynamic contribution of small firms in knowledge creation. In addition, they define small firms with informal relationship with the regional environment as an important agent of innovation paths.

Foundation of R&D units and creation of codified knowledge has been important for the regional innovativeness and development. The R&D expenditure is concentrated in large firms and they are expected to drive the technological progress. While large firms have advantages in the production of codified knowledge, SMEs could benefit

from the regional accumulation of tacit knowledge through the regional networks (Patrucco, 2003). The outcome of regional knowledge creation could be exploited by everybody in regional learning processes, against the will of the first creator. For small firms one way of solving the problem of improving the innovative capacity relies on regional collective learning. In this sense, regional collective knowledge could be exploited by small and medium sized firms effectively in the region (Capello, 1999).

Capability of small firms to cooperate and organizational, institutional and cultural proximity guarantee the development of dynamic and creative synergy. Trust among SMEs is another element on which dynamic synergy rest, since it helps in decreasing the risk and uncertainty in the innovation process. In regional networks of small firms, dynamic synergy causes the transfer of cumulated knowledge and local-know-how in the region (Keeble and Wilkinson, 1999). Moreover, it is also necessary that small and medium sized entrepreneurs need to supplement regional tacit knowledge with codified R&D results. The cooperation with other small firms, large firms, universities and research institutes become meaningful (Antonelli, 1999) in order to integrate tacit knowledge with R&D based codified knowledge.

It has already been discussed that in the development models, innovation capacity of SMEs highly depends on regional network relations. Learning by interacting focuses upon learning via network relations with other firms and institutions (Hudson, 1999). It shows that how companies, especially small ones, can remain competitive in an environment of rapid technological change and uncertainty (Lundvall, 1992). In the region, the networks of SMEs and institutions reduce uncertainties during innovation. It could be concluded that the new role of SMEs in development models is their innovative capacity, which depends on regional networks and regional collaborative environment.

The review of the literature on the development models indicated that regional actors, especially SMEs, regional network relations among them and their innovative capacity have been the core issues behind the recent success stories from different parts of the world. Most of the studies about development were based on social and economic analysis, which emphasized the contribution of regional externalities and regional networks to the innovative and competitive capacity. In these models, external

networks have not been adequately captured. However, recent competitive environment requires more than regional potential and regionally embedded networks.

2.2 Critical Evaluation of New Discourse: Can Regional Networks be a Response to the New Global Agenda?

In the end of 1990s, recent development models depended on regional capacity and regional knowledge started to be criticized (Staber, 1997, Glasmeier, 1999). Within this critical debate, important concepts of contemporary development approaches, such as spatial proximity, local embeddedness, institutional thickness, have been rediscussed with negative and positive sides. Moreover, path-dependency and lock-in concepts of evolutionary approach are used either explicitly or implicitly for explaining adjustment problems of regions in recent critical literature (Boschma and Lambooy, 1999).

Recent development models highly depend on space specific tacit knowledge and regional networks as an engine of development and innovation processes. However, evolutionary economy advocated that within the relational environment, economy is an open system**,** involving both endogenous and exogenous changes to the firm and to the region. Therefore, open systems require the integration to external networks, but development models highly concentrated on regional resources and regional networks (Groanewagan and Vromen, 1998).

In the innovative milieu approach, the outcome of the regional knowledge creation process could be exploited by everybody in the region against the will of first creator. So, the creative knowledge accumulates in the region and become 'club good'. This approach requires the relation of equals, however the evolutionary economy advocates that no one have full of knowledge, and unpredictable future call contingency and in-equilibrium (Hudgson, 1997). In contrast to development models, the base of networks is in-equilibrium and contingency, within which actors try to predict each other's reaction (Staber, 2001). Therefore, unequal environment obstructs the pure collaborative environment in the region.

The literature about the recent regression of success experiences describes the regionally embedded networks as a weakness that prevents radical and continuous changes (Glasmeier, 1994, Staber, 1996). Moreover, radical and continues changes are

required in order to induce innovation activity and economic growth (Schmitz, H, 1999). One of the limitations of collective environment is the path dependent nature of the knowledge and innovation, which generates irreversible patterns and choices for the region. Especially tacit knowledge may constitute an obstacle to further learning and radical innovations and it provides a possible basis for organizational passivity (Lawson and Lorenz, 1999, Bell and Albu, 1999). Thus, the importance of collaborative environment and strong regional networks are overemphasized in recent development approaches.

The role and benefits of regionally embedded networks in development and innovativeness also changes according to specialization sectors, technological levels and stages of development in the region. Much of the available empirical works, which support the role of regional networks in development, has focused upon the experiences of certain high-tech clusters and dynamic growth regions. In these regions that depend on formal R&D studies, scientific knowledge and skilled employees regional embeddedness and regional networks cause more innovative environment than that in low-tech regions specialized in traditional sectors. Thus, recent development models derived from experiences of high-tech, developed regions strongly emphasize the regionally embedded networks in innovation. In general, research on innovation outside the high-technology clusters does not support to the notion that development and innovation are embedded within the regional collaboration networks (Collinson, 2000, Freel, 2000).

The role of regionally embedded networks and regional tacit knowledge changes according to the stages of development, especially in regions, specialized in low-tech sectors. Regional networks is important in the initial phases of development, but in the later stages regionally embedded networks may lost their importance due to the increasing competition (Amin, 1999, Eraydın, 2002). Many clustering studies support this hypothesis and show that dense regional collective structure and regional embeddedness become more important in initial, riskable steps of growth. (Schmitz, H, 1999, Schmitz and Nadvi, 1999, Keeble, et. al., 1998). In this process collaborative environment of region encourages knowledge dissemination among entrepreneurs and cause to invest and to innovate. After a period, if regions do not find new knowledge sources, new ideas and motivations, they may lose their innovative capacity and earlier success level.

On the other hand at the later stages of development, regional embeddedness could generate resistance to change and may reduce response to changing environment (Eraydın, 2000). Locally cumulative knowledge, specialized structure of region and institutional capacity protect the region from new development trajectories. Therefore, institutional lock-in may cause the region to fall into the trap of rigid specialization. In these conditions, the firm in an established cluster might suffer from perceiving the need to change, although the existing regional relations could not give response to contemporary conditions.

High-tech regions within the later stages of development also have some growth problems, especially in rapid transformation processes. While importance of institutional thickness has been emphasized for success of region, in recent literature critical approaches have increased about this concept (Yeung, 2000; Maskell and Malmberg, 1999; Glasmeier, 1999). Important institutions of evolution are no longer produced at the same pace or to the same degree (Eraydın, 2001). For instance, new technology rapidly decreases former investments in skills, education, and infrastructure thus undermining the capabilities of the region. There is always a risk that in the technological paradigm shift, institutional endowment will become an obstacle to future development. In recent development models, regionally embedded learning relations are seen as important tool against resistance to change (Hudson, 1999). However the capability to move from already successful to potentially even more successful new development trajectories require more than regionally embedded networks and regional tacit knowledge.

In development theories, networking as a process of socialization through which actors and organizations are connected for mutual benefits and synergy are considered as regional issue. In other words network relations as an important part of institutional thickness are often embedded in the regional boundaries. However, increasing innovative and competitive capacity requires interregional networking, besides regional networks. Therefore, in recent literature, integration to global networks and importance of external knowledge has been increasingly emphasized (Amin, 1999, Porter, 2000, Young, 2000, Lyons, 2000, Koschatzky and Bross, 2001). The circumstances of globalisation and improvements in ICTs also force regions and firms to open systems and to integrate global networks. In this competitive environment,

SMEs keep and improved its central position due to its flexible, adaptive and innovative capacities.

The increasing critical debates about the regionally bounded knowledge, regionally embedded network relations and regional innovation environment are the main reason behind the subject of this thesis. In contrast to main notion of development models, recent experiences show that regional knowledge potential, regional institutions and regional networks alone could not give response to the global competitiveness. Besides them, external knowledge is also necessary for success of region and innovativeness. In the light of these discussions, in the following chapter, coexistence of regional and inter-regional network relations as source of innovativeness and competitiveness is re-examined in detail on the assistance of theoretical discussions and empirical studies. In the next Chapter, the main question is "*what is the role of inter-regional networks in improving innovative and competitive capacity of firms and regions in the globalisation era?"*

CHAPTER 3

NETWORKING TO IMPROVE INNOVATIVE AND COMPETITIVE CAPACITY IN THE GLOBALISATION ERA

It has also been argued in previous Chapter that the core of regional development has transformed from production system to knowledge and learning systems in the recent years. In addition, knowledge creation, processing and flows become the fundamental sources of regional development, instead of flows of goods and commodities (Castells, 1996). Within this knowledge-oriented era, networking has come into agenda as an important vehicle for knowledge dissemination. Networking as an important system, binding firms to gather into a relational contracting, collaborative product development and multiplex inter-organization alliances induces innovation processes of firms and regions. Moreover, many studies have been advocated that linking to networks has been fundamental in order to stay innovative in the long run (Keeble, Lawson, at all, 1999, Camagni, 1991).

Within knowledge economy, firms and regions have been competing in an increasingly complex and contingent environment due to increasing global competition, technological evolution, and flexible structure of organization. In this competitive environment, networking turns into core position in the success and competitiveness of region because they reduce the uncertainty by sharing risks and collaborating against rapidly changing environment.

Within this part, the increasing importance of networks in different types and geographical scales and the role of information and communication technologies (ICTs) in the interregional networks are analyzed in order to light the regional

development discussions about networking. It is also searched that whether the regional and inter-regional networks improve innovative and competitive capacity, and whether the inter-regional networks give response to regional lock-in in technological progress, or not.

The emphasis in recent debates has shifted from endogenous regional knowledge systems to global networking systems. It is also argued that regions are increasingly interacting with the external environment and gain competitive advantage through the global inter-regional networking. Therefore, it could be emphasized that coexistence of regional and global networks is essential for regional development and innovativeness in the globalisation process.

On the other hand, innovativeness has an increasing significance in regional development. For this reason, in the second part of the chapter relation between innovativeness and networking is analyzed. Both theoretical and empirical writings have been scrutinized, and with regards to this search different types of linkages as a source of innovation and spatial range of innovation networks are examined.

3.1 The Increasing Importance of Inter-regional Networks in Development

As it has already been discussed in Chapter Two that regional development studies show the importance of regional networks in development process. Although different schools exist, there is growing consensus regarding spatially relevant conclusions. The most important conclusion is the importance of regional network relations in accumulation and dissemination of knowledge, which play an increasingly crucial role in regional development. However, regional networks are not only the way to obtain knowledge, which could be obtained through various kinds of interaction with outside (Sternberg, 1999). Many studies show the importance of networks as the source of regional development, but there is no consensus about whether these networks are intra-regional rather than inter-regional or visa versa. Although regional networks constitute the important part of related literature, there is slight emphasis on inter-regional networks in development discussions.

When inter-regional networks come into regional development agenda, an important question is that what the relation and contribution between territory and network is.

Logic of networks requires interaction between networks and territories, which contradicts the myth of de-territorialisation. Therefore, networks make the possible the creation or the strengthening of interdependencies between regions. In other words, through the inter-regional networks, regions form a system (Offner, 2000).

Important functions of networks are to open the doors to resources and knowledge necessary for the development, production and consumption of goods. In this perspective regional and inter-regional networks play a crucial role in accessing complementary resources which a single firm or region does not possess. Results of many empirical studies, which will be analyzed in the following parts of this Chapter, reveal that firms with the help of network relations reach a higher annual employment and turnover growth than firms not networking (Keeble, et. al., 1998).

According to the recent studies, territorial agglomerations could develop competitive advantage through the regionally embedded network relations and learning process (Asheim and Cooke, 1998). Regional inter-firm networks and common know-how cause the emergence of embedded tacit knowledge, which is crucial for regional competitiveness and development. The economic success stories of Silicon Valley, the Third Italy and regional clusters in Southern Germany cause this conclusion about importance of regional networks (Cook and Morgan, 1998,). It might be possible to replicate the economic success of these experiences in other regions from developed and developing countries through replicating strong regional networks and collaboration with competitors, suppliers, customers, universities etc. In this idea spatial proximity is considered as the engine steering these networks by facilitating face to face contacts and fostering the sense of community (Romijn and Albu, 2002).

Spatial proximity becomes significant for assisting effective knowledge dissemination (Freel, 2003). However spatial proximity is not enough condition to integrate to social networks, because common or complementary values, norms, habitual, ways of life and ways of work are crucial in order to integrate into same network relations for firms. For this reason, other types of proximity, such as social, technological, organizational and institutional, should be present (Kirat and Lung, 1999). The feeling of belonging and the unity in the network stems from similar perception with respect to problems and a common strategy, which can be summarized as embeddedness (Grabher and Stark, 1997).

In the history, physical barriers protect individual to learn about opportunities of other settlements and to network with other cities' firms. However recent developments in ICTs is reducing the "tyranny of distance" (Freel, 2003). In the cases where codified knowledge can be transferred over distances at no costs, and where firms are able to access different kinds of knowledge sources, spatial proximity per se is not a sufficient precondition for networking relations (Koschatzky, 2000).

This discussion is not to suggest that spatial proximity have no importance in influencing the interaction between economic actors. Especially for small firms spatial proximity is still important in order to constitute network relations. Being a member of external networks or reaching external knowledge is not so easy for every time, and for every firm. For example, SMEs with fewer resources, less R&D and more uncertainties have many barriers to integrate into inter-regional knowledge networks (Tödling and Kaufmann, 2001). Therefore, regional networks are more important for SMEs than large firms. According to the empirical studies (Camagni and Capello, 1998; Staber, 1997), SMEs in growing clusters take place in inter-firm networking in order to resisting to contingent environment. Such networks are characterized by a quick diffusion of new knowledge, with this way small firms benefit the most as they have barriers to create the new knowledge (Arndt and Sternberg, 2000).

It has already been discussed that besides regional tacit knowledge, codified and external knowledge to the region is also important for development. The codified knowledge, produced by generally R&D activities of large firms, is transmitted to SMEs by means of production-related interactions, users-producer relationships, and interactive cooperation. For SMEs using codified knowledge and conclusion of R&D research require network relations with large firms. Within this discussion, regional network relations with MNCs gain importance for reaching new external knowledge without integrate into global networks.

Although regional networks provide the new knowledge to SMEs at a certain degree, collective learning, locked into regional tacit knowledge, has some limitations for regional development. Only using regional tacit knowledge and only taking place in the regional collective learning could protect the firm from adapting global shifts. Although there is a little empirical documentation about how firms actually acquire and use external knowledge, external networks could be seen solution to these problems.

It could be hypothesized that *several challenges of industrial districts in the future will be caused by weak relations to external environment*. In the past, information was disseminated through face to face relations, because of this, internal relations and tacit knowledge was the core concepts of regional growth. Today externally based codified information become crucial for many industrial regions and former model of face to face knowledge transfer are not sufficient mechanism for knowledge dissemination (Glasmeier, 1999).

Under the light of these discussions information and communication technologies (ICTs) increase the dissemination of knowledge, especially codified knowledge, over long distance through the global networks. For this reason before discussing the regional and inter-regional networks in detail, contributions of ICTs to the inter-regional networks are scrutinized.

3.1.1 ICTs as an Important Infrastructure of Inter-Regional Networks

The diffusion of new information and communication technologies (ICTs) increases the diffusion of knowledge in inter-regional and global networks. Computer networks link firms and provide important services; such as computer and information technologies services, hardware and software services, data processing services, advanced communication services, R&D services, economic and management services and training services. The core institutional and technological change is the possibility of on-line knowledge transfer between different agents of production from same region or not.

Once the technology of Internet become available in the 1990s, the fast diffusion of Internet has taken place in the realm of business. The Internet transforming business practice in relation to suppliers, customers, in management, in production process, in cooperation with other firms and in financing. For firms, the important competitive advantages to using the Internet have been indirect advertising, rapid feedback from customers, improved responsiveness to customers, access to government data sets, and accelerate corporate communications, economies of scope, current awareness. What is emerging is networked economy within an electronic nervous system.

Within the electronic networks era, network enterprises emerged from the network strategies (Castells, 2001). The first is internal decentralization of large firms by lean

and horizontal structure of cooperation. The second is the cooperation between small and medium sized firms, pulling together their resources to reach a critical mass. Third are the linkages between SMEs and large firms. The advantages of electronic networks have been seen very useful especially for viability of small and medium size enterprises. The services, which increase the knowledge recognition and transfer capacity of SMEs (Glasmeier, 1999), could be provides from remote areas with the help of ICTs (Antonelli, 1999; Glasmeier, 1999).

The dense using of electronic networks have stared from communication technology firms, like Cisco and Nokia. The network enterprise model, powered by the Internet, expends fast in all sectors of activity. For example Vaco, a French automobile parts manufacturers, which serves 50 percent of its orders online. Nowadays clothing as the most traditional sector has experienced this type of production in Zara (Castells, 2001).

It has already been discussed that information and communication technologies (ICTs) allow the speedy information transfer and allow spatially and temporarily fluid production and consumption (Kitchin, 1998). They are also regarded as the driving forces pushing economy in to the so-called "information and knowledge economy". ICTs are engine of technological innovation and regional development as the competitive weapons of 1990s (Antonelli, 1999). Since the 1990s, communication networks, such as electronic data interchange (EDI), has been critical for organizational restructuring of production. Within this system, it is possible to open up the firm's information to both suppliers and customers.

Within the information economy, depends on Internet, the development of 'e-learning' have been required. The main features of this type of learning are learning how to learn and increasing the ability to transform the information obtained from the electronic network process into specific knowledge

It is hypothesized that ICTs effect the territorial organizations and they increase integration between the areas and allow to interregional networks. Moreover, these technologies could be considered as a sort of catalyst, which establish complementary economic and social networks between global and regional scales. They are also making possible the inter-reginalisation of production through interregional networking, markets, cooperation, and strategic alliances. Computer communication

can be used to reduce the transaction cost associated with the market exchange of technological knowledge in inter-regional level. Consequently, telecommunication networks provide positive externalities, which affect regional development performance.

Spatial outcomes of telecommunication networks have been decentralization and re-centralization processes, creation of new spatial-industrial system and network type of organizations (Capineri and Romei, 1999). Decentralization and centralization occur simultaneously and they are two sides of the same globalisation process. ICTs is a dynamic concept, which makes possible decentralization of production to different areas.

Castells (1996) and Malecki (1998) emphasize that although decentralization of production become possible with the help of ICTs, it is impossible to achieve an equitable distribution of resources in global level through network relations. In other words, ICTs serve to realization of decentralization; it could not protect uneven development. Communication networks connect some places each other and create network spaces in which some places could not have the chance to be a member of these networks. In the past, advantages of one place were generated by geographical position, recently have been generated by position in the global networks (Graham, 2000). Therefore, center-periphery relation has been redefined in networking world, which connected with ICTs.

New information and communication technologies allow geographic decentralization at the same time cause re-centralization as new infrastructure aggregates in urban regions (Castells, 1996; Saxenian, 94). Knowledge and information have accumulated in certain centers (such as locality, cluster and region), which play the nodal role in the broader networks. ICTs provide dissemination of this centered knowledge through networks to the other regions. In one relational system, when degree of contingency and uncertainty increase, operational position of technology decreases and knowledge, depending on negotiation and collaboration become crucial. One of the questions of this decentralization - centralization debate is whether network relations depending on ICTs replace local face to face relations/cooperation or not.

In the context of this thesis, neither the disappearance of continues space, nor absolute superiority of global linkages are advocated. Coexistence of regional and inter-

regional networks is important for regional development. In this perspective ICTs provides necessary infrastructure for long distance networking and knowledge dissemination.

3.1.2 Coexistence of Regional and Inter-Regional Networks in the Globalisation Era

In the global system, while inter-regional networks increase with the help of information and communication technologies, locally based inter-firm networks, depending on regional mutuality and trust, keep their significance. While geographical scale of the networking ranges from firm to global, region could be seen as a meso level in this system. Competitive advantage of region comes from integration of regional and inter-regional networks.

Many studies reveal that the firm has to strengthen its linkages with regional and interregional networks in order to take advantages of synergetic effects as well as network externalities (Gioutzi & Stratigea, 1999; Capello, 1993). Staber (2001) has emphasized that besides open network systems, regional face to face relations have significant role in regional development. According to the study of Staber (1996) inter-firm relations tend to extent beyond the boundaries of region.

Network relations among firms from different regions and shifting from regional embeddedness to network embeddedness have been important debates of recent studies (Lyons, 2000, Staber, 2001, Grabher, 2000). According to these studies, firms must have information about and from the external world in order to being competitive. In the light of recent discussions, one of the main hypotheses of this thesis is that "*not only regional relations, but also external relations are sufficient for regional development, both of them are necessary and complement each other in the generation of new knowledge and success of firms and regions*".

In regional level, firms and other regional institutions create regional networks, depending on face to face relations and trust. At the same time, region could connect with other regions through network relations of firms and institutions. It is also possible to differentiate these network relations according to their characteristics and meanings. Formal and informal, loose and strict, vertical and horizontal relations are also possible among actors in regional and inter-regional networks.

In Figure 3.1, regional relations, depending on territoriality and spatial proximity, has been represented as two-dimensional, in reality it is possible to define them with more than one network layer. In the regional level, while nodes symbolize the firms and other institutions of production system, different types of lines represents the different types of linkages among agents, such as formal, informal, loose, strict, horizontal and vertical. All actors of the production system belong to the spatially defined regional system. However, connectivity level of firms to its regional level requires different characteristics of firms and regions besides being from same region. In inter-regional networks, space could be represented with the third dimension and distance and space undertakes new meaning. Inter-regional networks provide new knowledge to the region, which could be disseminated and integrated, with regional tacit knowledge through regional networks and face to face relations.

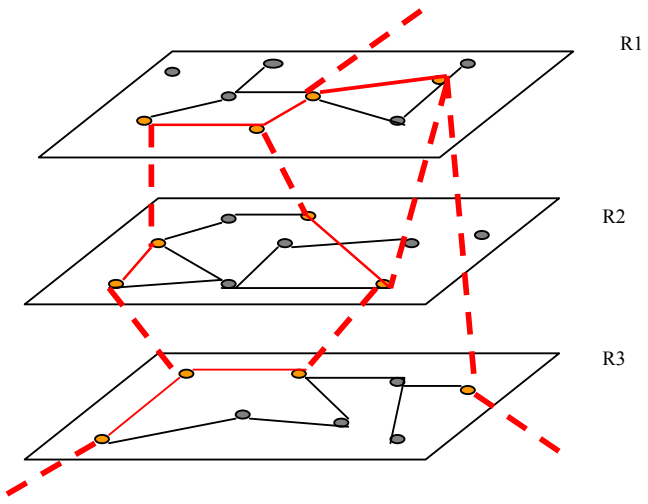

Figure 3.1 Coexistence of Regional and Inter-regional Networks

Empirical studies about relationship between firm size and networking (Arndt and Sternberg, 2000, Kaufmann and Tödling, 2000) suggest that smaller firms are more spatially embedded and strongly tie to regional networks than large firms. Because locally and regionally defined production systems ease networks of information flow among small firms to enhance competitive advantage (Fuellhart, 1999;43; Cooke and Morgan, 1993). In the light of the literature, it could be hypothesized that *there is a positive relationship between firm size and geographical level of network activities*.

Although regional networks are important for small firms that are less able to engage in large-scale networking (Camagni, 1991). In the region, generally, only success firms could be link to broader knowledge networks. Advantages and knowledge of these external networks come into region and disseminate through the regional network relations of externally connected firms.

In addition, externalities of networks, such as external knowledge or new technologies are so important for the success of region. It could be concluded from the previous discussions that regions might also benefit by the networking of firms in two ways;

- benefits related to regional networks of firms,
- benefits obtaining through interregional networks of firms.

Table 3.1 Advantages of Different Interrelations

	FIRM	REGION
FIRM	*IN INTER-FIRM RELATIONS, FIRMS;* Increase competitiveness Reach to external knowledge Become more innovative Creation of trust and cooperation	THROUGH THE RELATION BETWEEN FIRM AND ITS REGION, FIRM PROVIDES; Integration opportunity to global networks External knowledge to region New spin-offs Economies of scale and scope Synergies Capital flow to region
REGION	THROUGH THE RELATION BETWEEN FIRM AND ITS REGION, REGION PROVIDES; IC infrastructure Human capital Solidarity, mutuality Local knowledge pool, Specialized knowledge Supporting institutions	*IN INTER-REGIONAL RELATIONS, REGIONS,* Increase competitiveness Reach to external knowledge Become more innovative

Inter-firm and inter-regional relations provide some advantages for both firm and region. Inter-firm and inter regional relations are not completely separate, but interrelated processes. Firms are not atomistic actors in an open market place, but are embedded in a web of interrelationships through which they obtain critical resources. It has already been discussed that firms take place in inter-regional or global networks,

at the same time it is a member of regional system. Within globalisation era, integration of these systems gains importance in order to reach knowledge and being competitive (Table 3.1).

Like firms, regions take place in interactive relations in order to increase competitiveness, become more innovative and reach to external knowledge in the global economy. Inter-regional networks enable the region to learn as an entity like firms (Table 3.1). It has also been emphasized that regions integrate with the global system through network relations of firms. For firms, involvement in global networks is essential for increasing innovative capacity and competitiveness in order to access the latest technological knowledge from around the globe. Like firms, regions increase competitiveness and innovative capacity through reaching other region's knowledge and information centers.

As nodes of network relations, firms and regions provide some opportunities each other, it is an interactive process among them. While region provides to firms information and communication infrastructure, human capital, social capital, local knowledge pool. Firm with both regional and inter-regional network relations provides to region integration opportunity to global networks, external knowledge and capital flow, synergy and other opportunities for growth (Table 3.1).

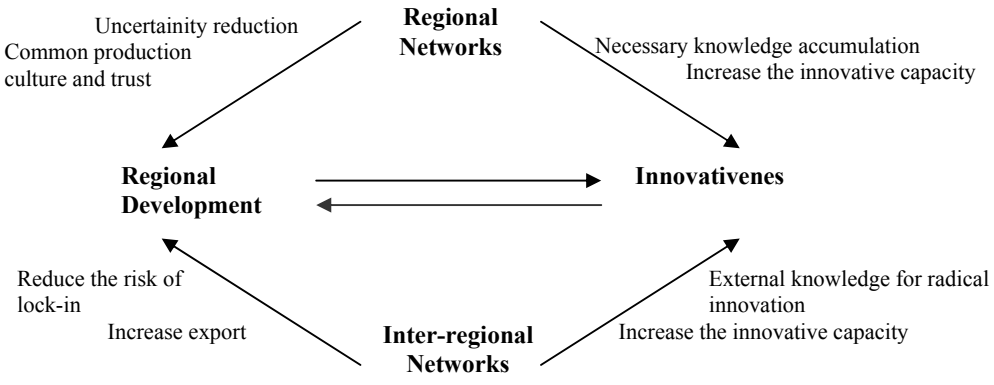

Figure 3.2 Relations between networks, innovativeness and regional development

Regional networks which has frequently involved in regional development models provides common production culture and trust, in this way reduce the uncertainty in regional development. On the other hand inter-regional networks which has rarely been emphasized in regional development models offer necessary knowledge about external markets and induce the export capacity of region. Moreover, with the assistance of new knowledge reduce the risk of regional lock-in (Figure 3.2).

Figure 3.2 shows that there is a strong relationship between regional development and innovativeness of firms and regions, which is already studied in the Chapter Two. Contributions of regional and inter-regional networks to innovative capacity are the subject of following section.

3.2 Relationship between Networking and Innovativeness

Innovation for a long time was understood as the outcome of autonomous decision making in the firm level, but nowadays it has been viewed as cumulative and cooperative phenomenon. In order to understand the relation between innovation and networking, innovation could be defined as 'the commercially successful exploitation of new technologies, ideas or methods through the introduction of new products or processes or through the improvement of existing ones' (Simmie, et. al., 2002).

Romijn and Albaladejo (2002) describe conceptual framework of innovative capacity of SMEs. According to them innovative capacity of SMEs is a result of the various internal and external sources (Figure 3.3). Potentially important internal sources include professional and educational background of manager, their learning and adaptation capacity to new conditions and ideas, professional qualification of workforce, ongoing technological efforts such as formal and informal R&D, formal and informal training. The internal sources of innovation will be discussed in the next part in the light of empirical studies from different regions and nations.

The using capacity of external sources also strongly requires networking and learning processes. The intensity of networking with a variety of agents and institutions, geographical proximity advantages, receipt of institutional support are defined as the external sources, which mainly depends on external network relations of firms (Figure 3.3).

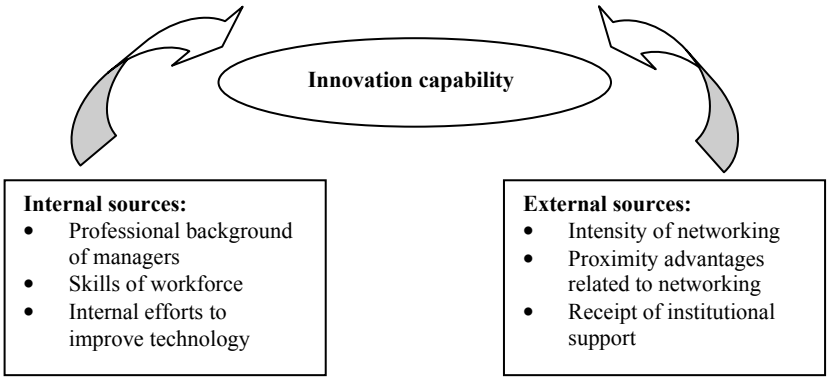

Figure 3.3 Internal and External Sources of Innovation Capability of SMEs
Source: Romijn and Albaladejo, 2002, p.1056.

High level of uncertainty in innovation process, associated with changing technology and competitiveness, has encouraged many firms to cooperate in this process. The importance of being in network relations stems from the high degree of uncertainty and risk that innovation entails.

This perspective brings a new research question: *whether the high level of linkages of SMEs positively effects innovation activities*. In the last three or five years some empirical studies have been handled this question and discussed the issue. Writers of the network theory of innovation (Cooke and Morgan, 1998, Florida, 1995, Koschatzky, 1999, Sternberg, 1999) hold that individual firms especially small ones are rarely capable of innovating in a vacuum. Arndt and Sternberg (2000) suggest that SMEs should cooperate during the innovation process for the reduction of uncertainties and costs, for the increasing flexibility towards changing market conditions.

High level of networks creates a synergy to induce innovative activities and also affects innovativeness positively. Because the importance of networking in the innovation process makes it clear, that networking is an essential means of knowledge exchange. To a certain extend, networking can compensate for lacking internal knowledge and resources, but without the ability for absorbing external knowledge and integrating it into their own production, firms not benefit from learning effects of networks. Therefore, access to networks becomes the basis of development and knowledge capacity. Successful innovation depends on the knowledge creation

capacity of firms and as well as entering into external relations with other firms in regional, national or international levels (Koschatzky, 2000).

Although most of the studies emphasis the inter-firm networks as the innovation networks, they are not the only means of innovation. Besides interfirm linkages; relations with research institutions, education institutions and technology transfer centers are normally considered important as well. As a plurality of actors in innovation process is necessary in order to access different kinds of knowledge and competencies. Networks among firms and firms and institutions becomes a key factor in fostering innovation dynamics, moreover complementary networks of SMEs is the key source of innovation. Different but interdependent economic institutions (SMEs and big firms, customers, suppliers, subcontractors, R&D laboratories, local agencies for economic development, universities, and service firms) constitute an important knowledge base of innovation process. Specific institutional settings and networks have an influence on innovation behavior of SMEs and effect regional innovation patterns (Freel, 2003, Sternberg, 1999, Simmi et. al., 2002).

There are the growing empirical evidences of regional concentration of innovation activity. Much resent research suggest that local embeddedness within a geographical cluster or milieu of innovative firms may be of crucial importance for the innovativeness and competitive capacity of SMEs in terms of access to innovative ideas, new technologies and range of benefits obtained through the regional networks (Camagni and Capello, 2000,). The reason of this idea is the favorable conditions of region fostering knowledge exchange. In other words localization is conductive to innovation because clustering and proximity create an environment where interdependent knowledge bases can be exchanged through a variety of relationships based on trust (Patrucco, 2003).

Larsson and Malmberg (1999) have found that in most cases there is a little contribution of regional relations in innovative capacity and technological performance of firms. Moreover, Fuellhart has emphasized in his research that "with respect to innovation and technology based information, interregional networks are more common" (Fuellhart, 1999; 43). Staber (2001) has also emphasized that a network can lead to innovation if it is open, permeable and flexible.

In many studies, it is accepted that regional tacit knowledge allows incremental (cumulative) innovation, while the external knowledge could cause the radical innovation (Asheim and Cooke, 1998), which could create capability to break existing technological trajectory. Tacit knowledge could lead to fetishisation of the regional potentials and it is weak to solve the problems due to lack of strategies, which based on codified knowledge. Because of this, industrial clustering and local networks do not guarantee generation of radical product or process innovation (Eraydın, 2002, Asheim and Cooke, 1999).

In the light of all these discussions, it could be hypothesized that *there is a positive relationship between innovativeness and networking. Moreover, besides regional networks external networks are significant in order to access new knowledge of innovation, especially radical innovation*. These hypotheses offer a starting point for alternative regional policies to economic problems. After the discussing networking and innovation relations in general frame, next sections discuss the empirical studies from different parts of the world. In this review the important questions are "how far the practice supports the theoretical findings?" and "what are the common and controversial findings from these experiences?" These findings are also important to determine the hypothesis of Turkey case. In the next sections of this Chapter specific characteristics of innovative SMEs as the internal sources of innovation, different types of networks as a source of innovation, spatial range of innovation networks and importance of spatial proximity in network relations as the external sources are examined in the light of experiences from different regions and countries.

3.2.1 Specific Characteristics of Innovative SMEs

Internal characteristics and capabilities of SMEs, which are essential to absorb and use external linkages and external knowledge, are significantly important in the innovation and growth processes. External linkages as external sources are necessary but not sufficient condition for SMEs in the innovation process. At that point, internal sources of innovation should be analyzed. In innovation networking literature, the innovative SMEs are analyzed and the main characteristics of them are defined implicitly or explicitly. In order to assist to the empirical study of this thesis, experiences from different regions and nations are reviewed as regards to characteristics of innovative SMEs (Table 3.2). In these empirical studies size, sector, age, high skilled employee,

R&D expenditures, turnover growth, patent number, specialization, personal characteristics of managers, computer base, export rate, etc. come into agenda with their effects on innovative capacity of SMEs (Table 3.2).

In the light of the recent studies, it could be hypothesize that *firm size has the positive effect on the innovative capacity of firms*. According to authors, larger firms which employ more high skilled R&D personnel are typically more innovative (Freel, 2003, Arndt and Sternberg, 2000, Koschatzky, 1999, Koschatzky, 2000, Lyons, 2000, Larsson and Malmberg, 2000, Keeble at. al, 1998, Grotz and Braun, 1997, Malecki and Poehling, 1999). In the research of Grotz and Braun (1997) it is also advocated that dense innovation activities is usually favorable for enterprises with more than 100 employees in Baden-Württemberg, Nortrhine-Wastphalia and Lower Saxony. In many studies 100 employee has been determined as the one type of threshold for innovative activities (Arndt and Sternberg, 2000, Koschatzky, 1999). Level of relations also changed according to size of firms. Micro firms with less than 10 employees have generally regional cooperation and profit from spatial proximity in the innovation process. However for SMEs with 10-499 employees a combination of regional and interregional linkages is especially important and successful in the same process (Arndt and Sternberg, 2000).

In Baden and Saxony Regions it is concluded that innovative SMEs with external innovation linkages are larger, employ more R&D staff, more persons holding university degree and have larger annual turnover than innovative SMEs without external linkages (Sternberg, 1999). In other words in these German areas, the probability of the existence of innovative linkages significantly increases with the size of firms, no matter where they are located. The study of Koschatzky and Bross (2001) also shows similar results for Slovenia that the larger firms are more innovative and take place frequently in innovation networks.

Main concerns about firm size are not the amount of unskilled employees. Size could have positive effect on innovativeness if the number of skilled worker increase with the firm size. A high proportion of qualified staff may also refer to more developed absorptive capacity to extent networking potential of firm in the innovation process. Freel (2003) finds a positive association between the proportion of technicians in the workforce of SMEs and the innovativeness and the presence of extended spatial linkages in Northern British. Arndt and Sternberg (2000) also conclude similar results

from their original database on 10 EU regions. Romijn and Albaladejo (2002) analysis the innovation capability in the electronic and software small firms in UK. According to their study to be innovative SMEs require adequate stock of scientists and engineers holding university degree to absorb new technologies and to be innovative. Other wise the inability to recruit high quality technical staff can be a serious constraints on subsequent growth.

Both with the rising share of highly qualified employees and the increasing R&D intensity, the share of innovative firms has increased in the region (Koschatzky and Bross, 2001). Larsson and Malmberg (2000) reveals that firms with an international innovation networks tent to have higher share of scientific workers than do firms predominantly local or national technology relations.

It is known that industrial sectors vary in terms of sources, paces and rates of technological level. Many empirical studies suggest that sectors create differences in innovation capacity of SMEs (Koschatzky and Bross, 2001, Freel, 2003, Arndt and Sternberg, 2000). Freel (2003) in his recent study has analyzed the sectoral pattern of small firm innovation and networking. He shows that sectoral differentiation create differences in the level of innovation and networking. According to conclusion of the study SMEs in science based, high-tech sectors are more innovative than others. Arndt and Sternberg (2000) classify sectors as innovative branches (like mechanical, automotive and electrical engineering) and non-innovative branches (like wood, paper, printing and furniture). As maintained by them firms in innovative branches are naturally more innovative than non-innovative ones. Lyons (2000) suggests that high-technology sectors are more innovative according to low technology sectors. Among high technology sectors he considered computer, communication and electronic firms and software firms.

Like firm size and sectors, the region and age of the firm create differences as regards to innovativeness. For example, Koschatzky (1999) indicates that the importance of regional effects in the innovation process of SMEs has changed according to type of region: rural, central urban and intermediate regions. Among them, firms in central regions reveal greater innovative capacity than that of firms in other regions. On the other hand Simmie et. al. (2002) discuss the differences between firms from global cities (London and Paris) and from regional areas (Milan and Amsterdam). Gortz and

Braun (1997) also reveal that innovativeness of firms differs from region to region according to the results of their empirical study about German regions.

According to the different empirical studies firm age have no impact on the innovative capacity of SMEs (Freel, 2003, Arndt and Sternberg, 2000, Lyons, 2000). On the other hand, Keeble and his colleagues' study (1998) shows that innovative firms tend to be older. Like Keeble, Malecki and Poehling (1999) advocates that learning and innovation increase over time as a firm matures. The innovative firms have the tendency toward path-dependence and over-specialization. However in many studies (Staber, 1997) over-specialization and path dependence have been seen as a huge obstacles to transformation and innovation.

An other important effect on innovative capacity is the exports of SMEs. According to Larsson and Malmberg (2000) export oriented firms are more innovative and have higher share of scientific workers. Koschatzky and Bross (2001) also reveal that larger, more exported and more cooperated firms are more innovative. Keeble and his friends (1998) shows that high-technology, innovative SMEs has higher export rate, more collaboration and partnership with other agents, higher employment and turnover growth but lower number of employees than non-innovative SMEs.

Access to knowledge sources is the basic external sources of innovation, which depends on regional and inter-regional linkages. Although regional and inter-regional linkages have been handled specifically in the next part, here these linkages discussed briefly as a source of innovative capacity. In Grotz and Braun study (1997) innovative firms have a good knowledge of possible information sources. They are relatively independent from regional innovation consultants and contact over large distances. The proximity of high-profile research institutions does not necessarily lead to a higher of innovativeness of SMEs. The networks of successful and innovative firms are probably non-local more than they are local (Malecki and Poehling, 1999).

In these empirical studies, it has been hypothesized that information and communication technologies (ICTs) and infrastructure positively affect the innovative capacity of firms and increase the external innovative linkages. On the other hand, computer base of firms has positive impact on the innovation capacity. Innovation capability of firms is also positively associated with in-house technological efforts such as foundation of R&D department, R&D expenditures, etc. (Romijn and

Albaladejo, 2002). Koschatzky and Bross (2001) also stress the importance of rising share of R&D intensity in the innovation process.

Table 3.2 Special Characteristics of Innovative SMEs: Experiences from Different Regions and Nations

Experiences from Different Regions and Nations
• **Baden (Germany) and Alsace (France)** – Innovation expenditure of SMEs is an important indicators of innovation activities. More than 32% of the manufacturing SMEs in Baden and 13% of manufacturing SMEs in Alsace invest more than 8% of their turnover in innovation. Firms size also effect innovative capacity positively. Innovative SMEs also focused on continuos development. 47,5% of Baden SMEs and 43% of Alsace SMEs indicated that they permanently develop. The knowledge base of innovative base also larger to absorb external knowledge in both sample regions (Koschatzky, 2000).
• **Baden and Saxony (Germany) -** 4/5 of all innovative SMEs have external linkages in regional, national or international levels relative to product or process innovations. (Sternberg, 1999).
• **Regions of Germany (**Baden, Saxony and Lower Saxony etc.) – Innovative firms have more than 100 employees, they have access to complementary knowledge sources outside their own region (Koschatzky, 1999).
• **Baden-Württemberg, Nortrhine-Westphalia, Lower Saxony (Germany)** - Innovative firms are larger, belong to innovative sectors and have more information sources and higher turnover according to non-innovative firms (Grotz and Braun, 1997).
• **10 European Regions** (Baden, Lower Saxony, Saxony, Alsace, Gironde, Barcelona, Stockholm, Vienna, South Holland, South Wales) - Innovative SMEs have more high skilled R&D employees. Firm turnover is higher than non-innovative firms. Share of turnover with new products is the highest in the intra and inter-regionally linked firms (Arndt and Sternberg, 2000).
• **Cambridge and Oxford** – Innovative SMEs have higher export rate, higher employment and turnover growth and higher network relations. In these regions, foreign workers are important for innovation SMEs to reach external knowledge. 31 % of firms have recruited at least one of their staff from foreign countries. For the internationalist firms proportion of new products in the sales 68% compared with 52% of nationalist firms. 52 % of internationalist firms have relation with universities, this share is 20% for nationalist firms. (Keeble, et.al., 1998).
• **Oxfordshire and Berkshire (UK)** – Innovative SMEs belong to high technology sectors like IT and electronic branches. High degree of skilled person. Personal, informal interactions among managers (Romijn and Albu, 2002).
• **Brianza (Italy)** – 64.2 of firms introduced innovations in processes, 74,4 % introduced to product innovation. Innovative SMEs have higher engineers and R&D expenditure, moreover they have higher turnover and investment according to less innovative firms (Patrucco, 2003).
• **Amsterdam, London, Milan, Paris, Stuttgart** - This study emphasis the importance of regional characteristics, there is no clue about innovative SMEs (Simmie, et. al., 2002).
• **Machinery producers in Sweden** - Firms which display a localized innovation relations, 84% are small while only 5% are large. More internationalist firms are more innovative. Internationally linked firms have 7% staff with university degree, nationally or regionally linked firms have 2-4 % workers with university degree (Larsson and Malmberg, 1999).
• **Slovenia** – Larger and more exported firms are more innovative. Electrical and optical equipment industries have networks that are more external and are more innovative than other sectors. R&D intensity also effects networking and innovative capacity of firms (Koschatzky and Bross, 2001)
• **Richardson (Texas)** - Computer, communication and electronics firms are more innovative with 52,5 percent. The share of engineers and other technical employees in total employment is quite high with 53 percent (Lyons, 2000).

Researchers tend to group SMEs according to their innovative capacity and network relations. In the light of these researches, it could be assumed that innovative firms have higher external relations than non-innovative firms. Cumber and his friends (2003) have grouped sample firms according to their innovative capacities: highly innovative firms (1), firms displaying innovation in the development of new products and processes (2), firms innovate only in terms of customization of products and processes (3) and firms displaying very limited innovation (4). According to results of this study, more innovative firms are more proactive in networks, especially in global networks. Moreover, less innovative firms have less global networks in the innovation processes.

Arndt and Sternberg (2000) grouped firms into four categories: firms performing regional networks (above average cooperation intensities), firms performing inter-regional networks, firms performing intra and inter-regional networks and firms with a low network intensity. Firms with intra and interregional linkages has higher turnover growth, firms with interregional cooperation has the highest share of export. This data shows inter-regional linkages positively effect growth and success of firms. They hypothesize that the firms, intra-regionally linked are more innovative than those lacking similar relations.

Like Arndt and Sternberg (2000) and Freel (2003), Keeble et.al. (1998) search for distinctions between nationalist and internationalist SMEs. They define these categories according to collaborative inter-firm research activity and to their exports. In terms of size internationalist SMEs are significantly larger, they employ a higher proportion of research, scientific and professional stuff. Moreover, internationalist firms report that university links in different levels are significant. Because of these characteristics, internationalist firms are more innovative than nationalist firms.

Malecki and Poehling (1999) also group SMEs as the extrovert and introvert firms in other words active and passive firms. It appears that extrovert firms are more innovative than introvert firms. In the light of all these empirical studies, it could be hypothesized that "*innovative SMEs have generally medium or higher firm size, employ more R&D staff and more persons holding university degree, have more R&D expenditure, belong to high-tech and innovative sectors, use ICTs effectively and have great export capacity*". Rethinking of these characteristics of innovative SMEs make

easy to understand the behavior of SMEs in the innovation networks and light to the rethinking of regional development in the new era.

3.2.2 Different Types of Innovation Networks as External Source of Innovation

After discussing main characteristics of innovative SMEs in the light of existing empirical studies, in this section, different types of innovation networks and their geographical levels will be discussed. Innovation networks are seen as a coordination of various innovative actors such as manufacturing firms, R&D institutions, universities and service providers, which participate in creating, developing, producing and selling new products. In recent literature on networks and innovativeness it has been increasingly claimed that firms cooperating with market partners are more successful in innovation process than the firms not cooperating within this process (Arndt and Sternberg, 2000, Camagni and Capello, 2000, Koschatzky,2000, Keeble, et. al., 1998, Grotz and Braun, 1997, Freel, 2003, etc.).

Inter-firm linkages enhances the innovative outputs are the most common means of cooperation which includes production relations with clients, suppliers, subcontractors and specialized firms. Moreover the innovative process of the firms does not only involve forward and backward linkages with other firms, but also implies cooperative relations between firms and other economic institutions, such as universities, research and innovation centers, consultants and business services (Patrucco, 2003). According to regional development models especially industrial districts, supplier, subcontractor and customer networks as production and marketing relations have the primary importance in innovation process. Nevertheless, in recent development models like regional innovation systems, learning regions etc. "untraded interdependencies" and horizontal network relations become important besides vertical networks in the innovation process. Like vertical relations horizontal relations are necessary in order to be innovative.

Suppliers contribute to design and development of products. On the other hand, the use of subcontracted services allows the small firms to supplement internal resource limitations. It is also suggested that subcontracting with large firms can enable small firms to innovate new products or production techniques without having to invest initial expensive research (Freel, 2000). The importance of customer networks in

innovation process has received much attention in the academic literature. The history of acceptance of customers as important components of innovation process goes back to very old times. It is suggested that understanding user need is crucial but not sufficient condition. In order to share risk and cost, to access new markets and the transfer of tacit knowledge horizontal collaboration among SMEs are essential.

The success of Route 128 and Silicon Valley as well-known experience of regional development depends on dense relations with and proximity to MIT and Standford University. It is argued that university research is source of significant innovation-generating knowledge, which diffuses through initially personal linkages with universities. However, in the literature empirical support to reveal importance of dense university linkages in innovation process of SMEs is very limited.

Many researchers from Germany have studied many success regions as regards to different types of network relations (Koschatzky, 2000, Grotz and Braun, 1997, Sternberg, 1999, Koschatzky, 1999). Koschatzky in his study (2000) compare the two regions of two different countries: Baden (Germany) and Alsace (France). In his study collaboration with business related service firms is clearly predominant in both Baden and Alsace. The second and third positions on both regions are customer and supplier network relationships (Table 3.3). The share of cooperation with research institution and with firms from same line of business is lower than share of vertical relations.

Of course, SMEs have links with their customers, suppliers, competitors and research institutions more or less. In Baden and Saxony as a research area of Sternberg (1999) it is evident that customer linkages are more widespread than supplier linkages. Four different forms of cooperation have been distinguished among these agents: general information exchange, formalized exchange of experiences, conception development, and prototype development (Sternberg, 1999).

An other study about German regions Baden Württemberg, Nortrhine-Westphalia, Lower Saxony comes from Grotz and Braun (1997). The results of this study support the findings of other studies about German regions. The original data reveals that vertical cooperation or subcontracting relations are more dense and frequent than horizontal cooperation. Their survey suggests that technology transfer from scientific institutions is not as important for innovative SMEs as is frequently assumed (Table 3.3). Moreover, in their sample there is a large group of firms has never had any

contacts with technology institutions. Difficulties in communication and common language have been stated as the most important reasons for this reluctance. Customers are an important external source of information, whereas the institutionalized technology transfer from universities and research institutes seems to be irrelevant. New products in mechanical engineering are more likely induced by market pull than technology push mechanisms. The result also shows the importance of customers in the innovation process in these German regions.

Like studies about German regions, many studies, form EU, show that horizontal relations have much lower share compared to share of vertical networks. In Arndt and Sternberg (2000)'s research in 10 regions of Europe relations also support this hypothesis. According to their study, network relations with customers and suppliers have the highest percentages among other types of networks in the innovation process. This study unusually shows that besides vertical relations, service networks such as consultants, software developers, etc., have an important role in innovative capacity of SMEs (Table 3.3).

The regions of UK especially Cambridge and Oxford have been frequently studied in order to explain different type of networks in growth of firm and region (Keeble, et. al., 1998, Romijn and Albu, 2002, Freel, 2003). Freel's study (2003) which depends on Northern British manufacturing data shows that great many firms were engaged in innovation-related collaboration, and many of them successfully innovated. Like German regions, among the existing linkages, customer and supplier networks have priority for SMEs. Cooperation with universities has the smallest share in the total external innovation linkages (Freel, 2003, Arndt and Sternberg, 2000).

Romijn and Albu (2002) in their study about Oxfordshire and Berkshire regions have discussed spatial proximity advantages and local networking with the regional universities and research and development agencies. In these regions of UK, university tradition, which goes back to old times, induces the university industry relation. The results of this study has differentiated from the studies about German regions and revealed the existence and importance of industry university networks in innovation process. However, in these regions also the share of university linkages has been much lower than customer and supplier linkages like other regions of Europe. Thus, the results of study reveal that the more strongly firms interact with research laboratories and universities, the more product innovation.

Table 3.3 Different Type of Networks as a Source of Innovation: Experiences from Different Regions and Nations

Experiences From Different Regions and Nations
• **Baden (Germany) and Alsace (France)** – the relationship with business related service firms are 87% in manufacturing SMEs of Baden and 71% in Alsace. The second and third positions are held by networks with customers and suppliers. Only less than 40% of the firms of both regions cooperate with research institutes. Only 33% in Baden and 27%in Alsacian firms cooperate with other firms from same line of business (Koschatzky, 2000).
• **Baden and Saxony (Germany) –** an average of 40 customers per SMEs and 23 suppliers per SMEs are excluded from the field survey. Although both customers and suppliers are important in innovation process, customer relations are more prevalent than supplier relations. 1/3 of SMEs has established linkages with research institutions in order to innovate. (Sternberg, 1999).
• **Regions of Germany (Baden, Saxony and Lower Saxony etc.)** – In innovation process vertical relations are the most important networks, besides vertical relations horizontal relations and relations with service firms are significant (Koschatzky, 1999).
• **Baden-Württemberg, Nortrhine-Westphalia, Lower Saxony (Germany)** - 43% of firms reported that they have never had any contacts with research institutions, technology transfer centers, innovation consultants. In the innovation process relations with customers 2 or 3 times dense than supplier relations. Supplier relations also have secondary importance among other type of relations in the innovation process. On the other hand the relations with research institutions, consultants and universities very limited (Grotz and Braun, 1997).
• **10 European Regions (Baden, Lower Saxony, Saxony, Alsace, Gironde, Barcelona, Stockholm, Vienna, South Holland, South Wales)** - Among the industrial partners (local and non-local) networks takes place most frequently with customers (57% of the firms surveyed) followed by suppliers (42%) and competitors (26%). 67% cooperate with service providers and only 30% cooperate with research institutions (Arndt and Sternberg, 2000).
• **Oxfordshire and Berkshire (UK)** – Relations with universities, private service providers, local training institutions are the most important sources of innovations (Romijn and Albu, 2002).
• **Brianza (Italy)** – Only 16,8% of sampled firms cooperate with research institutes, universities and technology transfer centers on innovation-related issues. 64.1% of firms, which do cooperate, have higher levels of innovative outputs. 63.8% of firms engaged in explicit innovation relations with other firms within the production process. Cooperation firms have higher percentages (33,7%) than no cooperation firms (15,8%). 40.7% of the firms that established cooperation in innovation activities with consultants and business services are within the group with high performances. Firms do not cooperate, higher innovation rates fall to 11.1%. Among high innovation firms, 76.4% have multilateral cooperation, while 8.3% of firms have no cooperation (Patrucco, 2003).
• **Amsterdam, London, Milan, Paris, Stuttgart** - While for Amsterdam, Paris, Stuttgart and London, customer relations are so important, for Milan supplier relations are the most important sources of innovation. On the other hand the importance of informal social relations is very low (Simmie, et. al., 2002).
• **Machinery producers in Sweden** - 40% of firms indicate that customer networks are the major sources of innovation, while corresponding value for the suppliers is 34 %, universities only 7%, for the research institution is 5%, and for competitors is 3 %. (Larsson and Malmberg, 1999)
• **Slovenia** – the number of firms, cooperating with research institution two times higher in large firms (over 100 employees) than small ones (blow 100 employees). Customer and supplier linkages and size of firm also positively related but less dramatically. (Koschatzky and Bross, 2001)
• **Hamamatsu and Suwa-Okaya (Japan)** - 4/5 of industrial SMEs regularly exchange information with other firms. About 1/5 of industrial SMEs have already had experience in collaborating with universities and national research institutes. Although 65% of large firms cooperate with universities, this share reduced to 20% for small firms. In the relations with regional research and technology centers small and large firms have similar results: 28-34% (Braun, et. al., 2002).
• **Florida (USA)** - Customer and supplier linkages are the most important source of innovation. Internet sides and universities have a slight impact on the finding information of innovation (Malecki and Poehling, 1999).
• **Richardson (Texas)** - A total of 37% (23 firms) of the sample firms were involved in strategic alliances; close to 66% (40 firms) of firms were involved in subcontracting relations in their production process, and 66 % of firms also carried out subcontracted work (Lyons, 2000).

The case of Italy regions differentiate from German and UK cases in terms of network relations. In the results of Patrucco's case study (2003) although firms relationships with research and innovation services, universities, technology transfer centers are less developed, firms which do cooperate have higher levels of innovative outcome in Brinza (Italy). Like study of Oxfordshire and Berkshire regions in this study, service networks have been handled as an important component of innovation. Thus, network relations, with consultants and business services, have a positive effect on innovation activities. Besides service networks informal networks with competitors have also important position to explain innovative capacity of SMEs.

Patrucco (2003) also reveals that there exist a positive link between networking and economic performances, in terms of profit, turnover and investments. It could be advocated that in stead of existence of these networks separately multilateral networking provides a greater contribution to firms' innovation capacity. Coexistence of different types of relations provides complementary knowledge and induces the synergy to innovate. The data of the study also shows that there are close relationship between multilateral partnerships and innovative performance of firms (Table 3.3).

Simmie, et. al, (2002) who search Amsterdam, London, Milan, Paris and Stuttgart regions analyze the effects of different types of regions in innovativeness and network relations. They asked SMEs to estimate the importance of four specific kinds of relations in their innovation process. It is concluded that all firms attach considerable importance to business networks. These networks include relations with customers, competitors or business services. According to the results of survey, the most important relationships in Amsterdam, Paris, Stuttgart and London as global cities are customer networks. However, in Milan as regional cities supplier relationships are more important than customers. The significance attached to relationships with customers may be a special and general feature of demand led innovation and an important source of knowledge. On the other hand, the relations with competitors are the least important relations among all type of linkages. In the innovation process relation with universities are so important for regional and global cities. Importance of academics is higher in global cities; Amsterdam, Paris and London due to the scientific infrastructure of these cities. On the other hand use of learning networks is more important for regional cities Milan and Stuttgart (Table 3.3). However, for Amsterdam relations with competitors have been more important than other four

cities. The importance of informal social networks is quite low in all cases, but lower in Milan and Stuttgart than the other cities.

In the study of Larsson and Malmberg (1999) which depends on the national data about Sweden machinery firms customers, suppliers, technical consultants, universities, research institutions and competitors have been considered as an important agents of innovation networks. Among these actors, customers and suppliers are reported as being the most important actors in relation to innovation like other European regions. It could be advocated that in the literature on innovation systems and industry clusters, the relationship with customers is often seen as the individually most important factor for technological development and innovativeness. Universities, research institutes and competitors seem to be less important in this context similar to other countries of Europe (Table 3.3).

The role of competitors are to force other firms to improve new products, production processes and selling methods, rather than helping each other. In other words, the existence of competitors in the regional level forces firm to be innovative and the increase their competitive capacity in global markets (Larsson and Malmberg, 1999).

Koschatzky and Bross in their study (2001) analysis the Slovenia. In this case, the share of small firms maintaining external innovation networks is far blow that of medium and large firms. This is true for linkages with customers, suppliers and research institutions, which increase with the share of exports (Koschatzky and Bross, 2001). The general exchange of information, the generation of new ideas is the characteristics of relationships mostly organized on an informal level. However, development of prototypes, pilot application represents formal cooperation relationship. It is obvious that informal contacts between all partners are predominant in Slovenian networks. This study shows that supplier networks are oriented towards general information exchange. Service firms are important as information partners. It is possible that highly innovative firms would be to form links with scientific institutions. However, the results of interviews do not provide much support for that idea. In the literature, it is argued that personal contacts are the crucial channel through which tacit knowledge is obtained.

The production tradition of Japan is different from the Europe in terms of organization, habitual and values. In Japan, subcontracting relations between small

and large firms constitutes the most important part of network relations. In Hamamatsu and Suwa regions previously the subcontractors mostly supplied only one large firm. Today the SMEs frequently have several regular customers and the tendency to dissolve local connections is marked (Table 3.3). The increasing technological competence means that many SMEs can now effort to have regular connections with customers all over the Japan (Braun, et. al., 2002).

Despite the tendency to become more flexible, many SMEs, in these regions, have depended only on one large firm as a custom. Besides customer and subcontracting relations, horizontal cooperations have been so important in Japan in recent years. However, this exchange of information among SMEs is often regional and informal. In recent years collaboration between firms and universities has increased in quantitative terms (Braun et. al., 2002).

Other research areas about network relation are regions of USA. Malecki and Poehling (1999) studying Florida region reveal that customer and supplier linkages are the most important types of information sources for both inward-looking and outward-looking firms. The importance of national trade associations and consultants follows the customer and supplier relations. Nevertheless, it is surprised that Internet sides are not seen as important information sources. The importance and usage degree of Internet sides and universities are similar (Malecki and Poehling, 1999). In the research of Lyons (2000) about Richardson (Texas), strategic alliances, customer and subcontractor relations are handled as an key relations of regional growth, innovativeness and embeddedness (Table 3.3).

The review of these regions shows that regional and national characteristics with production cultures, socio-economic conditions, social and economic values and habits creates differences in the organization of network relations. Table 3.4 provides general view to different types of network relations. In all cases, customer and supplier relations have singed as important components of innovation process. Besides them, the importance of relations with universities and research institutions in the innovation process has been advocated. However, the results of empirical studies could not support this expectation.

Table 3.4 Comparison of Different Type of Network Relations

	Primary Innovation Networks of Different Regions								
	Customers	Suppliers	Subcontractors	Service firms	Research institutions	Universities	Cooperating firms	Competitors	Associations
Baden Württemberg, Nortrhine-Westphalia, Lower Saxony (Germany)	!	!	!	%	%	∀	∀		
Northern British	!	!				∀			
Oxfordshire and Berkshire (UK)				!		!			
Brianza (Italy)	!	!		%	∀	∀		%	
Amsterdam, London, Paris, Stuttgart	!	%				!		∀	
Milan	%	!				∀		∀	
Sweden	!	!			∀	∀		∀	
Slovenia	!	!		%	∀	∀		%	
Hamamatsu and Suwa-Okaya (Japan)	%	!	!		%	%	!		
Florida (USA)	!	!				∀			!
Richardson (Texas)			!				%		

(! strong network relations, % relatively weak network relations, ∀ extremely week or no network relations in the innovation process.)

Source: Koschatzky, 2000, Sternberg, 1999, Grotz and Braun, 1997, Arndt and Sternberg, 2000, Freel, 2003, Rominj and Albu, 2002, Patrucco, 2003, Simmie et. al., 2002, Larsson and Malmberg, 1999, Braun et. al., 2002, Malecki and Poehling, 1999, Lyson, 2000, Koschatzky and Bross, 2001.

Similar to customer and supplier relations subcontracting relations as a sample of integration among small and large firms have been important requirements of innovativeness especially for small firms. In some of the studies, the significance of networks with service firms has been also emphasized. Relations with associations and cooperating firms have been handled rarely in the empirical studies.

3.2.3 The Spatial Range of Innovation Networks

After discussing different types of network relations in regions from the different parts of the world, spatial range of these networks gain importance and are discussed in this section. Innovation process of firms could be viewed as a network process, in which business interrelations with other partners play a significant role. In the related empirical studies the possible spatial levels of these network relations is differentiated into three types: regional, national and inter-national or global (Arndt and Sternberg, 2000, Freel, 2003, Koschatzky,1999). Both intra and inter-regional networking between firms is believed to stimulate and exploit innovation potential to foster learning processes and to increase creativity and competitiveness.

Although there are many studies about spatial range of network relations, there is no consensus about whether the regional, national or global linkages are more essential and widespread in the innovation and growth processes. Among these three levels of networks, there are a huge attention to regional level and a general agreement about importance of spatial proximity in the innovation process in the related literature, especially in regional development literature.

Spatial and cultural proximity is important components of cluster, which behaves as an incubator for innovative processes. In the cluster literature, the relevance of proximity is one of the most common topics in the context of innovative linkages and networks. Thus for the successful innovations, spatial and cultural proximity may play a crucial role in reducing uncertainty through informal contacts and intensive links between participants and improving access to important innovation factors (Koschatzky, 1999, Arndt and Sternberg, 2000, Koschatzky, 2000).

Lundvall (1992) linked the importance of proximity to radical innovation, which associated with higher uncertainty and risk. Moreover, proximity lowers communication costs, while face to face contacts may also enhance the quality of interaction. Rominj and Albu (2002) advocate that in radical innovation proximity rather than frequency are matter due to tacit character of necessary knowledge exchange. The hypothesis of Lundvall (1992) and Rominj and Albu (2002) require the strong local knowledge base like Oxford region. On the other hand, according to some authors, proximity is one but not a decisive criterion for innovation oriented networks. Like Lundvall, Freel (2003) advocates that spatial scope of innovative linkages

changes with the types of innovation. However dissimilar to Lundvall, Feel and some authors believe that radical product and process innovator SMEs more likely have innovation linkages at a higher spatial level than do incremental innovators (Koschatzky, 2000, Kaufmann and Tödtling, 2000, Freel, 2002). Because radical innovation require science based codified knowledge, if firms' own sources or regional potential does not response to global changes and does not provide the necessary new knowledge, external linkages and external knowledge become significant in innovation process.

Mutual trust is possible without the precondition of spatial proximity. Because regular-face to face contacts can be maintained over long distances if the necessary technological preconditions and communication channels exist (Grotz and Braun, 1997). Moreover, low costs of long distance interactions through the ICTs have also reduced the significance of spatial proximity.

Although information and communication technologies ease the long distance interaction, many authors believe that spatial proximity will not become irrelevant in the future. For instance in the survey of Sternberg (1999) about Baden and Saxony regions, one question gain importance whether the spatial proximity loss its importance with increasing availability of new telecommunication infrastructure. Results of this study reveals that personal contacts cannot simply be replaced by contacts via the new ICTs (Sternberg, 1999). ICTs could be seen as the only one of the means of long distance communications and inter-regional and global networks.

The results of Sternberg's study (1999) in Baden and Saxony hypothesized that firms with regional networks have higher interregional and global networks. In both regions high rate of innovation related networks are intra-regional. Although the intensity of intra-regional linkages is highest in Baden with its comparatively well-developed innovative infrastructure, at the same time, the share of international linkages is highest. It is surprising that there is low percentage of networks with partners in other countries in the two border regions Baden and Saxony (Table 3.5). On the other hand, Saxony has higher national linkages (Sternberg, 1999).

Keeble et. al. (1998) suggested that although the local and national linkages are so important, the Cambridge and Oxford regions have demonstrated importance of international links to innovative SMEs (Table 3.5). They have also promoted the

question whether the international links may reduce the need for local links within a technology clusters. Keeble et. al., 1998, shows that one third of the firms reported that their collaborative research with other firms was actually with firms outside the UK. Among network relations of firms global networks has the most important place as a source of innovation. Other important internationalization area of firms is origins of research workers, which recruited from foreign countries. According to their study older, larger and internationally-linked firms may need to connect international networks rather than regional embeddedness[1]. In other words, regional embeddedness may be related to the stage of development of the firms. The most important finding of them is that "firms which have successfully developed extensive international links show no evidence of reduced local links as a consequence" (Keeble, et. al., 1998). Moreover internationalist SMEs record higher local linkage intensities and frequencies than their nationally oriented counterparts. The simple hypothesis of diminishing local networking and embeddedness with stage of development are not valid (Keeble, et. al., 1998). This result also supports the hypothesis of Sternberg (1999) which accepts the positive impact of regional networks to integrate to inter-regional and global networks.

Arndt and Sternberg (2000) have started to their studies with research questions related to spatial range of network relations and innovativeness, Similar to Keeble (1998). The central question of Arndt and Sternberg (2000) in the study about 10 European regions is whether “firms in manufacturing sector with strong intra-regional linkages are more successful in innovative activities than firms with little connection to their region”. This study criticizes the issue from the regional networks' frame and searches for the answer to the following questions. “To what degree are the firms embedded in their regional innovation systems?” and “On what spatial level can the most important partners be found for innovation networks?”

Arndt and Sternberg (2000) reach a conclusion that in spite of numerous network relationships on the national as well as the international levels, knowledge exchange takes place mainly in the regional level. The firms are integrated into the national innovation system, which is followed by the regional level. Despite the continuos process of globalization a tendency toward international cooperation in innovation has

[1] Many authors represent regional embeddedness with high density of regional network relations according to national and global linkages (Freel, 2003, Keeble, et.al, 1998, Arndt and Sternberg, 1999,).

not yet been noticed. In sum, this study shows that national and regional levels represent the most important area for networks. Global level ranks second (Table 3.5).

In many studies, It is hypothesized that firm size and sectoral differentiation affect spatial range of networks positively. The smaller the firm, the more embedded in the regional networks in innovation process. Medium sized and large firms are less embedded in the regional environment and regional networks according to small ones (Rama, et. al., 2003, Arndt and Sternberg, 2000). In Japan although there can be cooperation between firms in quite different regional economic areas, small enterprise constitutes networks in geographical proximity and personal face to face meetings are seen as major requirements of innovativeness. Consequently, the networks of Japanese SMEs are strongly concentrated in the local region (Braun, et. al., 2002).

Arndt and Sternberg (2000) also illustrate that sectoral differences create diversity in the geographical scope of linkages. Traditional manufacturing firms primarily supplying national markets and independent from strong network linkages. While food and textile industries show low cooperation intensity, mechanical and electrical engineering and automotive industries prefer generally intra and inter-regional linkages. In other words, high tech industries take place in intra and inter-regional linkages. In the way it is tasted that the more knowledge-intensive the innovation activities of a business are, the greater the relevance of spatial proximity and of network ties.

Some studies advocated that the network linkages in the intra and interregional levels are necessary in order to coop with “lock-in effect” and improve the innovative potential of the firm. Koschatzky (1999) according to his study about regions of Germany assumes that the more diverse spatial range of cooperation activities the more diverse knowledge sources in innovation process. He likewise supports the conclusion of Arndt and Sternberg and suggests that the higher the innovation activity, the more networking contribute the innovation. It has also been emphasized that only diversity (in type and space) in networking prevents lock-in situations and strong path-dependencies. An other study advocating the importance of diversity comes from Patrucco (2003) who has studying on Italian region (Brianza) and proposed that there is the link between innovation and plurality of networking.

Larrson and Malmberg (1999) research to answer to the questions for Sweden machinery producers: At what geographical level (local, national or international) are the most important technological relations found? Is there a correlation between geographical level and the technological performance of firms?

In many studies, it is generally suggested that localized technological relations are qualitatively different from geographically more extended relations and consequently more likely to make firms innovative. Moreover, intra-regional linkages are more important for the innovation process than interregional linkages (Asheim, 1996, …). However, the case study of Larsson and Malmberg (2000) reveals that locally and nationally embedded firms recount slightly less product renewal than do globally networked firms. In addition, according the study of Lyons (2000) about Richardson (USA), in the strategic alliances regional relations have a great importance, although the most important level of these relations is national level. Strategic networks with firms located overseas are also important. This study shows the national level as the most important level of networks, like Larsson and Malmberg (2000).

Like other differentiation characteristics, such as size, export capacity, sector, etc. type of network relations generally aim to different levels. It is emphasized in many studies that backward and forward production linkages, knowledge based support linkages or technologic alliances require different network levels as regard to main characteristics of relations.

In their case study about Milan and Pisa regions, Camagni and Capello (2000) reveals that high proportion of firms reports close links with other firms within the region, especially those in vertical customer/supplier chains. In the customer networks, external linkages have higher proportion than suppliers share. In the same survey, SMEs report that local customer and supplier relations are very important for their innovative activities. Sample firms reported that local customer relations are more important in the innovation process than local supplier relations (Table 3.5).

In the subcontracting relations, importance of spatial proximity extends and so the share of regional relations increases in Richardson. In other words, only few firms employ overseas subcontractors. The geography of such connections penetrates well beyond the geographical boundaries of the region and firms integrated in the national economy (Lyons, 2000).

Table 3.5 Geographical Focus of Innovation Linkages: Experiences from Different Regions

Experiences from Different Regions and Nations
• **10 European Regions (Baden, Lower Saxony, Saxony, Alsace, Gironde, Barcelona, Stockholm, Vienna, South Holland, South Wales).** In customer relations, national level is seen as an important (60-80%). In supplier relations, again national linkages are dominant (60-90%) and share of international linkages increases. In research institution relations, regional (50-80%) and national level (70-100%) are common. Relations with competitors distributed among three geographical levels. National level with 40% represents most important level of networks (Arndt and Sternberg, 2000).
• **Regions of Germany (Baden, Saxony and Lower Saxony etc.)** – Spatial proximity is important in the vertical relations, however regional networks gain significance in the horizontal relations (Koschatzky, 1999).
• **Baden-Württemberg, Nortrhine-Westphalia, Lower Saxony (Germany)** - Geographical proximity is more important for supplier relations than customer relations. In the scientific relations spatial proximity loose its importance (Grotz and Braun, 1997).
• **Baden and Saxony (Germany) –** 39% of innovation related networks are intra-regional. Only 10.4 % of firms have cooperation with partners from other countries. 60.3% of interviewed SMEs maintains linkages with research institutions in the same region. Almost 50-55% of customer and supplier linkages occurs in interregional level in the national boundaries. (Sternberg, 1999).
• **Oxfordshire and Berkshire (UK)** –Geographical closeness are crucial in this type of relations. Customers are located all over the world, so spatial proximity are not necessary in customer relations (Romijn and Albu, 2002).
• **Cambridge and Oxford (UK)** – 34% of firms collaborate with firms from outside the UK. 52% of firms reported that at least one overseas sources have been very important in the innovation process. (Keeble, et.al., 1998).
• **Pisa and Milan (Italy)** - 84% of firms reported local linkages with suppliers, 16% with external suppliers, 19% with external customers. 54% of firms reported that local supplier networks, 68% of firms told local customer networks are important for their innovative activities (Camagni and Capello, 2000).
• **Brianza (Italy)** – 97.4% of linkages are fully local, embedded in the district. This study focuses on local relations and does not consider the differences among local, national and international linkages (Patrucco, 2003).
• **Amsterdam, London, Milan, Paris, Stuttgart** - For Milan and Stuttgart local supplier and customer relations more important than global cities. Customer relations tend to be more international than supplier relations. Time proximity is important to suppliers(Simmie, et.al., 2002).
• **Machinery producers in Sweden** - 55% of firms claim that relations with customers at national level are technologically important. 34% of firms report that suppliers in Sweden are technologically important for innovativeness. Half of the firms who work with technical consultants prefer local relations (Larsson and Malmberg, 1999)
• **Slovenia** – 38% of firms cooperate with customers and suppliers from Slovenia, 29% with the corresponding partners from the neighboring countries, 33% with companies from other foreign countries. In the research relations only 20% of relations constituted at international level (Koschatzky and Bross, 2001)
• **Hamamatsu and Suwa-Okaya (Japan)** - 28% of SMEs connect with regional research and technology centers, whereas only 8 % of SMEs connect national centers. Supplier relations also constituted at regional level for SMEs (Braun, et. al., 2002).
• **Richardson (Texas)** - 82.6 % of firms have strategic alliances in the rest of United States, 43.5% have regional linkages and 30.4 % have global linkages. In the subcontracting linkages, regional relations 62.5% and national relations with 57.5% are the most important networks. Global linkages are only 7.5% (Lyons, 2000).
• **Florida (USA)** - National trade associations two times important than regional trade associations as a source of information and innovations (Malecki and Poehling, 1999).

Rama at.al. (2003) have also studied the subcontracting relations, in this context asked the question why some places remain sticky within an increasingly slippery global economic space. Location of subcontractor and client are in the same region with high proportion (61-77%). Although they do not use abroad firms for subcontracting relations, they use global markets for final goods. On the other hand medium sized and large firms are less embedded, purchasing inputs and selling most products outside of Spain (Rama et.al., 2003).

The Japanese firms are also much more directed towards their local area in terms of cooperation with other SMEs or research institutions. Besides regional relations, national relations gain importance in terms of the development of new products (Braun et. al, 2002).

What these experiences suggest is that many studies has tended to over-generalize the importance of local supplier / customer production networks. The importance of local production networks to innovation systems may be mainly limited to some regions, which have necessary conditions to be successful, such as Baden Württemberg, Emilia Romagna or other regional cities in the UK and Spain.

Koschatzky (1999) strongly puts emphasis on importance of external network relation rather than regional networks in innovation process. It is also assumed that for both customers and supplier networks, innovative firms do not prefer the regional cooperation. Looking at the type of region this seems especially true for firms located in the central areas. All in all, interregional supplier and customer networks stimulate innovation much more than intra-regional networks, while in horizontal networks contacts with research partners from the same region dominate (Koschatzky, 1999, Koschatzky, 2000). Service firms are also some influence, though weak, in the innovation process and being close to, service firms in metropolitan regions provide some benefits to innovative SMEs. For technical services, spatial proximity does not seem to be an important aspect and complementary network relations include both regional and interregional networking (Koschatzky, 1999).

According to Romijn and Albu (2002) spatial proximity is essential for maintaining the frequent contact required for effective interaction with part-time employment at these institutions, access to laboratory facilities, informal exchange with staff and so on. This study indicates that regional science base has been a valuable source for

competitiveness and innovativeness. Oxfordshire and Berkshire with research laboratories, universities are special regions, differentiating from other regions.

In the study of Larsson and Malmberg (1999) which depends on Sweden national data of machinery producers, the role of domestic actors is particularly important for contacts with universities, research institutes, technical consultants and suppliers, similar to the study of Romijn and Albu (2002). In other words when producers need research support, they turn to regional or national institutions. Regional relations and spatial proximity gain the most importance in the relations with technical consultants. Because general character of service relations fits well with regional level, simplifying transfer of information and knowledge. In their study, European level comes into agenda as an important geography. Firms report that in the collaboration with competitors European level is so important besides national level. Sample firms which see foreign customers as technologically more important than national customers have higher innovative capacity (Larsson and Malmberg, 1999).

Like the study of Larsson and Malmberg (1999) in the study of Simmie et.al. (2002) locations of customers and suppliers have been examined and European level gain importance among other spatial levels. Consequently, regional suppliers do not play a significant role in the regional innovation systems of Amsterdam, Paris and London as a global city. However, for the Milan and Stuttgart, as a regional city, local suppliers have a limited importance. In all these five cities network relations in Europe has the highest score among the supra-national relations. In customer relations the importance of international relations are more important than supplier networks. Speed, cheapness and capacity of telecommunication systems provide time proximity among actors.

In Grotz and Braun study (1997) about Baden-Württemberg, Nortrhine-Westphalia, and Lower Saxony for technology transfer of a more scientific character, a national or even international orientation is more common. It has been concluded that spatial proximity might be important for low profile interactions such as general innovation consultancies. For high-profile technology transfer, such as joint product development, spatial proximity is obviously irrelevant.

According to the research results of Koschatzky and Bross (2001) about Slovenia, a similar spatial structure of both the cooperation relationships with customers and those with suppliers is found. In supplier and customer relations, the rate of international

linkages is higher than national linkages. The spatial openness of vertical relations is due to the limited market potentials of Slovene regions, which necessitates cooperate with foreign partners. However, the frame is different for research networks, which embedded in national relations (Koschatzky and Bross, 2001).

Keeble et.al. (1998) show that some type of relations have been constituted at global level to be more innovative and competitive in Cambridge and Oxford. International research collaboration, explicitly innovation alliances, recruitment of research and managerial staff from foreign countries are core issues, which discussed by Keeble and his friends.

In the light of all these studies from different regions it could be concluded that among many different types of cooperation partners research institutions have the highest share of intra-regional linkages. In addition, the share of international linkages is the lowest in linkages with research institutions. This outcome supports that in linkages with research institutions, such as universities, proximity to such institutions enhance linkages. In the supplier and customer relations spatial proximity loss its importance. Sufficient access to innovation knowledge is only assured when firms access both regional and international networks.

3.3 The Relative Importance of Proximity in the Different Types of Networks: Need for Reformulating Some of the Theoretical Assumptions

The main interest area of this Chapter is to examine the relationship between innovativeness and networking as important components of development. For this reason, theoretical discussions and empirical studies from different parts of the world are reviewed. Although each region has their own conditions and characteristics, there are some repeated findings that could be derived in terms of networks and innovation activities of SMEs.

According to the review of experiences, large firms have more innovation activities than SMEs, in respect to main indicators of innovation capacity. Moreover, the density of external innovation linkages significantly increases with the size of firms. The positive effect of firm size on innovation capacity is not related with unskilled employees, but rather with the share of skilled worker. Selected case studies also show

that the other important indicator in innovation capacity is the sectoral differentiation. According to them, SMEs in high-tech sectors are more innovative than in other sectors. In addition, regional differences and capability to use ICTs has also a positive effect on innovative capacity.

In many studies, it is emphasized that the density of network relations increases the innovation capacity of SMEs. Relations with suppliers, customers, subcontractors, service firms, universities and R&D institutions are important networks for innovation activities. Among them, customer and supplier networks have the highest percentages according to the empirical studies. Moreover, many studies show that vertical production networks are more dense and frequent than horizontal relations. In almost all case regions, technology transfer from scientific institutions and universities are very scarce in the innovation process. The role of competitors is to force firms to be innovative rather than helping each other in the competitive environment. Therefore, many studies emphasized that coexistence of different types of network relations is important in the innovative capacity of firms. In other words, there are close relationship between multilateral networks and innovative performance of SMEs.

Spatial range of these networks, as regional, national and global, is also very important in the innovation process. In the spatial dimension of network relations, the role of spatial proximity comes into agenda. Some studies realized in high-tech success regions have advocated that spatial proximity (regional networks) is important in innovation process. On the other hand, many studies reveal that external network relations are more important than regional networks in innovation. These global networks are necessary in order to cope with the 'lock-in' effect and improve the innovation activities of firms. The empirical studies also reveal that firms belonging to high-tech sectors prefer global linkages in the innovation process. Among network relations, global networks have the most important place as a source of innovation, besides regional networks. Therefore, the diversity in types and geographical levels of networks prevent 'lock-in' situation and strong path dependency, and increase the innovative capacity. With the increasing global networks, ICTs come into agenda, which allow the transfer of information and allow spatially fluid production. Moreover, global networks in relation with suppliers, customers, and other agents increase with the help of ICTs.

Common findings of empirical studies show that although in all types of linkages external networks exist, the importance of proximity changes according to the type of networks. In the customer and supplier relations, the share of external networks is higher according to other types of networks. On the other hand, in the subcontracting relations, the importance of spatial proximity increases and the share of regional relations raises. In horizontal networks, besides, contacts with research partners from the same region are dominant. While some studies emphasize the importance of regional networks in relation with service firms, some studies stress especially the importance of knowledge based service networks in the regional level. In addition, spatial proximity is highly important in university linkages, as the general characteristics of these types of networks fit well with regional level.

The most important finding is that not only regional relations but also external relations are sufficient for innovativeness and both of them are necessary, and they complement each other in the success and innovative capacity of firms / regions. While, regional networks constitute common production culture and trust, and provide uncertainty reduction, interregional networks reduce the risk of 'lock-in' effect in development process. Moreover, both of them provide the knowledge of innovation and constitute the components of regional knowledge system. On the other hand, theoretical debates on innovation networks reveal that while regional networks allow incremental innovation that depends on tacit knowledge, the external networks could provoke the radical innovation. All these benefits of network relations are equally important for innovation of SMEs, due to their own characteristics. Thus, the high level of innovation linkages positively affects innovation activities of SMEs, which are rarely capable of innovating in a vacuum. Besides inter-firm linkages, relations with other institutions, such as R&D and education institutions, universities, are also important as well.

It is possible to derive some outcomes from the contemporary experiences for the evolution of recent development models. First, although the role of regional networks is strongly emphasized, there are no clues about the interaction between regional and global networks in recent development models. It is generally accepted that face to face regional networks provide important benefits, however it has also some limitations. On the other hand, global networks enable firms to benefit from networks beyond the limits of clusters and provide the new knowledge of innovation. Therefore,

it is possible to advocate that not only regional relations, but also external relations are sufficient for innovation, as both of them complement and strengthen each other.

Second, the role of tacit knowledge is overstated in development models. However, recent empirical studies exhibits that regional tacit knowledge and external codified knowledge should be integrated as response to rapidly changing conditions, especially in the regions with low scientific background. Bell and Albu (1999) also indicate importance of open knowledge systems to sustain the competitiveness of clusters.

Third, spatial proximity constitutes the core of recent development models. Nevertheless, the importance of spatial proximity changes according to the types of networks (relation with customers, suppliers, subcontractors, service firms, universities, R&D and education institutions etc.). Moreover, different types of linkages require different geographical levels in network relations (regional, national and global) in order to increase innovative performance of SMEs. Thus, the diversity in relations and geographical levels should be included in development models in terms of innovation capacity. According to the empirical studies, in some types of linkages, such as production and marketing networks, spatial proximity are not considered as a crucial requirement. On the other hand, in some types of linkages, like knowledge networks, the relative importance of spatial proximity increases.

Forth, with the increasing information and communication technologies (ICTs), spatial distance looses its tyranny. In this context, if there are no cognitive distance between entrepreneurs and other institutions, they could constitute close relationship and work together easily. Therefore, many studies illustrate that ICTs increase the national and global linkages of firms. All these findings include important clues for the reformulation of some assumptions of recent development models and regional policies.

Furthermore, these findings also provide guidelines for the case study on Turkey. Moreover, hypotheses of the case study are written according to these empirical findings from the world, questioning whether the sample regions in Turkey represents similar results with existing empirical studies in terms of network relations and innovation activities, or not. Before comparison of these well-known experiences with Turkey case, the methodology used in the case study will be discussed in the following Chapter.

CHAPTER 4

METHODOLOGY AND DESIGN OF THE CASE STUDY: DEVELOPMENT, NETWORKING AND INNOVATIVENESS

In Chapter Three, empirical and theoretical frame on networking and innovativeness has been discussed. Many of these theoretical explanations are embedded in empirical studies on networking and innovation in selected industrial clusters from different parts of the world. These studies use statistical data of national or regional institutions, or use original survey data to analyze innovative capacity of selected firms and innovation networks in different geographical levels. While some of the studies have explicitly discussed the coexistence of regional, national and global networks in development and innovativeness (Collinson, 2000, Koschatzky, 2000, Keeble, at.al., 1999, Cumbers, at.al., 2003), some of the studies have only emphasized the importance of regional networks in innovative and competitive capacity of firms and regions (Asheim and Cooke, 1998, Camagni and Capello, 2000). Although there is a consensus on positive effects of regional networks on innovative and competitive capacity, there is no apparent consensus on the importance of external networks and knowledge.

In the analysis of networks and innovativeness, there are some restrictions. First, there is difficulty in understanding and measuring informal relationships that support innovation activities. Second, there is the complexity of broad and general meaning of innovation, making difficult to identify different levels and types of innovation. Therefore, it is not possible to find an agreement on a single method in order to measure innovativeness and networking in the existing studies. However the common

findings and indicators of the existing studies, guide to determine main indicators of innovation and hypothesis of the case study.

After having discussed theoretical explanations in the previous chapters, the case study part of this thesis is an attempt to analyze network relations and innovative capacities of SMEs as the main components of development in the sample regions. This chapter deals with the design of the case study in three sample regions. The following sections discuss the aim and the context of the case study, the main hypothesis and the choice of sample with reference to KOBINET, firm size, sector and regions. The final section treats the design of the field survey and the main characteristics of surveyed firms.

4.1 The Aim and The Context of the Case Study

The case study was designed to identify and explain the relationship between networks in regional and global levels and the innovativeness of firms and regions. Derived from this aim, the study is built around the networking and innovativeness themes. It is already argued that the innovation capacity and networks at regional and global levels are important at the emergence and sustainability of industrial regions. In the context of the thesis, networks are defined as new engines of economic development, and innovativeness as the main factor of development. In this study, different Turkish industrial regions have been handled in order to analyze similarities and differences with theoretical debate and world experiences with reference to network relations and innovation capacity.

The network and innovation experiences affected from regional and national development background as well as global conditions. For this reason comparative analysis of industrial regions in Turkey and the development stories of selected regions are analyzed in terms of innovative capacity and regional network relations. For the review of the development stories of sample regions the existing regional development studies on these regions are re-examined. Understanding development processes makes easier to analyze the relationship between networking and innovativeness in sample regions with reference to original field survey.

In this case, innovation and networking are scrutinized with reference to theoretical and empirical studies. It should be noted that there is lack of formal statistical data in

regional level in order to analyze networking and innovativeness. This situation requires the collection of original data through the field survey. Moreover, the lack of data is also relevant for time series data ant it was not possible to collect them through the field survey due to the time restriction of the thesis. In this study, the comparison is realized between the different regions with different characteristic in development and innovation processes.

In this case, the main subject of the analysis is "SMEs" and the regions are determined as the geographical scale of agglomeration of firms and other institutions. The main focal points are the regional, national and global network relations of SMEs with different agents and for different purposes, and their innovation activities. The findings help to explain the role of external networks for the innovative capacity of sample firms. The combination of firm information with the regional characteristics and development stories provide some findings about future development trajectories of sample regions. Additionally the findings may highlight alternative approaches to handle networking studies and to develop new hypothesis for the future regional development studies.

4.2 The Hypotheses of the Case Study

The main hypotheses of the case study are determined according to the findings of Chapter Two and Chapter Three. Besides comparison of three regions of Turkey, the study provides the chance to compare sample regions with different experiences from the world. The hypothesis could be grouped under three main titles that are similar to the main structure of the thesis. These three hypothesis groups are:

- Hypothesis about innovative capacity of firms,
- Hypothesis for analyzing different types of regional, national and global networks of firms,
- Hypothesis for revealing relationship between networking and innovativeness.

Innovativeness

Hypothesis: "Firm size, sector, quality of employees, R&D expenditure, capacity to use ICTs, as the internal capabilities of firms positively affect innovation activities of SMEs."

For this purpose, firms from different sectors and sizes are included in the field survey in order to examine the effects on innovation activities. Moreover, the share of qualified worker in total employment, R&D expenditure in total expenditure, computer number with Internet connectivity per worker, number of patent are taken in the last 3 years and total number of innovation activities in the last 3 years are examined through the questionnaire survey.

Networking

Hypotheses: "The smaller the firm, the higher the share of regional networks. Medium sized firms have more dense global linkages in accordance with small firms which has higher share of regional networks." Moreover, "firms from high-tech sectors have more dense global linkages according to firms from low-tech sectors."

On the other hand, "positive relationship exists between intense use of ICT (electronic networks) and the density of external networks of SMEs." "The increasing global networks affect the existing regional networks negatively." "As regards to types of networks, while vertical linkages are more dense in global level, horizontal networks are more dense in regional networks."

In the questionnaire, density of regional networks, density of national networks, and density of production, service, marketing and knowledge linkages in regional, national and global levels are scrutinized in order to analyze the related networking hypothesis.

Interrelationship between Networking and Innovativeness

Hypotheses: "There is positive relationship between density of networks and innovative activities."

"SMEs with dense regional linkages have more innovation activities than SMEs with weak regional networks." "SMEs with dense global networks have higher innovative activities than SMEs with weak global networks only."

"In innovation networks, horizontal linkages of firms are more important than vertical linkages." "Diversity in types and geographical levels of networks increases the density of innovative activities of firms"

In the case study, data is collected and tested according to these hypotheses. In order to examine the hypotheses questionnaire sheet is prepared with the similar structure with hypothesis. Therefore, questionnaire sheet is composed by two main parts: first part is related with indicators of innovation and innovation activities of firms, and the second part is related with network relations and innovation networks of firms (see Appendix A). After preparation of questionnaire, sample of this case are determined according to prepossess of the case study.

4.3 The Choice of the Sample

In the selection of sample, size, sector and region are the main determinants and in addition being a member of networks or not are important for the study. It is necessary that surveyed firms should have belongs to regional, national and global networks, and electronic networks in order to analyze the network relations. For this reason, it is assumed that subscribers of KOBINET as the members of electronic network use the ICTs effectively. Therefore, KOBINET membership or non-membership has been considered as the first limitation in the chose of sample.

In the hypothesis, sectoral, regional and size differences are important for both networking and innovative capacity of firms. For this reasons, determination of sample according to these groups have been discussed in this section.

4.3.1 The Choice of Firm Sizes, Sectors and Regions

In the theoretical and empirical discussions, SMEs are considered as new engines of innovativeness and development. Hence, the selection of SMEs is explained by the fact that, they are important components of regional development in Turkey. The other

reason is that they are expected to need more external knowledge and also have more external relations than large firms. Moreover, SMEs need to supplement their tacit knowledge with external codified knowledge, because they generally do not have their own R&D units. Therefore, the effects of external networks and new ICTs in external relations are more obvious in SMEs than that of large firms, which have many channels to increase their external relations.

So in the case part of the thesis, SMEs are chosen as the main actors and defined with 10 to 249 employees. This definition, corresponding with the definition of many European countries, makes comparison between SMEs in Turkey and SMEs in different countries. Micro firms with 0-9 employees and large firms with higher than 250 employees are not included in the sample of the case study. The focus group of the analysis is divided into two size groups in order to examine the effects of size of the firm in network relations and innovation activities. The two size groups are:

- small firms with 10-49 employees,
- medium firms with 50-249 employees.

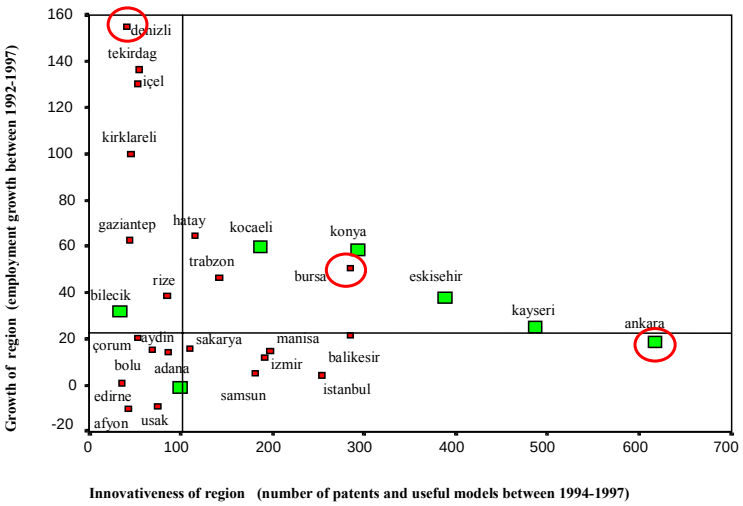

Figure 4.1 Selection of Regions according to employment growth and innovativeness

Source: Unpublished statistics of SIS, 1992 - 1997.
Unpublished data of Patent Institute, 1994-1997.

According to the theoretical part it is expected that firms in different regions may show different behavior in network relations and innovation activities due to effects of the regional entrepreneurial and institutional environment and historical background. It should be pointed out that the selection of the sample regions is not arbitrary. In the selection two variable are used: growth and innovative capacity of regions. In the selection of sample regions, first of all, regions, which have less than 0.5 % share in total manufacturing employees of Turkey, were excluded from the study. Among 81 provinces of Turkey, only 30 provinces take place over this threshold as leading regions of manufacturing. Next, these 30 cities are analyzed according to employment growth and innovativeness criteria. Employment growth between 1992-1997 is used as a proxy of growth and total patent numbers of four years between 1994-1997 is used as a proxy of innovativeness (Figure 4.1). In the next Chapter, growth and innovativeness of 30 industrial regions are analyzed in detail, and the place of sample regions among the industrial regions are examined.

In this analysis, there are four quadrants, and 30 regions are distributed among them (Figure 4.1). At the first quadrant regions have similar innovative capacity below Turkey average, but their employment growth are above national average, has highly differentiated. Among these regions, *Denizli* has the highest growth rate in Turkey. In the second quadrant, regions are winners in terms of employment growth and innovation capacity. Among the regions in this quadrant, *Bursa* has a medium position as regards to both growth and innovativeness. In the third quadrant, as the important metropolitan area centers of Turkey, *Istanbul, Izmir* and *Ankara* take place. Among the regions of this quadrant, *Ankara* has the highest employment growth rate and at the same time is the most innovative region of Turkey. The forth quadrant represents the losers among the 30 regions in terms of growth and innovativeness. In the case study, any region is not chosen from this group (Figure 4.1).

As an outcome of this analysis, *Ankara, Bursa* and *Denizli* are chosen as sample regions of the case study. In fact, these three regions exemplify different points of correlation of development and innovativeness:

- *Ankara* with its high innovative value and relatively low growth rate is named as *innovative region with low growth rate,*

- *Bursa* with its high innovative capacity and high growth rates is named as *innovative growth region.*

- *Denizli* with its low innovative capacity and high growth rate is named as *growth region with low-innovative capacity,*

The choice to conduct an analysis in different sectors of economy is necessary in order to search whether sectoral conditions influence the density and frequency of network relations and innovativeness capacity of firms, or not. A difference is expected between high technology and low technology sectors in terms of network relations and innovation activities. In the literature different sectoral grouping exist according to technology usage. Chemicals, electric and electronic, fibres manufacture, instrument engineering, mechanical engineering, motor vehicle engineering and office machinery are grouped as high-tech sectors. On the other hand, food manufacturing, footwear and clothing, furniture, metal manufacture, non-metal manufacture, printing, publishing, rubber-plastic, and textile are grouped as low technology sectors (Gortz and Braun, 1997, Romijn and Albu, 2002, Lyson, 2000). In this study, the sectors are divided into two groups:

- *High technology sectors:* Machinery, equipment, appliances, apparatus and associated products. Motor vehicles, trailers and vehicle parts. Office and computing machinery, equipment and supplies. Electrical machinery, apparatus, equipment and consumables. Radio, television, communication, telecommunication and related equipment and apparatus. Medical and laboratory devices, optical and precision devices, watches and clocks, pharmaceuticals and related medical consumables.

- *Low technology sectors:* Food products and beverages. Textiles and textile articles, clothing and footwear.

In sum, SMEs that belong to high technology and low technology sectors are chosen in three sample regions, Ankara, Bursa and Denizli. Besides, the other important indicator in the choice of sample is the KOBINET as the electronic networks of SMEs in Turkey.

4.3.2 The Choice of KOBINET: Meaning for SMEs and Development

In hypothesis, ICTs are considered as an important device for external networks. In the light of this, subscribers of KOBINET, which is an electronic network program of KOSGEB, are taken as the sample of the empirical analysis. The reasons for the choice of the KOBINET, as the basis for the empirical analysis in Turkey are threefold:

- This network is devoted to the development of SME networks at national and global level.

- The other reason is that many ICT services and infrastructure (such as web page, e-mail, e-commerce) are provided by public institution (KOSGEB), as free of charge. Moreover, every firm with computer and phone line has the right to join this network.

- The third reason is that this network is devoted to integrate SMEs of lagging regions into national and global networks.

KOBINET provides web-side, e-mail address, and open knowledge bank services for every subscriber. Moreover, this institution wants to improve production, investment and technological alliances between subscribers and foreign firms. In addition, European Knowledge Center in KOSGEB is the mediator institution for SMEs in Turkey in order to support e-commers within the e-Europe and goDigital projects. For these projects, the aim of KOBINET is to improve the information and communication infrastructures of SMEs in Turkey.

In the geographical distribution of KOBINET members, *Istanbul, Izmir* and *Ankara* have the highest share of subscribers in Turkey. *Bursa, Denizli, Konya, Gaziantep* and *Kayseri* as the new growth regions follow them. Although close regions to metropolitan centers have important manufacturing capacity, for example *Manisa, Izmit, Tekirdağ, Sakarya*, their KOBINET membership is dramatically weak according to their manufacturing capacity (Figure 4.2).

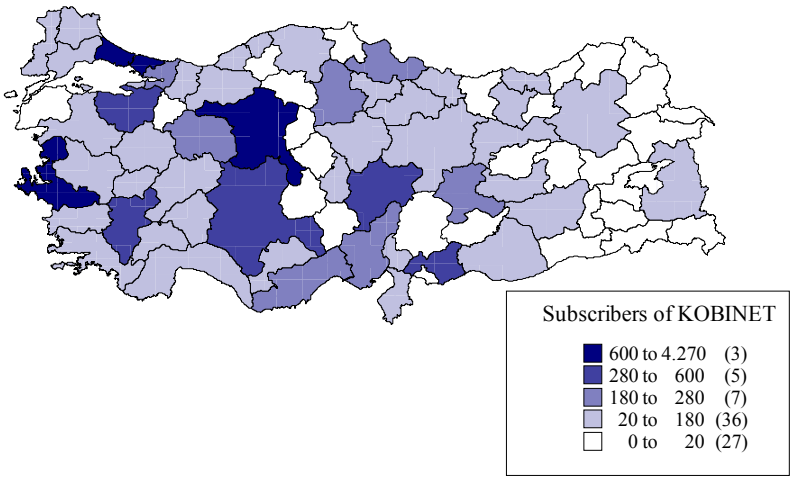

Figure 4.2 Geographical Distribution of Subscribers of KOBINET
Source: www.kobinet.org.tr (February 2003)

In particular, within the KOBINET the analysis concentrates on Ankara, Bursa and Denizli regions, where a sample group of SMEs is interviewed. In order to analyze the effects of being and not being a member of an electronic network, firms that are not member of KOBINET are also included in the case study.

Table 4.1 Share of KOBINET Subscribers in Total Firms of Region

REGIONS	SECTORS	ENTIRE REGION			KOBINET SUBSCRIBERS		
		Total	Small	Medium	Total	Small	Medium
ANKARA	High-tech (30-29)	232	172	60	191	143	48
	Low-tech (15-17-18)	171	123	48	68	46	22
	Total	**403**	295	108	**259**	189	70
BURSA	High-tech (30-29)	197	119	78	115	80	35
	Low-tech (15-17-18)	391	187	204	89	53	36
	Total	**588**	306	282	**204**	133	71
DENİZLİ	High-tech (30-29)	41	33	8	14	11	3
	Low-tech (15-17-18)	303	203	100	60	37	23
	Total	**344**	236	108	**74**	48	26
TOTAL		**1335**	837	498	**537**	370	167

Source: Unpublished statistics of SIS, 1997
KOBINET data bank. www.kobinet.org.tr/ February 2003

Ankara, Denizli and Bursa as sample regions of the study have high rang in Turkey as regard to total number of manufacturing firms and KOBINET subscribers (Figure 4.1). In Ankara, 64 percent of firms are members of KOBINET. This percentage is lower in

Bursa with 35 percent. In Denizli, subscribers of KOBINET could not represent the whole region with only 21 percent. In the sum of three regions, representation rate of KOBINET in total is 40 percent. The share of KOBINET is higher in high-tech sectors according to low-tech sectors. On the other hand, participation rate of small firms is higher than medium firms (Table 4.1). Therefore, KOBINET members in related firm size, sectors and regions are defined as sample environment. In addition to KOBINET subscribers, in order to determine non-subscriber firms, list of members of Chamber of Industry and Commerce are used. On the other hand, all of the KOBINET members have the Internet addresses, and therefore, all of them are included in the field survey.

4.4 The Design and Sample Size of the Field survey

Because of the absence of systematic firm data, field study became necessary in order to examine the network relations and innovativeness of sample firms. The methods of data collection, used in this study, are telephone and Internet survey and face to face in-depth interviews in Ankara, Bursa and Denizli. The limited number of in-depth interviews provides general idea about regional network relations, leading firms, regional production environment and entrepreneurial characteristics.

The data is represented by primary data, collected via questionnaire survey with subscribers and non-subscribers of KOBINET. The questionnaire survey is conducted in three different regions: Ankara as innovative non-growth region, Denizli as non-innovative growth region and Bursa as innovative growth region in Turkey. The questionnaire is used to gather information about the usage of KOBINET and other electronic networks, density and frequency of regional, national and global linkages and reasons of choosing local or global networks, innovation indicators and innovative activities in selected regions.

In Ankara, Bursa and Denizli in related sizes and sectors, subscribers of KOBINET with e-mail addresses and fax numbers are listed for the field study. In addition to KOBINET subscribers, the data of regional Chamber of Industry and Commerce is used as a sample of non-subscriber firms. The firms' e-mail addresses, telephone numbers, name of managers and fax numbers listed according to related sectors and firm sizes for the KOBINET subscribers and members of Chamber of Industry and Commerce. Firms without telephone and fax numbers removed from the lists.

The survey is realized through Internet (e-mail) Fax and telephone. Besides sending questionnaire, managers of the firm are called by telephone in order to explain theme of study and questionnaire sheet. A total of 131 firms completed the questionnaire in the period between 23 March 2003 and 15 June 2003.

Table 4.2 Results of the Questionnaire Survey according to Regions.

	ANKARA		BURSA		DENİZLİ	
	number	%	number	%	number	%
Completed questionnaires	74	22.3	32	11.4	27	12.7
Unconnected entrepreneur	103	31.0	58	20.7	39	18.5
No response from the entrepreneur	142	42.8	173	61.8	140	66.0
There are no production for a time	8	2.4	11	3.9	4	1.9
Completed questionnaire but invalidated	5	1.5	6	2.2	2	0.9
Total	*332*	*100*	*280*	*100*	*212*	*100*

In both lists of KOBINET and Chamber of Industry and Commerce there are 332 firms with telephone number and Internet address or fax number in Ankara. This value is 280 firms in Bursa and 212 firms in Denizli (Table 4.2). These firms also belong to the related firm sizes and sectors. In these lists, addresses and telephone numbers for some firms are incorrect, so these entrepreneurs could not be reaches. The rates of unconnected entrepreneurs are very high in all regions. In some cases although fax or e-mail is sent, the entrepreneurs did not respond, and they could not be reached through the phone. In other words, they reject participating to this survey. The share of this situation is 42,8 percent in Ankara, 61,8 percent in Bursa and 66,0 percent in Denizli. Some entrepreneurs reported that they had stopped their production since the economic crisis. On the other hand, some questionnaires are invalidated, as they have been partially completed. The share of completed questionnaire has the highest degree in Ankara with 22,3 percent, Denizli is the second region with 12,7 percent and Bursa has 11,4 percent (Table 4.2).

Table 4.3 represents the basic characteristics of surveyed firms. Although the definition of SMEs at the case study includes all firms with less than 249 employees, most of the small firms could be described as small firms with 10-49 employees. In Bursa and Denizli most of the firms belong to high-tech sectors, but in Denizli most of firms belong to low-tech sectors especially to textile and clothing. It could be seen

from Table 4.3 that surveyed firms are not equally distributed among regions, firm sizes and sectors.

Table 4.3 Main Characteristics of the Sample.

REGIONS	COMPLETED QUESTIONNAIRE						
	SECTORS	Total		Small size		Medium size	
		number	%	number	%	number	%
ANKARA	High-tech Sector	56	42,7	43		13	
	Low-tech sector	16	12,2	13		3	
	Total	**72**	**54,9**	**56**	**42,7**	**16**	**12,2**
BURSA	High-tech Sector	19	14,5	13		6	
	Low-tech sector	13	9,9	10		3	
	Total	**32**	**24,4**	**23**	**17,5**	**9**	**6,9**
DENİZLİ	High-tech Sector	4	3,1	2		2	
	Low-tech sector	23	17,6	14		9	
	Total	**27**	**20,7**	**16**	**12,3**	**11**	**8,4**
TOTAL		*131*	*100*	*95*	*72,5*	*36*	*27,5*

Specifically, 824 small and medium sized manufacturing firms are surveyed, generating 131 useable responses with a total of 15,9% response rate. The sample firms are distributed among three regions unequally as: 72 firms from Ankara, 32 firms from Bursa and 27 firms from Denizli. In Ankara, 56 firms belong to high technology sectors, and 16 firms belong to low technology sectors. In Bursa, distribution of firms to the sectors is more equal, 12 firms are in high technology sectors and 19 firms in low technology sectors. In Denizli 27 firms are included, among them only 4 firms are in high-tech sectors as 23 firms are in low-tech sectors. In Denizli the share of firms in low technology sectors is extremely higher than other sample regions. These proportions among sectors also reflect the real sectoral pattern of sample regions (Table 4.3).

After discussing the methodology of the case study, in following chapters the findings of literature survey about regional development of sample regions and the results of the field survey will be analyzed. In the following Chapter, the evolution of three sample regions with reference to regional network relations and innovative activities will be handled and comparison will be made. Afterwards, the data gathered through the field survey will be analyzed in a comparative perspective.

CHAPTER 5

INDUSTRIAL DEVELOPMENT AND TRANSFORMATION IN ANKARA, BURSA AND DENİZLİ

Before analyzing the data of the field survey, in this Chapter the role and position of sample regions in the changing industry of Turkey is scrutinized. Moreover, industrial development and transformation processes in Ankara, Bursa and Denizli are evaluated. Within the transformation process, changing regional networks, regional collaborative environment and regional innovation capacities are analyzed. The objective of all these discussions is to provide the necessary base to understand the behavior of SMEs in the innovation networks.

There has been a tendency of polarization in Turkey for a long time in which some metropolitan regions have been dominant in the manufacturing industry. However, the structure of polarization has been changing in recent years as some new growth regions have emerged out of the metropolitan areas increasing their share in national manufacturing activities. This unexpected success has attracted the attention on new growth regions. Among them, Denizli has the most important position due to the remarkable success in textile production and export. At this changing industrial geography of Turkey, Denizli, Bursa and Ankara represent special industrialization processes and are selected for the case study.

Ankara, which is the metropolitan area and the capital of Turkey, has mostly specialized on national services since the foundation of republic. The manufacturing sectors, on the other hand, have played secondary role in the regional economy. However, in recent years, among manufacturing sectors engineering industries,

machinery, defense industry, electronic and software have increased. Although the innovative capacity in Ankara is high, the growth capacity is lower than new growth regions. In recent years, Ankara is described as a high-tech industrial region in its early stages of development. In other words, Ankara represents the *innovative regions with low growth rate* in this study.

The other sample region is Bursa, which is the traditional center of textile and automotive industry. This region is in the later stages of economic development compared with new growth nodes. Moreover, according to the capacity of manufacturing and export activities, Bursa seems to be one of the most promising regions. Both growth rate and innovative capacity are above the country average, and for this reason, Bursa represents the *innovative growth regions* in this thesis.

Denizli as the last region of this case is considered as the miracle of export times in Turkey. Employment and SME number in Denizli is as high as that in metropolitan provinces. Moreover, since the 1990s Denizli has been the first region in the country according to rapid growth in employment and export. However, the innovative capacity of the region is not as improved as its growth capacity. Thus, Denizli represents the *growth regions with low* i*nnovative capacity* in Turkey in this case.

Consequently, in this Chapter, changing industrial geography in Turkey is redefined, and within this geography, new and traditional industrial regions are analyzed comparatively. Than the development processes of the three sample regions in light of the information obtained from the existing regional development studies and interviews, realized during the field survey are studied. Within this context, industrial development stories, innovation and networking in the sample regions are discussed. Thus this chapter provide the necessary frame to scrutinize the results of the field survey in the following Chapter with reference to the industrial development stories of sample regions.

5.1 The Comparative Analysis in Industrial Regions in Turkey

In the 1970s, neo-classical liberalism helped to push the political agenda of the first world away from statism. With the rising free market ideology, the role of state in the economy has reduced, and the role of the market and competitiveness have been re-emphasized (Bruton, 1998). The competitive environment seems to be leading to

increase inequalities and create losers as well as winners in the globalisation era. Under the highly competitive conditions, some less developed regions, which have been called as new growth nodes from different parts of the world, could catch up the success regions.

In early stages of the republic, the main objective of the new Turkish State was an inward oriented national economy. Until the 1980s, under the inward oriented economy, regional economic growth had mainly depended on the income redistribution and welfare policies of the state. During this era of inward oriented policies a few number of metropolitan regions dominated the industrial production in Turkey (Eraydın, 1999). This result show that welfare and redistribution policies of republic could not reach the success in terms of equally distributed industry in the country.

After 1980s, it is not surprising that Turkey has been effected from the economic and industrial transformations in the world. It became difficult to sustain interventionist state policies within the context of globalisation and the state led development strategies to be substituted by market directed and export oriented policies (Boratav, 1988). In 1984, with the structural regulations that ease the foreign trade, production environment became more competitive. New incentives and institutional support have been provided in order to integrate global markets not only for large firms but also for small and medium sized firms.

Under the effect of neo-liberal policies and changing global conditions, existing industrial geography of Turkey has started to change. In the national geography, while the share of traditional industrial regions in the national manufacturing has decreased; some relatively less developed regions have displayed a remarkable increase in manufacturing and in export activities under the conditions of 1980s. In 1971, the share of four metropolitan area centers in the country (Istanbul, Izmir, Ankara and Adana) was 64,64 percent in the manufacturing. In 1985 this value falls to 63,46 percent and in 1997 this share decreased to 58,85 percent. As a result, some other artisanal places also show some degree of progress and become visible in the country. These new growth regions not only effect national industrial geography, but also show the local potentials of regions outside the major industrialized centers of Turkey (Eraydın, 2002, Pınarcıoğlu, 2000). In addition to the macro economic policies, the entrepreneurial spirit and the historical and cultural accumulations together increase

the growth and export capacity of these regions. Therefore, they become important in the national economic geography.

5.1.1 Comparison of Industrial Regions According to Employment Growth and Export Capacity

In this section, as the important indicators of development, employment growth, SME growth and export capacities of industrial regions are analyzed and place of sample regions in the industrial geography of Turkey are defined. In order to realize the comparative analysis of industrial regions; regions with less than 0,5 percent share in national manufacturing are excluded from the analysis. It has also been emphasized in the methodology chapter that among 81 regions of Turkey only 30 regions could pass over this threshold. Moreover, 30 regions constitute nearly 91 percent of manufacturing employment capacity of Turkey.

Table 5.1 represents the employment growths by regions, which has the share more than 0.5 percent in manufacturing activities of Turkey. Among these relatively more industrialized regions, some regions demonstrate greater growth performance in number of establishments, number of SMEs, and employment than others. Among these growth regions some of them are named as Anatolian Tigers, or new growth nodes. *Denizli, Kahramanmaraş, Gaziantep, Konya, Kayseri* and *Çorum* are well-known new growth regions in Turkey. Between 1992 and 1997, among them *Denizli* represented the highest growth rate in SMEs. Within this period number of employment in SMEs (10-249 employees) reached from 6799 employees to 17359 employees with 168 percent growth rate in *Denizli*. It has also been discussed that this high growth capacity of Denizli is one of the selection reasons for the case study. *Bursa* as the second sample region, is the tenth region in Turkey with 50,66 percent SME growth rate between 1992 and 1997 (Table 5.1). *Bursa* as a traditional industrial center, displays employment growth rate as high as new growth nodes in the same period. SME growth in *Ankara* is lower than Denizli, Bursa and also Turkey average with 20,34 percent.

Table 5.1 Employment Growths in Industrial Regions in Turkey between the 1992 – 2000

Level in Turkey	Regions	Employment Growth in SMEs 92-97 (%)	Level in Turkey	Regions	Total Employment Growth 92-97 (%)	Level in Turkey	Regions	Total Employment Growth 97-00 (%)
1	**DENIZLI**	**155,32**	**1**	**DENIZLI**	**146,47**	**1**	**DENIZLI**	**18,18**
2	Tekirdağ	136,76	2	Şanliurfa	346,32	2	Kırklareli	17,18
3	İçel	130,10	3	Tekirdag	95,88	3	Bolu	11,29
4	Kırklareli	100,36	4	Kırklareli	94,62	4	Gaziantep	7,52
5	K.maras	67,62	5	Sakarya	67,13	**5**	**ANKARA**	**7,18**
6	Hatay	64,83	6	Gaziantep	65,24	6	Tekirdag	6,15
7	Gaziantep	62,71	7	Edirne	61,21	7	Manisa	4,44
8	Kocaeli	61,39	8	K.maras	48,93	**8**	**BURSA**	**4,11**
9	Konya	60,08	9	İçel	48,87	9	Kayseri	-1,64
10	**BURSA**	**50,66**	10	Kayseri	36,93	10	K.maras	-3,78
11	Trabzon	46,75	11	Usak	36,82	11	Kocaeli	-4,48
12	Eskisehir	39,60	**12**	**BURSA**	**32,67**	12	Istanbul	-9,27
13	Antalya	38,87	13	Bolu	28,70	13	Çorum	-13,49
14	Rize	38,70	14	Kocaeli	21,24	14	Eskisehir	-13,57
15	Kayseri	23,82	15	Aydin	20,01	15	Adana	-17,69
16	Balikesir	21,76	16	Izmir	18,49	16	Balikesir	-18,10
17	Çorum	20,65	17	Çorum	17,36	17	İçel	-18,80
18	**ANKARA**	**20,34**	18	Eskisehir	12,87	18	Aydin	-22,04
19	Sakarya	15,73	19	Manisa	9,70	19	Antalya	-23,71
20	Bolu	15,20	20	Istanbul	8,12	20	Edirne	-23,75
21	Manisa	14,76	**21**	**ANKARA**	**7,77**	21	Izmir	-23,93
22	Aydin	14,70	22	Balikesir	7,21	22	Konya	-24,78
23	Izmir	12,02	23	Antalya	5,22	23	Usak	-26,39
24	Samsun	5,32	24	Trabzon	-1,99	24	Sakarya	-29,51
25	Istanbul	4,41	25	Konya	-5,71	25	Afyon	-44,61
26	Edirne	1,05	26	Adana	-12,70	26	Trabzon	-45,57
27	Adana	0,63	27	Afyon	-16,00	27	Samsun	-56,61
28	Usak	-8,93	28	Hatay	-19,49	28	Hatay	-65,19
29	Afyon	-9,92	29	Rize	-27,32	29	Şanlıurfa	-77,10
30	Şanliurfa	-90,07	30	Samsun	-28,58	30	Rize	-89,75
	Turkey average	*23,08*		*Turkey average*	*21,04*		*Turkey average*	*-15,01*

Source: Calculated from unpublished statistics, SIS

Similar to employment growth in SMEs, as regards to total employment growth, Denizli is the first rank region in Turkey with 146,47 percent growth rate. The rank of Bursa regressed to twelve from ten. This regression is also valid for Ankara. With 32,67 percent growth rate, Bursa takes place over the country average. However, employment growth rate of Ankara is dramatically blow the Turkey average with 7,77 percent. The growth rate of Istanbul and Izmir as other important metropolitan centers was higher than Ankara between 1992-1997 years.

At the end of 1990s and in the 2000s economic growth reveal different composition due to the economic crisis. Table 5.1 reveals that employment growth rates turn to negative value in the country with negative 15,01 percent average between 1997 to 2000. Moreover, in this period while total manufacturing employment became smaller in the country, eight regions sustain their positive employment growth rates. Although employment growth rate of *Denizli* has dramatically decreased from 146 percent to 18 percent, Denizli maintains its leading position in the country as regard to employment growth. This growth capacity in the crisis era reveals that the success of newly growth regions is not temporary. On the other hand, in contrast to general decreasing tendency of metropolitan industrial centers, *Ankara* and *Bursa* show a positive growth rate. Between them especially *Ankara,* the fifth region in the country, sustains a growth success with 7,18 percent employment growth rate. This growth rate represents the transformation of economy from service base to industry base. The reasons and characteristics of this growth are analyzed in detail in the following section of this Chapter.

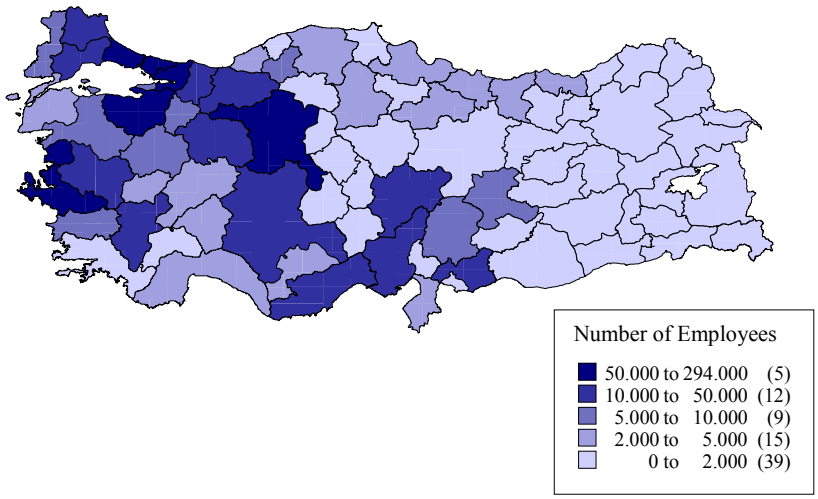

Figure 5.1 Number of Employees in Manufacturing Sectors in Turkey, 2000.

Source: Unpublished SIS manufacturing data.

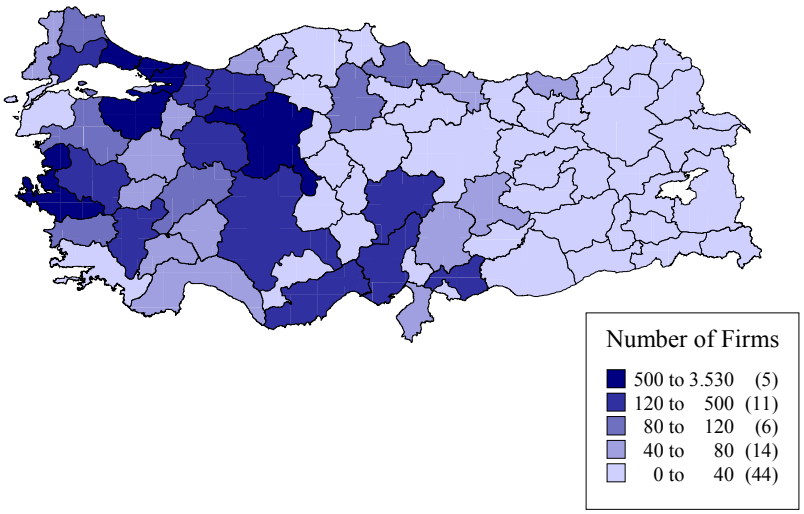

Figure 5.2 Number of Small and Medium Sized Entrepreneurs in Manufacturing Sectors in Turkey, 1997

Source: Unpublished SIS manufacturing data.

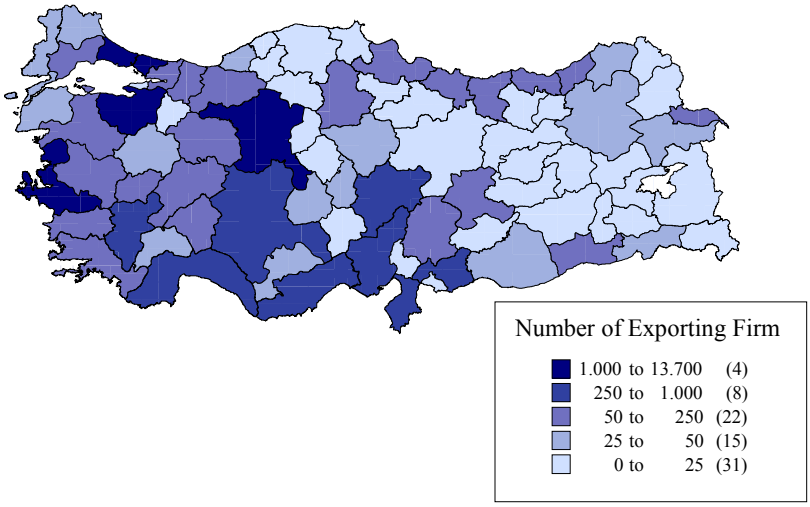

Figure 5.3 Number of Export Firms by regions (2001)

Source: Unpublished SIS manufacturing data.

After analyzing growth capacities, contemporary industrial geography of Turkey is studied. According to distribution of employment in manufacturing industry, *Istanbul, Izmir, Ankara, Bursa* and *Kocaeli* are first rank cities with more than 50.000 employment capacity according to annual manufacturing statistics of SIS in 2000. As new growth nodes, *Denizli, Içel, Kırklareli, Gaziantep, Konya, Eskişehir* and *Kayseri* have more than 10.000 employees and have an important position in the contemporary industrial geography of Turkey (Figure 5.1). It could be concluded that besides traditional industrial regions, new industrial nodes gain importance in the national manufacturing. In the number of SMEs, Istanbul and Izmir are first rank regions with more than 1000 establishments. Moreover, Ankara, Bursa and Denizli as the sample regions belong to same category and have 300-1000 establishments (Figure 5.2).

In the global integration period, besides regional resources and potential, state policies that support export of firms gain importance. Moreover, it is obvious that after 1980s central government started to support the SMEs, which are accepted as important agents of export oriented regional development. As a result of export oriented policies of 1980s, new growth nodes integrate into global markets rather than national markets in the 1990s. With the economic recession the export growth in industrialized regions become smaller in the end of 1990s. However in the crisis, new growth regions continued their export activities. Within this geography *Istanbul* is the leading region with 13700 export firms and *Izmir, Bursa* and *Ankara* follow *Istanbul* in terms of export capacity. Figure 5.3 also illustrates that *Denizli, Gaziantep, Kayseri* and *Konya* as new growth regions that take place above the country average in export capacity with 250 to 1000 export firms. Ankara, Bursa and Denizli, as the samples of the case study, have an important position with reference to employment growth and export capacity in the country. In these analysis Denizli is the leading region in growth capacity but according to values in employment and export capacity Denizli follows Ankara and Bursa.

5.1.2 Distribution of Engineering and Textile Industries in Turkey

The high growth rates in employment and export have realized especially in flexibly organized and labor-intensive sectors. With the effects of neo-liberal policies the role of labor unions and the real wages index has reduced dramatically in Turkey. Under these circumstances, labor intensive sectors gain cost advantages in the global markets

(Pınarcıoğlu, 1998, Erendil, 1998), and industrial regions specialized in labor intensive sectors could integrate into global markets. Therefore, in the 1980s in Turkey the rising sectors are generally craft-based sectors; *Denizli*, which claimed to be the leader among new growth nodes, specialized on textile; *Gaziantep* specializes on textile and food, *Çorum* specializes on brick, and *Bursa* specialized on textile and automobile parts (Köse and Öncü, 1998). In addition, textile and clothing, and machinery sectors, as the core sectors of the case study, are analyzed in this section.

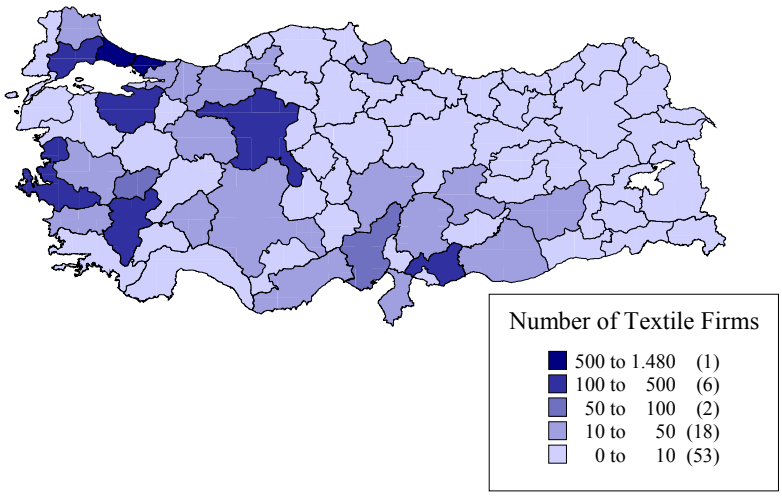

Figure 5.4 Number of Textile and Clothing Firms by Regions in Turkey, 2000
Source: Unpublished SIS manufacturing data.

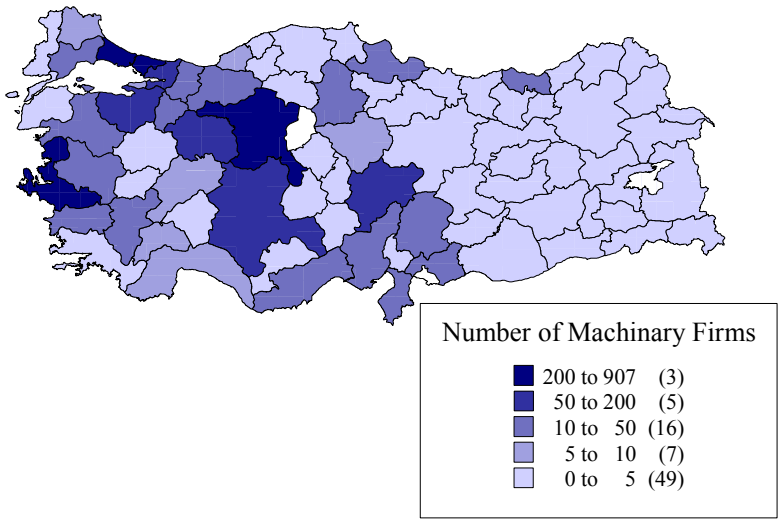

Figure 5.5 Number of Firms in Machinery Sector by Regions in Turkey, 2000.
Source: Unpublished SIS manufacturing data.

Istanbul is the first rank region in Turkey as regards to textile and clothing sectors. Moreover *Edirne, Tekirdağ* and *Kırklareli* show some development in textile activities but this stems from the expansion of Istanbul's textiles. Besides Bursa and Izmir, *Denizli* and *Gaziantep* seem to have been most promising in terms of employment and value added in the 1990s. Figure 5.4 shows that most of the new growth nodes are specialized in textile and clothing industries as the labor-intensive craft based sectors. On the other hand, *Adana* started to lose its attractive position as the traditional industry center in the 1990s. According to population census of 2000, Adana stays behind textile employment capacity of the Denizli and Gaziantep. However, in the 1950s *Adana* was an important manufacturing center, in which private textile establishments created value added nearly half the *Istanbul* level but two and a half times more than those of *Bursa* (Pınarcıoğlu, 2000). All sample regions (Ankara, Bursa and Denizli) of the case study are leading textile regions in the country and take part in the first rank group with 500 to 1480 establishment in textile industry.

Engineering, on the other hand, is one of the most important sectors in the economy of Turkey. In terms of employment Istanbul, Ankara and Izmir are dynamo regions for engineering sector that have the highest number of employees in the country (Figure 5.5). Çorum, Kahramanmaraş, Gaziantep and Denizli, as new growth regions, hold 10 to 30 establishments in machinery sector and take place in the third group. The figures represent that machinery is the secondary sector for the new winners of 1980s. Therefore, Ankara as the sample region has an important engineering capacity and takes place in the first group with Istanbul and Izmir regions. Bursa is in the second rank group, which include 50 to 200 establishment and Denizli has lower engineering capacity with 10 to 50 establishments (Figure 5.5).

5.1.3 Comparison of Industrial Regions according to Innovation Capacity

The geography of innovation is important in order to understand the innovation capacity of sample regions with reference to other industrial regions of Turkey. In order to analyze the innovation geography of Turkey numbers of both patent and useful model are used in this part. In many studies, patent numbers have also been taken as the proxy of innovative capacity of firms and regions (Arndt and Sternberg, 2000, Freel, 2002). Figure 5.6 illustrates that during the last 4 years period, 23

provinces among 80 provinces of Turkey has not taken any patent. It is not surprising that *Istanbul, Ankara, Izmir* and *Bursa* with more than 100 patent numbers are the leading regions in the country according to innovation capacity. In the methodology Chapter, it is analyzed that Ankara is selected for the case study as the most innovative region in Turkey. Moreover, Bursa takes place in the first group as regards to patent number. As seen from the Figure 5.6, although *Gaziantep, Kahramanmaraş, Çorum* and *Denizli* have important position in employment and export capacity, they could not show similar remarkable performance in innovation activities. Among these regions, Denizli as one of the sample regions represents the growth regions with low innovation capacity.

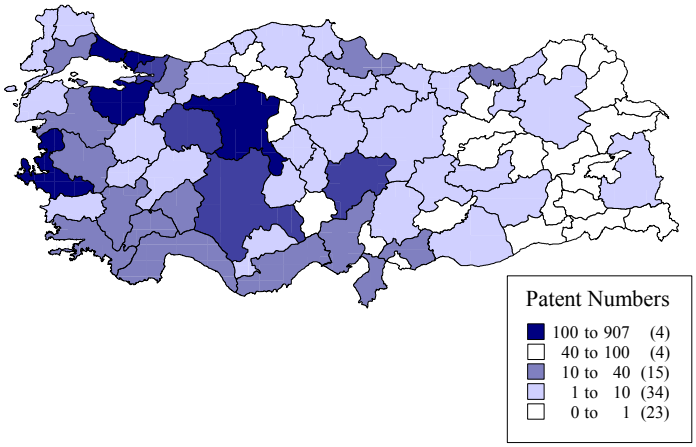

Figure 5.6 Patent Numbers by Regions (1997-2000)
Source: Unpublished data of Turk Patent Institute

It has already been discussed that many industrial regions depend on SMEs, which are specialized on traditional sectors such as textile and clothing industries. The study of Taymaz (2001) about national innovation system (NIS) of Turkey shows that chemical industry is the most innovative sector and engineering follows the chemical sector. On the other hand in Turkey the least technological innovations have occurred in textile and clothing sectors. Similar to Turkey there are many recent experiences approving this result about innovative capacity in different countries (Koschatzky and Bross, 2001, Romijn and Albu, 2002).

SMEs are less innovative actors than the large firms, as SMEs generally do not have their own R&D expenditures and departments (Taymaz, 2001). Moreover, in Turkey R&D activities, as one of the most important innovation factors, is less than the R&D activities in developed countries (Taymaz, 2001). In the light of these arguments it is not surprising that the number of patent, in other words the level of technological innovation, is very low in new growth regions.

It is generally accepted that at product and process development R&D plays an important role. In the sample regions, most of the entrepreneurs report that even without formal R&D unit they are capable to innovate. This is related with the changing perception of innovation during the last decades. With the criticism of linear innovation models, broader viewpoint with respect to innovation process, which also includes social and relational perspective, comes into agenda. In this context, besides technological innovation, organizational and management innovations are also possible. On the other hand, besides radical innovations, some improvements on the product and process are also included in the innovation context. It is not surprised that within this broader perspective number of innovations in firms have also increased.

Many studies about industrial regions show that the main sources of innovation in these regions are '*imitation'* and '*practicing ideas developed by leading firms'* (Eraydın,1999, Erendil, 1998, Pınarcıoğlu, 2000, Varol, 2002). The design of product is generally taken from foreign customer or imitated by regional firms. It has already been discussed that both national and foreign fairs are important spaces to imitate new products. In addition, relatively large leader firms are the important agents to imitate for other SMEs in region (Eraydın, 2002). The study of Taymaz (2001) indicates that in the production process suppliers and customers are also seen as important sources of innovation. The study has grouped the factors that obstruct the innovation activities as: high cost of innovation, high risk, and lack of necessary financial sources (Taymaz, 2001). For SMEs, the lack of skilled employees is also other important restriction to innovate. It is obvious that imitation in the innovation process reduces the cost of innovation, which are more suitable for the limited financial capacity of SMEs.

In the following part of this Chapter development processes of sample regions are analyzed with reference to networking and innovativeness. As discussed in the beginning of the Chapter Ankara, Bursa and Denizli represent different type of

clusters, which have experienced different development, networking and innovation processes.

5.2 Industrial Development in Ankara as an Innovative Region with Low Growth Rate

Ankara is the capital of Turkey with 3.540.520 city population according to the population census of 2000. Although Ankara is the capital of Turkey, until the recent years industrial capacity of region has not been as improved as in Istanbul and Izmir. However, in recent years development has been observed in the industrial investments in Ankara, where there is two organized industrial zones: Sincan and OSTİM, which provide the necessary infrastructure for industrial development. In addition new industry areas, which provide some clues about industrial improvement, have been planned in Ankara. Many firms in the field survey have emphasized that "*Ankara became more attractive for newly emerged entrepreneurs and for industrial investments especially after 1999 Marmara earthquake*". The manufacturing industry statistics in 2000 supports this idea that the number of manufacturing establishments have been increased between 1997 to 2000 period. In addition to organized industrial zones, the number of electronic, software and hardware establishments have increased in the city center.

Evolution of industry in Ankara

The number of manufacturing employees in Ankara has the tendency to decrease in 1990s, however this figure was different in 1970s and 1980s. In 1971, 31717 people were employed in manufacturing, the share of which is 5.51 percent in Turkey. The share of Ankara in Turkey reached to 5,47 percent in 1983 and to 5,72 percent in 1988. With this share Ankara is the fifth region in the country, after Istanbul, Izmir, Kocaeli and Bursa regions. In 1992 manufacturing firms in Ankara, which employed more than 10 employees, includes 44438 employees. This value reached to 47893 in 1997. The share of Ankara in total employment potential of Turkey decreased from 4,51 to 4,02 in this period. On the other hand, the firm number decreased in this period from 683 to 609 (Table 5.2). In 1992 manufacturing firm potential constitutes 6,09 percent of Turkey which has decreased to 5,32 percent in 1997.

Table 5.2 Number of Establishments and Employees in Ankara according to Firm Size and Sectors (1992-2000)

	Firm Size	Number of Firm			Number of Employee		
		1992	1997	2000	1992	1997	2000
Manufacturing	10 _49	543	435		10619	9978	
	50 _249	104	138		10999	16038	
	250+	36	36		22820	21877	
	total	683	609	824	44438	47893	51332
	Share in Turkey	6,09	5,32	7,60	4,51	4,02	5,12
Food	10 _49	140	76		2153	1316	
	50 _249	19	18		2212	2588	
	250+	7	6		4878	3107	
	total	166	100	100	9243	7011	4818
	Share in Turkey			6,47			3,93
Textile and Clothing	10 _49	60	49		1264	1193	
	50 _249	7	25		666	2401	
	250+	3	5		1391	1731	
	total	70	79	102	3321	5325	7644
	Share in Turkey			3,01			2,03
Engineering	10 _49	199	172		4268	4268	
	50 _249	41	50		4422	5768	
	250+	17	20		12742	14610	
	total	257	242	344	21432	24646	23513
	Share in Turkey			13,12			10,35

Source: Annual Manufacturing Industrial Statistics of SIS (unpublished data). *Note*: Private establishments, which have more than 10 employees have been included in the Table 5.2. Within this table ISIC Rev.2 has been used due to the 1992 and 1997 statistics were analyzed according to this classification.

From 1997 to 2000 years, number of manufacturing firms and number of employees have increased in Ankara region. On this period the share of Ankara in Turkey has increased sharply as regards to number of firms and employees. Although there were decreasing tendency in Turkey generally, Ankara sustained its position in the country as the fifth city in 2000.

Within the context of the thesis, three sectors are analyzed in the sample regions: food, textile and engineering. Among these sectors, while engineering has an important position, the shares of food and textile are really low in Ankara. In 1997 employment in engineering sector constituted half of the total manufacturing employees (Table 5.2). The share of Ankara in engineering sector in Turkey is also actually high (above 10 percent) according to other manufacturing sectors (Table 5.2). In Ankara, during the emergence of leading sector, public institutions and their factories, such as Institution of Machinery and Chemistry Industry (MKEK), have played an important

role and have increased the share of engineering sector. Moreover, these factories required a large amount of subcontracting relations that has caused the foundation of many new small firms. Hence, the tendency towards SMEs has continued during the 2000s and the number of small firms has increased in Ankara. In other words, as in 1997 the average machinery firm size was 79 employees, this value decreased to 62 employees in 2000.

It is interesting to note that between 1992 and 1997 textile industry has greater growth potential as reference to firm number and employment than food and engineering sectors (Table 5.2). This tendency has continued during the 1997-2000 period, within which the number of textile firms reached 102 in Ankara with 3,01 percent country share. However the employment share is 2,03, and this shows that textile firms are relatively small. In sum, in Ankara, the share of small firms (10-49) is higher than the share of both medium and large firms (Table 5.2). On the other hand, the small firms have decreased between 1992-1997, as regards to employment and number of establishments. However, between the 1997-2000 the small firms have gained importance.

Table 5.3 Export Capacity of Ankara in Manufacturing Sectors between 1989-2001.

	Total Export in Manufacturing Sectors (1000 US $)	Export in engineering sector (1000 US $)	Engineering exports /Total manufacturing exports (%)	Engineering exports of Ankara /those of Turkey (%)
1989	97100	31583	32,53	4,32
1992	143979	62730	43,57	3,93
1995	289645	151210	52,21	5,30
1997	361519	216741	59,95	5,45
2000	405980	275048	67,75	4,21
2001	417467	310551	74,39	3,84

Source: Unpublished data of SIS.

The export capacity in Ankara has increased from beginning of the 1990s to 2000s as the other important indicator of industrial regions. The dominance of engineering sectors has become obvious again in the export capacity. As can be seen in Table 5.3 the share of engineering exports in total exports in Ankara has increased between 1989 and 2001. In 1989 exports in engineering activities in Ankara constituted 4,32 percent of total country engineering exports, which increased to 5,45 in 1997. It could be seen from the table that in the first half of the 1990s this share started to stir and the real development happened in the second part of the 1990s. The exports of Ankara rose

from 97,1 million US dollars to 405,98 million US dollars in the 1989-2000 period. At the end of the 1990s, due to the economic crises, the export share of engineering in Ankara increased, but the share of Ankara in Turkey decreased in the 2000s. Again export capacities show that engineering, especially in electronic industry, have an important share in Ankara.

One of the most important forces behind engineering and electronic industry in Ankara is military industry. Besides military industry, the university tradition of Ankara, since the foundation of republic, has also supported the improvement of engineering sector. In the electronic industry, security systems for banks were first introduced in Ankara, which played an important role in the development of the electronic sector. The most important investments in military industry were realized in Ankara due to being the capital of Turkey. For example, the largest defensive industry project in Turkey has been realized by '*Türk Havacılık ve Uzay Sanayii'* (TAI) which was established in 1984 by Turkish and American cooperation. Therefore, military industry has provided necessary infrastructure and demand for machinery, metal and electronic industries. The other important example is ASELSAN, which is one of the important inducements for the development of the sector. ASELSAN is an establishment of Turkish Armed Forces Foundation founded at the end of the 1975 to produce defense electronic systems for Turkish Army. Most of the market of ASELSAN is formed by state institutions. After the foundation of ASELSAN, HAVELSAN, which was also established by Turkish Armed Forces Foundation in 1982, is specialized in software industry since 1995.

In the industrial pattern of Ankara electronic industry has an important position. In many examples, military industry provides the necessary bases for the emergence of electronic sector. For example, similar process has been examined in USA, Silicon Valley as the most important electronics and aerospace agglomeration in the world. The agglomeration of high technology firms started with military industry, the technology, human capital and financial bases of this environment created necessary synergy for high-tech industrial development (Scott, 1988). In Ankara, the military industry and its support base exists, but Silicon Valley type synergy has not been established yet.

Military industry also provides skilled employees to the region. Many people from military industry have employed in other engineering industries or have founded their

firms in order to utilize their experiences. This process provides the dissemination of specific knowledge about high technology and new techniques in the region. At that point the importance of regional network relations and innovative capacity are also significant for and interrelated with research areas in the context of the thesis.

Innovation capacity and institutional bases of innovation in Ankara

It has already been emphasized that the existence of universities in Ankara, especially according to entrepreneurs graduated from METU in specific, is important to sustain and create social relations among firms. On the other hand, the city conditions allow face to face relations, and the entrepreneurs have continued informal relations with their colleges from the university. These types of social networks are more important in the start up periods of firms (Eraydın, 1999). Hence, with the help of leader firms and social networks, knowledge diffused rapidly among the members of the small communities.

Besides universities, there are many other institutions that provide consultancy and financial support for innovation and technological progress in Ankara. TUBITAK, Patent Institute, TTGV, KOSGEB and Public Bank are some of the important institutions in Ankara, which support and finance innovation activities and projects of the firms. However, firms in Ankara are not fully aware of these opportunities and are not using them effectively[2]. This result also shows that firms in Ankara could not utilize the chance of spatial proximity to related institutions perfectly. It could be argued that this national institutional base, which is important for national and regional innovation systems, could not be used effectively by the firms in Ankara.

The other important field in innovative capacity is the existence of R&D departments in firms. Most of the military firms have R&D department in Ankara. Moreover, the share of R&D employee is higher in this sector, which includes generally large firms (Dede, 1999). Unlike machinery, electronic and software sectors, military sector have relations with universities and technology based public institutions such as TUBITAK. However, it is not surprising that large military establishments do not have strong relations with small and medium sized firms as regards to technology and the knowledge of innovation.

With the help of various experiences and strong educational basis, Ankara firms have more innovative capacity according to other Anatolian regions. Moreover, they learned how to produce their own technology and compete in national market (Dede, 1999). It is generally accepted that regional network relations and collaborative environment are important for the regional capacity. Public institutes provide necessary institutional infrastructure, but there is not strong regional collaborative environment and regional loyalty in Ankara.

Regional network relations in Ankara

Besides human capital, social environment and network relations are important for regional development and innovative capacity. It has already been emphasized that state based market is an important opportunity for manufacturing industry in Ankara. Many firms have strong market relations with state institutions, which are the main customers, providing firms the guarantee for their production. As the largest firm of Ankara with its employment capacity of 2955 ASELSAN singed a recent contract with Defense Industry in the end of 2002 (www.aselsan.com.tr). On the other hand, all customers of HAVELSAN are state institutions. For example, some recent projects of HAVELSAN have been with General Staff Headquarters, Ministry of National Defense, Ankara Court House and State Security Court, General Directorate of Land Registration and Ownership (www.havelsan.com.tr). In Ankara there are examples of spin-off firms, emerged from these existing large firms. Generally there is subcontracting and customer relationship between newly emerged small firms and large firms. However, it is interesting to note that relations with ASELSAN are not at R&D level, due to the isolated structure of ASELSAN in research area (Dede, 1999). Hence, the relation between small and large firms is not symmetrical. Moreover, during the field survey two entrepreneurs, who rejected to interview, report that:

> "We are producing for an important state military institution. According to our contract we can not give our firm data about network linkages and innovation activities. Moreover, we can not even give the name of this public institution."

These reports show the highly bounded structures of small or medium sized firms to military and other state establishments. Moreover, this type of big and strong

[2] The regional innovation systems in Ankara have been studies in Regional Planning Studio in 2001-2002 education period by master students. The findings of this study have been used in order to support some findings of the case study in Ankara.

customers have also restricted the behavior and network relations of SMEs and also restricted to integrate with regional collaborative environment. These features of network relations have similarities with Japan system, which depends on the domination of large firms in network relations (Young, 1999).

On the other hand, in market relations, firms in Ankara do not have strong relations with abroad, although there is the presence of universities with foreign language factor in their education. As regards to export capacity of Ankara as the Capital City of Turkey, it takes place behind export capacity of Bursa[3]. Furthermore, the market of Ankara firms is dispersed in national geography, which have domination on inner, South Eastern and Eastern Anatolia (Dede, 1999). In other words, the proximity to Anatolian markets gives a national commercial advantage to firms in Ankara.

In Ankara, being from the same university is important at the constitution of business networks. However, in general there is no regional collaborative environment. In other words, living and working in Ankara are not important for entrepreneurs. In stead of the importance of sharing Ankara region, sub communities are more important in the entrepreneurial networks. For example, taking place in the same social clubs, being from same university or collage are more important at the constitution of networks.

As a conclusion, Ankara has some specific features that are important to be preferred by entrepreneurs. As public institutions are the major customers, Ankara is an important market location for firms. The presence of universities and foreign language factor in their education plays an important role in location choice of these firms. However, newly graduated young engineer reduced wage levels in Ankara. On the other hand, those young people are able to follow technological progresses easily. Production relations with public institutions, and dominance on Anatolian markets are other important locational advantages of Ankara. Studies show that many firms in Ankara are based on these psychological reasons (Dede, 1999).

Hence, it could be assumed that Ankara region, as the traditional metropolitan area in republic period, has different industrial development characteristics and processes than Bursa and Denizli. Therefore, in the next parts, the industrial development processes of Bursa and Denizli are examined. Although the characteristics of

[3] For example in 2001 the export capacity of Ankara in manufacturing industry was 417,467 million US dollars, which was three times higher in Bursa and reached 2521,5 million US dollars.

development have some similarities between Denizli and Bursa, due to the same leading sectors, these two stories have unique characteristics, which are explored in detail in the following part.

5.3 Industrial Development in Bursa as an Innovative Growth Region

Bursa is the fifth largest town in Turkey with a population of 1.630.940 according to the population census of 2000. With this population, Bursa is one of the largest metropolitan cities of Turkey. Unlike Ankara, Bursa has a long production history in textile, which was the ancient form of recent specialization. Since 17th century Bursa has continued to produce in textile and became the undeniable center of industry in Turkey. The geographical closeness to Istanbul is also an advantage for industry in Bursa. Besides the city center, investments have also accrued in some districts. Although most of the industry is concentrated at province center, Inegöl as a district has specialized in textile and furniture industries. In addition to textile industry, machinery and automotive activities play an important role in the economic development of Bursa.

The Evolution of industry in Bursa

Since the early 1970s the number of firms and the employment capacity have increased in Bursa. In 1971, 19035 people were employed in manufacturing, the share of which is 3,31 percent in Turkey. The share of Bursa in the country reached to 5,14 in 1983 and 6,58 in 1988. With this share Bursa is the fourth region, after Istanbul, Izmir and Kocaeli. It should be emphasized that the share of Bursa in Turkey is higher than Ankara. These figures show that Bursa has maintained its dominant and important position in Turkish manufacturing industry within the time. In 1992, manufacturing firms in Bursa, which employed more than 10 employees, have a total of 73383 employees, 65 percent higher than Ankara. In 1997, this value reached 97354 employees and 101355 employees in 2000, which is also approximately two times higher than Ankara. Both in number of firms and employment capacity a high growth rate has occurred above the average of Turkey (Table 5.4). Hence, the share of Bursa in national manufacturing employment was 8,16 percent in 1997 and reached the 10,11 percent in 2000. With this share Bursa has kept its third rank position in Turkey industry.

As the traditional sector, textile and clothing industry has continued its dominant position in Bursa within the time. More than half of the employees has been employed in this sector in 2000 and the share of Bursa in textile production of the country is 13,52 percent (Table 5.4). According to both firm number and employment capacity in textile and clothing industries Bursa is the second rank region in Turkey, following Istanbul. Table 5.4 represents that the other important sector in Bursa is engineering according to employment values with 24284 employees. More than half of the employment in engineering industry belongs to automotive sector[4]. Like in textile and clothing industry, in engineering sector the share of Bursa in Turkey is above 10 percent in 2000 (Table 5.4). The growth rates in textile and engineering sectors have positive value between 1997 and 2000 but these growth rates are not as high as Ankara.

Table 5.4 Number of Establishments and Employees in Bursa according to Firm Size and Sectors (1992 - 2000)

	Firm Size	Number of Firm			Number of Employees		
		1992	1997	2000	1992	1997	2000
Manufacturing	10 _49	347	417		8138	10678	
	50 _249	152	240		17026	27235	
	250+	59	84		48219	59441	
	total	558	741	763	73383	97354	101355
	Share in Turkey	4,98	6,47	7,04	7,45	8,16	10,11
Food	10 _49	47	41		957	867	
	50 _249	19	23		2396	2883	
	250+	10	10		5106	5376	
	total	76	74	61	8459	9126	8828
	Share in Turkey			3,95			7,21
Textile and Clothing	10 _49	112	165		2796	4308	
	50 _249	76	113		8311	13214	
	250+	27	44		20820	31831	
	total	215	322	335	31927	49353	50993
	Share in Turkey			9,90			13,52
Engineering	10 _49	100	119		2213	3047	
	50 _249	29	62		3061	6739	
	250+	14	16		18182	14798	
	total	143	197	199	23456	24584	24284
	Share in Turkey			7,59			10,69

Source: Annual Manufacturing Industrial Statistics of SIS (unpublished data). *Note*: Private establishments, which have more than 10 employees have been included in the Table 5.4 Within this table ISIC Rev.2 has been used due to the 1992 and 1997 statistics were analyzed according to this classification.

[4] In 2000 14284 people employed in automotive industry, 24284 employees in total engineering sector.

Although between 1992 and 1997 the number of small firms has continued to increase, in 2000 this result has changed and the number of medium and large firms has enlarged. In total manufacturing firms the average firm size was 131 in both 1992 and 1997 in Bursa, as in Ankara the average firm size was 62 employees. In 2000, the average firm size increased to 133. It is a fact that firm size in Bursa has enlarged and giant firms have already emerged in specialized sectors.

Among the sectors, textile and automotive industries have the leader position within the history, however the textile has never lost its dominant position in the industry and economy of Bursa.

The Increasing textile and automotive industries in Bursa

In the first part of 19th century, silk production was important for the industry of Bursa. In the Ottomans period a silk reeling factory was established. The aim of the factory was to export silk yarn to Europe, especially to France. In the late 1920s and in the beginning of 1930s, the world crisis and inward oriented policies destroyed the silk export of Bursa (Pınarcıoğlu, 1999). Hence, in the beginning of 1940s silk reeling activity lost its importance and entered into the crisis.

However, during the state leaded industrialization period of 1930s, a new era of textile production started in Bursa with the establishment of two Sümerbank factories[5] established as state enterprise in 1938 in Bursa. At this period the establishment of state firms in Bursa provided employment and technology improvement through machinery transfer to small enterprises. Within the history of textile production, the main production has shifted from silk to rayon, wool and synthetic textiles.

These two state factories effected the regional production environment as regards to modern technology and skilled employment. Technical and skilled employees of these state factories have later established their own private textile firms. Through this way the number of establishments, especially small and medium ones, have increased and knowledge of textile production have diffused in the region. The other important contribution of these factories to the regional production is the technological progress. In the beginning of 1950s wool factory updated its technology and small textile firms, which used power driven looms, bought old looms of the state factories. After rayon

and wool factories, factory to produce synthetic and nylon industrial yarns was set up in 1964. Later, the number of synthetic factories has increased and synthetic products became the main products of textile production in Bursa.

In 1962, the organized industrial zone, as the first experience in Turkey, has been established in Bursa. The state support between the 1960s and 1980s had intensified in automotive, consumer durable, and yarn production. This state policy and establishment of industrial zone increased the industrial capacity and success of the region. During this development two important automobile factories, Fiat and Renault was established in the late 1960s. With the automobile investments in the region, many small firms emerged as the suppliers and subcontractors of these two factories. In these years, although automotive industry has increased in the region, textile kept its leading position.

In the first part of 1980s the export in textile industry has extremely increased in Turkey due to the related incentives. Between 1980 and 1984 the textile export of Bursa has increased sharply[6]. Within the export materials synthetic yarn was the most important category. At the same time in the beginning of 1980s the production of clothing sector has increased. Since the 1980s the amount of state establishment had fallen behind the private textile sector in export. In addition to textile industry, machinery and automotive industries have also been effected by the atmosphere of 1980s and started to export in 1990s (Pınarcıoğlu, 2000).

Table 5.5 Export Capacity of Bursa in Manufacturing Sectors between 1989-2001.

	Total Export in Manufacturing Sectors (1000 US $)	Export in textile and clothing sector (1000 US $)	Textile and clothing exports /Total manufacturing exports (%)	Textile and clothing exports of Bursa /those of Turkey (%)
1989	340484	123669	36,33	3,04
1992	441184	188743	42,78	3,27
1995	946621	314692	33,24	3,63
1997	1086404	400572	36,87	3,93
2000	1946897	373768	19,20	3,63
2001	2521504	416850	16,53	3,92

Source: Unpublished data of SIS

[5] These state factories were not constructed to produce silk. Wool, cotton and rayon were planned to be produced.
[6] In 1980 textile and clothing export value is 6236 thousand $, this value reached 114.264 thousand $ in 1984 (Pınarcıoğlu, 2000).

As it could be seen in Table 5.5 the export capacity in manufacturing sector in Bursa has increased since 1989. Between the years 1992 and 2001 the export capacity has increased six times and reached 2521,5 million US dollars (Table 5.5). On the other hand, within the export capacity the share of textile and clothing industry decreased sharply after 1997. This show that as the share of textile decreased in total manufacturing of export capacity, the share of automobile industry increased. Thus, it is interesting to note that the share of textile export of Bursa in Turkey has increased during the 2000s.

The new liberalization period has also brought the expansion of imports besides export orientation. With the liberalization of import policies, regional firms are forced to compete with foreign firms as regards to quality of products. Firms with low technology and with low quality in products suffered from the decline in subcontracting rates. These small firms became the main losers of this technological transition (Pınarcıoğlu, 2000). As a result, vertical integration came into agenda, and is carried out by large firms due to the lack of quality as an important problem in subcontracting relations. Besides large firms, medium sized textile firms also have a tendency to work with foreign firms.

As parallel to these discussions one of the entrepreneurs in textile industry stated that:

> "We try to reach the necessary scale to produce many parts of end production in our body, as it is really difficult to organize many small firms for subcontracting. At that point quality is the most important problem for us. But I have to agree with the fact that there are some advantages to work with smaller firms also. …"

Among different sectors in Bursa the rapidly developing clothing sector has had very extensive subcontracting relations among medium and small firms. However, the quality problem has also started in this sector and export firms stared to find new subcontractors from different cities in Turkey, for example from Adana and Denizli.

Regional network relations in Bursa

In Bursa, the emergence of large integrated firms, cause the decline of collaborative regional environment. In the end of 1980s, relatively large firms renewed their technology with imported automatic looms and decreased their relationship with the cluster (Pınarcıoğlu, 2000). On the other hand, formal cooperative forms of organization, such as associations, are also fragile structure in Bursa. The basic recent

strategy in this region is to continue in-house production as much as possible. Thus, there has been a low degree of interdependence among large firms in regional environment. Although in Bursa vertical integration is dominant, many small and medium sized entrepreneurs need this type of subcontracting works to continue their production.

Although one of the essential features of the industrial regions is the small and medium sized firms, many experiences from the world show that in the later stages of development large firms, as well as SMEs, exist in the industrial regions. As an example the shoe industry of Sinos Valley (Brazil) comprises firms of all sizes, including very large ones. Schmitz (1995) emphasizes the strong presence of large firms constructing an asymmetric power within the district. After the emergence and dominance of large firms in Bursa, small firms got a more fragile position due to the lack of work. Networks became much more loose and segmented with unequal degrees of power among firms and relatively large firms play a leading role in network relations in asymmetric production environment. Moreover, the patronage relations are dominant among small and large firms instead of equally defined collaborative relations.

This process in Turkey does not unique to the Bursa experience, many newly emerged regions also experience this type of relations between large and small firms. This is also observed in the industrial development process of Denizli, which has been handled in detail in the next part. Under the light of these discussions, it could be argued that there is hierarchical production environment rather than cooperative form of equals in Bursa (Pınarcıoğlu, 2000). While Bursa represents hierarchical production environment, Denizli shows relatively cooperative relation of SMEs, which includes some clues of Bursa type hierarchical production environment.

On the other hand, in the non-cooperative business climate in Bursa, a new business association has risen on a religious basis. These types of organizations are also observed in many parts of Turkey. This Islamic business association (MUSIAD) has been founded in 1989, in the crisis environment in Turkey. In 1995, the members of this association have reached a number of 2000 in Turkey with 165 members in Bursa (Pınarcıoğlu, 2000). These religious based network relations provide strategic guidance and collective service provision in business and social terms. In this context,

small and medium sized entrepreneurs enjoy the benefits of the organization that could not be provided from other national and regional associations and institutions.

Bursa, due to having the attractive capacity in Turkey to migrate, has a heterogeneous demographic structure, making difficult the foundation of collaborative regional environment. Compared with Bursa, Denizli has a more homogeneous demographic environment due to the low migration rates. Having discussed the industrial development process in Bursa, Denizli is examined as the more collaborative and traditional industrial environment in the following part.

5.4 Industrial Development in Denizli as a Growth Region with Low Innovation Capacity

Denizli as the Anatolian region has an urban population of 413.915 according to the population census of 2000. Denizli, as one of the medium sized city of Turkey, is specialized in textile industry. Two districts of Denizli: Buldan and Babadağ are important districts that are specialized on textile. In textile production towel and bathrobe are the most important products of Denizli especially in exporting. In recent years, besides towel and bathrobe, clothing has gained importance at a limited degree. In Denizli, the organized industrial zone is the important agglomeration area for the textile producers. Beside the industrial organized zone, Ankara road is also an important linear industrial agglomeration area. In addition to these areas the other important industry axes is the Izmir road in Denizli.

The development of industry in Denizli

At the beginning of the 1970s, Denizli was a backward region of Turkey with little expectation for any success. The unprecedented economic growth of Denizli, which is called as the textile miracle of Turkey, depends on the integration to the global production networks after the 1980s. Since the early 1970s, the number of firms and the employment capacity have increased with positive growth rates in Denizli. In 1971, 3412 person was employed in manufacturing, the share of which is 0,59 percent in Turkey. However at that year Bursa as the important textile center of Turkey constituted 3,31 percent of textile industry in Turkey with an employment capacity of 19035. Thus, the employment capacity of Bursa was six times larger than Denizli in the 1970s. The share of Denizli in Turkey in 1983 is only 0,99 percent. Within this

period Denizli could not realize a great growth in manufacturing and has not an important position as a medium city. From 1983 to 1988 the employment doubled in Denizli and reached 11941 employees. On the other hand, the share of the region in Turkey increased to 1.25 percent. Beside this increase Denizli was still behind the level of Bursa.

Table 5.6 Number of Establishments and Employees in Denizli according to Firm Size and Sectors

	Firm Size	Number of Firm			Number of Employees		
		1992	1997	2000	1992	1997	2000
Manufacturing	10 _49	108	296		2304	6500	
	50 _249	44	100		4495	10859	
	250+	16	31		7174	17080	
	Total	168	427	415	13973	34439	40701
	Share in Turkey	1,5	3,73	3,82	1,42	2,89	4,06
Food	10 _49	15	21		297	428	
	50 _249	5	6		342	586	
	250+	0	0		0	0	
	Total	20	27	25	639	1014	970
	Share in Turkey			1,62			0,79
Textile and Clothing	10 _49	47	182		959	4042	
	50 _249	24	67		2682	7637	
	250+	12	27		5473	15213	
	Total	83	276	284	9114	26892	32494
	Share in Turkey			8,40			8,62
Engineering	10 _49	15	33		358	753	
	50 _249	5	7		420	813	
	250+	1	1		359	323	
	Total	21	41	28	1137	1889	1376
	Share in Turkey			1,07			0,61

Source: Annual Manufacturing Industrial Statistics of SIS (unpublished data). *Note*: Private establishments, which have more than 10 employees have been included in the Table 5.6 Within this table ISIC Rev.2 has been used due to the 1992 and 1997 statistics were analyzed according to this classification.

After 1980s, real boom in manufacturing industry, especially in textile industry, is realized in Denizli. In 1992, the number of employees reached 13973, this value increased to 34439 employees in 1997 and 40701 employees in 2000 (Table 5.6). Within this period, due to the export boom many new entrepreneurs, who were from different provinces and even from non-textile-oriented professions (such as medicine), have entered the market in order to benefit from opportunities of the town. Consequently, the number of firms and employees and the amount of textile exports of Denizli increased sharply in the 1990s. Although Denizli has been always behind Bursa as regards to number of firm and employees, the growth rate of Denizli has the

leading position in the country among all other regions. In the beginning of 1970s, the employment capacity of Bursa was six times higher than Denizli, however this share has decreased to below three times in the 2000 due to the high growth rate of Denizli during the 1990s.

Table 5.6 shows that textile production constitutes 80 percent of total employment in Denizli. On the other hand, in Bursa, the textile industry has 50 percent share, and besides textile, engineering industry has also an important position in the Bursa economy with 25 percent. However, it is obvious that textile is the dominant sector in Denizli and other sectors could not improved as textile industry. Within the context of this thesis, besides textile, food and engineering industries are also analyzed, and in Denizli the share of food industry in total employment is 2,38 percent, which is 3.38 percent in engineering sector (Table 5.6). This data represents the uniqueness of textile and clothing industry in Denizli.

Among different sizes of firms, the SMEs have an important position in the development process of Denizli. The share of SMEs with respect to the number of establishments has been around 90 percent between 1992 and 1997 in manufacturing industry. During this period the average firm size is around 80 employees, which is lower than Bursa (133 employees). However, the average size increased to 98 in 2000 due to the recent tendency to integrate production in Denizli. Moreover, the average firm size in textile industry is larger than the average size of total manufacturing sectors due to the labor-intensive nature of textile.

Historical background of textile industry in Denizli

A rich institutional and historical background is one of the important features of nearly all of the successful industrial districts. Thus, it is no surprise that artisanal textile (fabric) production in Denizli has a strong tradition, rooted in Greco-Roman period (Mutluer, 1995; Batmaz and Özcan, 1998). During the Second world war, the number of SME textile cooperatives in Denizli increased because Sümerbank employed the cooperatives for the distribution of cotton yarn (Erendil, 1998). With the help of cooperatives, small textile producers began to learn the collective responsibility and develop a tradition of mutual trust-support, which have played important roles in the growth process of Denizli (Eraydın, 2002).

In 1964, the Sümerbank factory began to produce fabric and initiated printing and dying operations (Erendil, 1998). As parallel to Denizli in the 1960s, Sümerbank had areal effects on the textile environment in Bursa. As a result of state factory, small textile producers were no longer able to get cotton-yarn as cheaply and easily as before and had relatively lost their importance in the Denizli economy. Although the operations of many small textile producers have slowed down in the end of 1960s (Eraydın, 2002), in 1970s with the establishment of few private cotton-yarn factories small firms again gained importance in Denizli (Pınarcıoğlu, 2000). During the 1970s, two important factors were experienced for the development of Denizli. Firstly, in 1973, Denizli was designated as a province having priority for development[7] (Mutluer, 1995). The second important factor in the economic development of Denizli in 1970s was the investments realized by the Turkish immigrants working abroad, especially in Germany.

Table 5.7 The Effects of Export Oriented Policies in the 1990s in Denizli

	Total Export in Manufacturing Sectors (1000 US $)	Export in textile and clothing sector (1000 US $)	Textile and clothing exports /Total manufacturing exports (%)	Textile and clothing exports of Denizli /those of Turkey (%)
1989	71967	49793	69,19	1,22
1992	91606	74180	80,98	1,28
1995	179912	157871	90,72	1,82
1997	249361	227559	91,26	2,23
2000	291583	264525	90,72	2,57
2001	245104	228035	93,04	2,14

Source: Unpublished data of SIS

The 1990s could be considered as the export era for Denizli. However, this result is not unique to Denizli, as a result of export oriented policies in 1986 Turkey became one of the most important textile exporting countries. Table 5.7 represents the results of 1980s policies. At the end of 1980s, total export in manufacturing industries was 91,6 million US dollars. In 1995, the export capacity in Denizli reached 179,9 million US dollars. In the first part of 1990s, the export capacity in textile and clothing industry reached 90 percent in manufacturing industries (Table 5.7). This data shows that textile and clothing industry constitute almost all of the export capacity in Denizli. On the other hand, in Bursa, the share of textile and clothing industry was

[7] This is an instrument of the state to support industrial development in the lagging regions of the country.

above 50 percent in the first part of 1990s, and the total export capacity of Bursa was extremely higher than Denizli. The share of Denizli in textile export of Turkey was around 1.2 percent in the first part of the 1990s. However this share reached 1,82 in 1987 and increased to above 2 percent in the 1997 (Table 5.7).

In the integration process to export markets, trade firms that are operating in Istanbul and foreign fairs are important mediators for firms in Denizli. At the foreign fairs enterprises perceived demand for bathrobe, and updated their production organization according to bathrobe. The relatively higher value added of bathrobes and high export rates gave chance to some firms to set up new units and to transform to relatively large-scale firms within time. The tendency of 1990s toward integrated production could be measured in 2000s that the average firm size increased in Denizli (Table 5.6). The emergence of leading firms could be considered as the force behind SMEs to integrate into the global production networks in the initial stages of growth. This gives some clues about the existence of regional collaborative environment. Although the existing collaborative environment that depends generally on the homogeneous structure of Denizli has started to break up in the later stages of development.

Innovation capacity and Technological Improvement in Denizli

In Denizli, both in technological development and in innovation capacity, leading firms are seen as important agents. Small and medium sized firms follow the success examples and imitate what they see. In other words, the entrepreneurs have imitated the development path of leader firms in terms of product and process technologies in Denizli. Therefore, at the technological renewal, the relation between the small and large firms is important. On the other hand, in the innovative capacity the dissemination of knowledge through social networks is important.

The technological renewal in the region started from the leading export firms. Thus, Denizli has upgraded its production technology in a step by step model from large firms to small ones. Some leader firms in Denizli started to invest in machinery, especially the second hand machinery from Italy (Erendil, 1998). Additionally, small firms were also able to upgrade to the minimum level of technology required for the export markets through the second hand machinery of large firms. During the period of export boom, catching up the international standards in the quality of products became crucial. For this reason, leading firms started to modernize their machinery by

importing automatic looms, the so-called second technological transformation. Therefore, this gave an opportunity to many small and medium sized firms to benefit from incentives (Pınarcıoğlu, 2000) and to update their machinery besides large leader entrepreneurs.

It could be said that after 1980s, in Denizli the export relations have led to a better access to information about new technologies (Özelçi, 2002). In addition to machinery renewal, international networks forced entrepreneurs to adapt to international standards and to take some foreign quality certificates in the production. Furthermore, the collaborative environment in Denizli supports the innovation of firms. The experience on innovation showed that the innovation capacity does not rest only in formal R&D activities, but also on the regional accumulation of knowledge. In communitarian environments, knowledge of one firm may become "*club good*" (Camagni and Capello, 1999). Therefore, in spite of the hierarchical production environment of Bursa, Denizli has more collaborative environment, which increase the free distribution of production and export knowledge.

The regional collaboration environment in Denizli

One of the most important characteristics of Denizli is the relatively homogenous production environment, which depends on SMEs (Eraydın, 2002; Erendil, 1998). Compared with the other provinces of Turkey, Denizli did not receive an important migration from other parts of the country. Moreover, until 1980s, Denizli was able to attract population only from its own hinterland, and especially from Babadağ. The textile producers who migrated to the province center from Babadağ initiated the creation of a local collaboration atmosphere due to their strong royalty to Denizli region.

In Denizli, among firms family ties, kinship relations, and long-standing friendship are still important types of relationships in production and export processes. For example, there are many groups which are managed by brothers or cousins, who handled the different processes of the production, marketing and exporting (Özelçi, 2002). Being from the same neighborhood, or being from the same family has always been very important at establishment and growth of firms (Eraydın, 2002); especially among the textile producers, born in Babadağ. The kinship, friendship and family relations as the social networks provide different types of support to entrepreneurs, ranging from

knowledge, financial, and machinery exchange to human capital exchange (Eraydın, 2002, Ayata, 1999, Işık and Pınarcıoğlu, 1998, Pınarcıoğlu, 2000). In addition, within the context of compatriotic relationships they have helped each other in the export markets.

These strong social networks also continue at out of work hours. At the meetings of families, they always talk about the industry, about the future of Denizli and their industrial problems. Solutions for the problems concerned with industry and economy of the region have been created in the collaborative environment within the social networks. Being from Denizli, or being from the same districts of Denizli has been very important in order to take place in social networks. Consequently, within these strong social networks, loyalty to place and responsibility to their region have improved. It could be concluded that the industrial communities of Denizli have formed in this sphere.

Since the middle of 1990s, in Denizli the necessity of collective action in global export markets has diminished, as the demand has been guaranteed by the large firms. Thus, the increasing gap between small and large firms has affected the horizontal network relations quite negatively and caused an asymmetric environment in Denizli. In this asymmetric environment, network relations have become much more loose and fragmented due to the power struggle among the firms (Pınarcıoğlu, 2000). Similar results of crisis have been experienced in many regions in the world in the second part of 1990s. Swiss Jura Arc region, specialized on watch production, (Glasmeir, 1991), Prato knitwear region (Harrison, 1994) are well known examples of the collapse of regional collaborative environment during the 1990s.

The conditions of 1990s gave rise to a new form of collaborative action in Denizli, which depends on solidarity and trust tradition. In 1993, many-partnered foreign trade company: the Aegean Ready-Garment Producers Association (EGS) was founded by small enterprises to compete with the leading large firms (Eraydın, 2002). EGS was initiated by 464 small producers and the percentage of Denizli in this cooperation was very high (57 percent). In this cooperation, the share of each member could not be more than 3 per cent. With its roles and values, EGS could be considered as a capitalist form of traditional cooperatives (Pınarcıoğlu, 1998). The aim of this company has been to provide services, such as export, transportation, and insurance. In order to realize these services, collective companies have been formed, while the

member firms stayed autonomous. The success of EGS model originated from supplying major needs of small producers, which depends upon solidarity, mutual trust and self-help tradition.

In the end of the 1990s, the number of associations has increased, which hold usually small enterprises. The most important group among them is MUSIAD (Independent Entrepreneurs Association), which was constituted by Muslim entrepreneurs (Pınarcıoğlu, 2000) to implement rules of Islam in economic activities. These new organizations show that today capitalist type of institutions and organizations start to take the place of traditional communitarian relations, such as family ties and kinship. However, at the emergence of new type of organizations the existing social network and collaborative tradition of the region still have an important position.

5.5 Conclusive Remarks: The Different Geographies of Innovation Activities

In this Chapter, the sample regions have been analyzed with reference to employment growth, export capacity, regional networking, and innovation capacities. In the analysis of innovation capacities, the patent numbers and useful model numbers have been used as the proxy of innovativeness. Although the patent numbers are extremely low in the total of Turkey, the results of field survey show that innovation activities are extremely high, as it has been discussed in the following chapter.

At the explanation of this challenge, the definition of innovation has an important function. In recent years, the studies on innovation have also involved social and relational perspective following the criticism of linear innovation models. Furthermore, in additon to technological innovation, organizational and management innovations are also taken into consideration. Henceforward, some improvements on the product and process are also included in the innovation context.

According to the character of production activities, the process of innovation changes. Although it is generally accepted that R&D plays an important role at product and process development, most of the entrepreneurs in the sample regions stated they are capable to innovate that even they do not have any formal R&D units. This is related with the changing perception of innovation during the last decades. However, patent numbers only includes radical innovation in product and therefore, process

innovations and even some improvements in product could not be covered by patent numbers. Moreover, as the firms in Turkey do not apply for patent at each product innovation or improvement, the formal patent numbers does not completely correspond to the real product innovation. That is why the patent figures are only a rough proxy for innovativeness in Turkey. Therefore, it is not surprised that within this broader perspective, the number of innovations in firms have high values.

R&D activities In Turkey, as one of the most important innovation factors, have fallen behind the R&D activities in developed countries. Similar result is also true for patent numbers. Although the patent numbers are low in general, Istanbul, Ankara, Izmir and Bursa have been the highest innovative regions in the country with over 100 patents in last four years. Consequently, Ankara and Bursa are the relatively innovative regions of Turkey among the sample regions. On the other hand, new growth regions such as *Gaziantep, Kahramanmaraş, Çorum* and *Denizli* could not show remarkable performance in innovation activities as similar to the regions given above, although they have important positions in employment and export capacities. Denizli, as an example to these regions, which represents the growth regions with low innovation capacity, is involved in the case study as the theird sample region.

It could be advocated that sample regions represent different types of innovation geographies. In Ankara, there are many institutions to provide consultancy and financial support for innovation and technological progress, and to support innovation research and activities in the firms, such as universities, TUBITAK, Turkish Patent Institute, TTGV, KOSGEB and Public Banks. However, even innovative firms in Ankara are not much aware of these institutional supports, and therefore, are not using them effectively.

The other important potential in innovative capacity is R&D departments and R&D studies of the defense industry in Ankara. Moreover, the share of R&D employee and specialization in high-tech sectors are also very important innovative capacities of Ankara. However, it is possible to argue that Ankara is still in the early stages of development as high-tech innovative region. Today Ankara could not use its innovation potentials effectively, and could not produce knowledge of innovation for the integration processes to global knowledge networks.

On the other hand, while Bursa maintain its medium position among sample regions as regards to innovative capacity, Denizli represents extremely different innovation characteristics than Ankara. In Denizli, both in technological development and in innovation capacity, the leading firms of the region are seen as important agents. Small and medium sized firms follow them, and imitate the development path of these leader firms in terms of product and process technologies in Denizli. It could be said that after 1980s, in Denizli the export relations have led to better access to information about new technologies. In addition, the global networks have enabled the regional entrepreneurs to adapt the international standards to their products and processes, and to apply for foreign quality certificates. Furthermore, the experiences have indicated that the innovation requires the regional accumulation of tacit knowledge, in addition to on formal R&D activities. Therfore, the regional collaborative environment in Denizli supports the firms at innovation process.

Consequently, brief discussion about the development processes of the three regions demonstrates that these regions are different geographies of innovation. In this Chapter, regional network environment and regional innovative capacities are briefly analyzed. In the light of development stories of sample regions, the data derived from the field survey is held in order to analyze the regional and external networks and their effects on innovation capacity of SMEs in the following Chapter. Next, the similarities and differences between the selected regions are studied with reference to the data collected.

CHAPTER 6

NETWORKING TO PROMOTE THE INNOVATIVE AND COMPETITIVE CAPACITY OF SMEs: COMPARATIVE ANALYSIS IN ANKARA, BURSA AND DENİZLİ

In recent years, a great deal of research has been made in two related and spatially relevant concepts "*networking*" and "*innovativeness*". Some of the studies about regional networks have been made with reference to industrial districts (Scott and Storper, 1992, Senberger and Pyke, 1991, Sabel, 1989). Some has been made with reference to more recent discussions like, regional innovation systems and learning regions (Florida, 1995, Keeble at.al, 1998, Morgan, 1997). Among these different schools, network forms of production and its impact on regional development is interpreted. However, it is important to node that there is no consensus about whether these networks are regional rather than interregional or visa versa. Although many researchers present arguments to support the importance of regional networks (Asheim, 1996, Maskell and Malmberg, 1999, Amin and Cohendent, 1999), some researchers stress the importance of interregional (global) networks in their studies (Koschatzky, 2000, Camagni, 1991, Glasmeir, 1999).

In addition to networking, the other spatially relevant discussion is the knowledge accumulation and innovation processes that gain importance especially in the recent development discussions. The increasing role of networking in innovativeness has also been emphasized in many studies (Sternberg, 1999, Koschatzky, 1999, Collinson, 2000, Keeble, at.al, 1998, Asheim and Isaksen, 2002, Maskell and Malmberg, 1999).

Within the innovation network literature, the role of regional embeddedness and spatial proximity gain importance in the definition of networks. There is a general agreement on the importance of regionally embedded network relations and spatial proximity among the actors of networks (Asheim, 1996, Malmberg and Maskell, 1997, Morgan,1997,). In these studies, spatial proximity is considered as the main factor of regional networks based on the face to face relations and a sense of community. However, in recent years, alternative discussions to regionally bounded relations have been put forward (Rominj and Albu, 2002, Sternberg, 1999, Freel, 2003), some of which emphasized that only regionally embedded networks and regionally embedded tacit knowledge create regional 'lock-in effect' in regional development (Raco, 1999, Glasmeier, 1994, Amin, 1999, Lyons, 2000). Global networks may provide the innovative new knowledge that is essential to cope with 'lock-in effect' in regional development and regional innovation (Camagni, 1991, Eraydın, 2002, Rama at.al, 2003).

These theoretical considerations and empirical trends, which have already been discussed in detail in Chapter Two and Chapter Three, provide the necessary conceptual frame to this Chapter. Given these, the objective of this Chapter is to assess *how far global networks appear to be important in innovativeness and development of SMEs*. The hypothesis put forward in this Chapter is that there is a relationship between the innovation activities of firm, its integration degree in networks and the spatial range of networks. This discussion increases the importance of spatial proximity debate, within which it is necessary to shed light on the question: *whether geographical proximity in network relations beneficial for innovation or not*. Within this context, this chapter compares the innovative capacity of SMEs, which have developed relatively global networks, and firms with more regional networks. For this reason, three regions have been analyzed: Ankara, Bursa and Denizli. In the previous Chapter, the emergence and development processes of Ankara Bursa and Denizli as the industrial regions and the specialized centers have been scrutinized in order to provide necessary background for this chapter.

This Chapter, depending on the data gathered through the field survey, concentrates on three main parts: innovativeness, networking, and interrelationship between innovativeness and networking. Firstly, growth rates and innovation capacity of SMEs have been handled. In the light of existing empirical studies, firm size, sector, quality

of employees, R&D expenditures, regional characteristics and capacity to use ICTs have been considered as the indicators of innovation capacity of SMEs and regions. Next, the meaning of spatial proximity in network relations, different types and different levels of networks, and the contributions of ICTs to interregional networks have been discussed in the networking debate. At the end, the interrelationship between networking and innovativeness has been discussed through the comparative analysis among three sample regions.

6.1 Dynamics of Employment Growth in Sample SMEs

Before analyzing the innovative capacity of sample SMEs, employment growth is scrutinized in Ankara, Bursa and Denizli in order to understand the development processes of firms and regions. A great many studies reveal that growth of skilled persons, rather than total employment growth, could be considered as the real indicator of development and innovativeness (Sternberg, 1999, Braun, at.al, 2002). For this reason not only employment growth but also the growth in skilled employees have been scrutinized as the main indicators of economic growth. Moreover, the share of skilled employees in total employment has been considered as the proxy of human capital in sample SMEs and regions.

In sample regions, employment growth is analyzed according to sectoral and size differentiation. The high technology sectors are defined as machinery, motor vehicles, vehicle parts, office and computing machinery, electrical machinery, radio, television, communication, telecommunication, medical and laboratory devices, pharmaceutical and medical consumable. On the other hand, the low technology sectors are defined as food products and beverages, textiles and clothing. Although all sample firms belong to the SME categories (10-249 employees), they could be divided into two groups of size as small firms with 10-49 employees, and medium firms with 50 - 249 employees. In this section, these categories have been used to examine the growth of SMEs and regions.

Table 6.1 presents the growth rates of both total employees and skilled employees in last two years in Ankara, Bursa and Denizli. Yet, before discussing growth rates, the share of skilled employees has been handled as the proxy of human capital. Within the context of skilled employees, engineers, technicians and R&D staff are included. The share of skilled employees is lower in regions specialized in labor intensive traditional

sectors according to regions specialized in high technology sectors. Among three regions, Ankara has the first ranks as regard to the share of skilled employees with 25,09 percent in 2000. As, it has also been discussed in previous Chapter, due to the university background and human capital potential of the region this share is extremely high, compared to other regions. Bursa follows Ankara with 11,30 percent and Denizli is the last region with 3.85 percent (Table 6.1). In all regions, the share of skilled employees in total has increased from 2000 to 2002.

The opposite is true for growth rates in total employees and skilled employees; both are higher in regions specialized in low technology traditional sectors confronted with others. In the methodology chapter, as Bursa and Denizli have been defined as growth regions, Ankara has been defined as low growth region in spite of its relatively high growth in the end of 1990s. According to the data of field survey (2000-2002), employment growth rate in Ankara, is close to the value of Bursa. The recent increase at industrialization process in Ankara may explain this high growth level. The growth rate, in Ankara goes up to 10,65 percent, Bursa to 11,48 percent and Denizli to 17,51percent. With this rate, Denizli, as highly specialized region in textile and clothing sectors, has the highest employment growth rate among sample regions (Table 6.1).

Table 6.1 Employment Growth according to Sectoral Differentiation, 2000-2002 years.

	2000	2002	2000-2002	
	The Share of Skilled Employee in Total (%)	The Share of Skilled Employee in Total (%)	Growth Rate in Employees (%)	Growth Rate in Skilled employees (%)
ANKARA				
High-tech sector (n=56)	30,07	31,38	10,35	15,15
Low-tech sector (n=16)	9,36	8,51	11,59	1,49
Total (n=72)	**25,09**	**25,83**	**10,65**	**13,92**
BURSA				
High-technology sector (n=19)	11,70	14,53	4,28	29,46
Low-technology sector (n=13)	10,73	13,09	21,75	48,61
Total (n=32)	**11,30**	**13,88**	**11,48**	**36,96**
DENİZLİ				
High-technology sector (n=4)	17,04	21,43	27,27	60,00
Low-technology sector (n=23)	3,36	4,54	17,15	58,02
Total (n=27)	**3,85**	**5,18**	**17,51**	**58,33**

Source: Calculated from survey data

In all regions and in all sectors employment growth rate in skilled employees is higher than total employment growth. It is also interesting to note that Denizli has also the highest growth rate in skilled employees with 58,33 percent. This high growth rate in Denizli may be the result of the increasing demand for skilled employees in traditional sectors, as well as high-tech sectors, in recent years. Obviously, the share of skilled employees in total is high in high technology sectors according to low technology sectors in all sample regions.

It is argued that growth rates are higher in low technology sectors than high technology sectors. This is also true for sample regions. Employment growth in high-tech sectors has the lowest rate in Bursa with 4,28 percent compared to Ankara (10,35 percent) and Denizli (27,27 percent).

Table 6.2 Employment Growth according to Firm Size, between 2000-2002.

	2000	2002	2000-2002	
	The Share of Skilled Employee in Total (%)	The Share of Skilled Employee in Total (%)	Growth Rate in Employment (%)	Growth Rate in Skilled employee (%)
ANKARA				
Small (n=56)	23,19	28,43	9,19	33,85
Medium (n=16)	26,24	24,30	11,53	3,28
Total (n=72)	**25,09**	**25,83**	**10,65**	**13,92**
BURSA				
Small (n=23)	11,51	14,41	-6,35	17,24
Medium (n=9)	11,21	13,70	19,48	46,03
Total (n=32)	**11,30**	**13,88**	**11,48**	**36,96**
DENİZLİ				
Small (n=16)	6,46	8,51	45,22	91,30
Medium (n=11)	3,41	4,47	12,90	47,94
Total (n=27)	**3,85**	**5,18**	**17,51**	**58,33**

Source: Calculated from survey data Note: Small firms=10-49 employee, Medium firms=50-249

The firm size also results in differences in employment growth rates similar to sectoral and regional differentiation. In Ankara, Bursa and Denizli the employment growth rates are positive for medium sized firms with more than 50 employees. The growth rate of small firms is three or four times higher than the growth rates of medium sized firms in Denizli. This value represents the increasing importance of SMEs in this region. However, small firms have negative employment growth rate in Bursa (Table 6.2).

It is interesting to find out that growth rates of skilled employee are higher in small firms than medium sized firms in Ankara and Denizli. This may be important evidence

to understand the growth strategies of small firms, or to analyze the increasing importance of knowledge and human capital in the production process in knowledge economy. The share of skilled employees could not give common characteristics in all regions according to the firm sizes. The share of skilled employees has close values in small and medium sized firms in Ankara and Bursa. As Ankara specialized in high-technology sectors, and there is a balance between high tech and low technology sectors in Bursa. Therefore, the share of skilled employees in small and medium firms is similar in these regions. On the other hand, in Denizli, as highly specialized textile region, the share of skilled employment is about two times higher in small firms than large firms, which have more employees but not necessitate more engineers and technicians.

Consequently, among sample regions, Ankara as the specialized region in machinery and electronic sectors has the highest share of skilled employees in total employment. Bursa, specialized in textile and automotive industries, follows the Ankara. Denizli, as an outcome of being a highly specialized cluster of textile and clothing sectors has the lowest rank in the share of skilled employees. However, the growth rate in skilled employees has the highest value in Denizli, which is two times higher than Bursa, and about four times higher than Ankara.

6.2 Innovative Capacity of SMEs: The Analyze of Innovation Indicators in Sample Regions

After having discussed the growth potential of firms and regions, in this section the innovative capacity of SMEs in Ankara, Bursa and Denizli are studied as regards to related indicators. Different indicators are used to measure innovation capacities of firms in various studies. Many empirical studies on regional growth and innovation networks use the share of R&D staff in total employment, the share of employees holding a university degree, degree of R&D expenditure, belonging to higher technology or innovative sectors, and patent numbers as important indicators of innovative capacity of SMEs (Keeble, et.al., 1998, Arndt and Sternberg, 2000, Koschotzky, 2000, Larsson and Malmberg, 1999, Romijn and Albu, 2002, Lyons, 2000). Here too, innovation indicators are examined in the light of these studies. Expressed in detail, the share of engineers in total workforce, the share of R&D

expenditure in total expenditure, and the number of patents and quality certificates have been analyzed as main indicators of innovation capacity.

Table 6.3 Innovation Indicators and Innovation Activities in Sample Regions, 2001-2003

	ANKARA			BURSA			DENİZLİ		
	High-technology sectors n=56	Low-technology sectors n=16	Total n=72	High-technology sectors n=19	Low-technology sectors n=13	Total n=32	High-technology sectors n=4	Low-technology sectors N=23	Total n=27
Share of engineers in workforce %	11.4	2.8	**9.5**	4.7	3.4	**3.9**	8.0	1.67	**2.6**
Share of R&D expenditure in total %	8.2	5.0	**7.5**	1.6	2.1	**1.9**	6.7	3.05	**3.6**
Average patent number	0.3	0.8	**0.7**	0.6	1.0	**0.9**	0.0	1.0	**0.9**
Average quality certificate number	1.1	0.7	**1.01**	0.8	0.2	**0.4**	1.0	0.6	**0.7**
Launched new products in 2001-2003 %	78.8	87.5	**80.6**	89.5	66.7	**76.9**	100.0	73.9	**77.8**
Average number of new products	5.8	4.5	**5.5**	7.1	4.1	**5.9**	4.0	3.5	**3.6**
Launched new process in 2001- 2003 %	58.9	68.7	**61.1**	73.7	58.3	**64,6**	75.0	56.5	**59.3**
Average number of new process	2.2	2.9	**2.3**	2.1	2.6	**2.3**	2.5	2.0	**2.1**
Launched total innovation in 2001-2003 %	82.1	87.5	**83.3**	89.7	84.3	**87.5**	100.0	73.9	**77.8**
Average innovation	8.0	7.4	**7.8**	8,3	8,1	**8.2**	6.5	5.6	**5.7**

Source: Calculated from survey data

Table 6.3 shows that high technology sectors are more innovative than low-technology sectors in three sample regions. Moreover, among sample regions, Ankara has the first rank with reference to most of the indicators. The university background of the region supplies huge number of employees that holds a university degree and public research and development institutions like TUBITAK, KOSGEB etc. support the R&D studies of SMEs. Thus, this is a significant finding as it may be asserted that the spatial characteristics of Ankara have empowered innovation capacity of firms. Bursa and Denizli follow Ankara according to these indicators. Of the three regions, the share of engineers in Denizli is lowest with 2,6 percent. On the other hand, the share of R&D expenditure and quality certificate number has the lowest shares in Bursa (Table 6.3).

It was unexpected to find out that the average patent number, as an indicator of innovation, is higher in Denizli and Bursa than that in Ankara. Furthermore, it has also interesting that, this value is higher in textile and food industries than electronic and

mechanical engineering industries (Table 6.3). One entrepreneur in Denizli from the textile industry has stated that "we take a patent for every original product". The increasing regional competition and replication, in similar branches, force the entrepreneurs to protect their innovations through taking patent before it is used by another entrepreneurs. In other words, the highly cooperative and competitive environment of Denizli forces entrepreneurs to apply for patents. However, in engineering industry, patent could only be taken with producing new machinery or one special part of machinery.

The average number of quality certificate is higher in high technology sectors than low technology sectors in all three sample regions. The highest quality certificate rates both in high and low technology sectors are in Ankara region (Table 6.3). As regards to quality certificate Denizli has the close results to Ankara. As foreign customers and subcontracting relations force the entrepreneurs to take national and foreign quality certificates in Denizli. The studies made by Grotz and Braun (1997), Sternberg (1999), and Koschatzky and Bross (2001) show that there is a positive relationship between these indicators and innovative activities of firms. However, the empirical results of this thesis could not completely confirm the results of these experiences. Although almost every indicator has the highest value in Ankara, the innovation activities has the highest value in Bursa. (Table 6.3). Yet, it is expected that Ankara with its sectoral advantages and human capital background would be a first rank region in innovation activities.

The most of the experiences in European regions also reveal that among different indicators of innovation the share of engineers is very important in the innovation capacity of SMEs. Freel (2003) in his study about Northern Britain has found a positive association between the proportion of engineers in total employment and innovativeness. Arndt and Sternberg (2000) and Romijn and Albu (2001) have also found similar results about the different regions of Europe. In the light of their studies, it could be concluded that engineers are required in order to be innovative. However, in this study positive relationship between engineer capacity and innovativeness of SMEs could not be observed. Although, Ankara has the highest engineering capacity with 9,5 percent, innovation activities are higher in Bursa. On the other hand, among sample regions Denizli is the last region with 2,6 percent share in total workforce, but its innovation capacity could not be underestimated.

The investigation of innovation activities of sample firms in last three years could be classified in two dimensions, namely (1) types of innovation and (2) degree of innovation. In the literature, innovation has been handled within three different types: product, process and organizational innovation (Romijn and Albaladejo, 2002). Organizational innovation has been excluded due to the difficulties in measuring this type. Therefore, only product and process innovations are measured at case study. The degree of innovation has also been divided into three categories: products new to the firm's sector, products new to the firm, and improvement of existing products or processes in the firm.

Table 6.4 Different types and degrees of innovations introduced in the last three years in sample regions

	ANKARA		BURSA		DENİZLİ	
	Number	Innovation per firm (n=72)	Number	Innovation per firm (n=32)	Number	Innovation per firm (n=27)
Types of innovation						
Product innovation	395	5,48	188	5,87	96	3,55
Process innovation	169	2,35	75	2,34	57	2,11
Degrees of Innovation						
New product for the sector	104	1,44	26	0,81	9	0,33
New product or process for the firm	216	3,00	121	3,78	67	2,48
Improvement of existing products or processes in the firm	244	3,39	136	4,25	77	2,85

Source: Calculated from survey data

According to the data of the field survey in Ankara, Bursa and Denizli, product innovation is higher than process innovation. 70 percent of total innovations in Ankara, 71 percent of total innovations in Bursa, and 63 percent of total innovations in Denizli are product innovations (Table 6.4). Brinza region in Italy also shows similar results and the share of firms that has made process innovation (74,4%) is higher than share of firms that has made product innovation (64,2%) (Patrucco, 2003).

The experiences from different regions of world reveal that incremental innovation is more widespread than radical innovation (Romijn and Albu, 2002, Sternberg, 1999). According to the results of the case study, improvement of existing products or processes is more widespread than introducing new products or processes to the sector or to the firm (Table 6.5). Among sample regions, the development of new product for the sector has the highest share in Ankara with 1,44 new product per firm. Bursa

follows Ankara with 0.81 new products for the sector per firm. The share of Denizli within this category is very low according to other regions. The share of improvement of existing products or processes reaches to 43 percent in Ankara, 52 percent in Bursa and 50 percent in Denizli. Thus, it is possible to argue that sample firms prefer or enable improvement of existing products and processes in stead of develop entirely new products and processes.

Table 6.5 Different types and degrees of innovations introduced in last three years in High-technology and Low-technology Sectors

	High-Technology Sectors		Low-Technology Sectors	
	Number	Innovation per firm (n=79)	Number	Innovation per firm (n=52)
Types of innovation				
Product innovation	454	5,74	225	4,33
Process innovation	173	2,19	128	2,46
Degrees of Innovation				
New product for the sector	86	1,09	27	0,52
New product or process for the firm	252	3,19	158	3,04
Improvement of existing products or processes in the firm	289	3,65	168	3,23

Source: Calculated from survey data

Many studies emphasized that firms from high technology sector are more innovative than firms from low technology sector (Koschatzky and Bross, 2001, Sternberg, 1999, Grotz and Braun, 1997). According to the results of the case study, it is not surprising to observe that low technology sectors have lower innovation activities than high technology sectors (Table 6.5). Both numbers of product and process innovation activities are higher in firms from high-technology sectors. However, while product innovation per firm is higher in high-technology sector, process innovation per firm is higher in low technology sectors (Table 6.5). Especially in textile and clothing industry, improvement of process is more possible according to completely new product. For example, in textile industry, new product ranges are very limited in towel and bathrobe production, which is the main specialization branch of Denizli.

It could be concluded that among sample regions, number of innovation per firm is higher in Bursa, but indicators of innovation such as share of engineers in workforce, share of R&D expenditure and quality certificate are higher in Ankara. This result may be caused by significance of the regionally embedded network relations and regionally embedded knowledge systems in the innovation processes. The results of this section

show that only scientific base are not enough to be innovative, beside them different types of network relations are necessary in the innovation process within the sample regions.

6.3 Network Relations of SMEs in Ankara, Bursa and Denizli

Having discussed the main characteristics of sample firms as regards to the growth and innovation indicators, networking as the main concept of this thesis came into agenda. In the literature, the possible spatial levels of network relations are analyzed in three levels, which are regional, national and international or global levels (Arndt and Sternberg, 2000, Freel, 2003, Koschatzky, 1999). Here too in the context of this case three types of relations are accepted as the spatial levels of analysis. Furthermore, in this study, the proxy of regional networks is defined as the density of regional linkages of sample firm. The density of national and global linkages is also determined as the proxy of national and global networks in the field survey. Total numbers of linkages are used in the measurement of 'network density'. This proxy shows the quantity of networks, it could not test the quality of linkages. In addition, different types of linkages are examined such as production networks, marketing networks, service networks of sample firms, which will be discussed in the next sections in detail. In this section, distribution of total number of networks into different geographical levels is discussed.

According to the general examination of these networks, the density of regional and national networks is extremely higher than the density of global networks in all sample regions. In Bursa and Denizli, the density of regional linkages is higher than other types of linkages, however in Ankara national linkages are dominant among networks. In global networks, Ankara has the lowest and Denizli has the highest share (Figure 6.1).

In Third Chapter, it is advocated that the levels of networks change according to size and sector, besides regional differentiation. In many studies in Europe it is hypothesized that "*the smaller the firm the higher the share of intra-regional networks*" (Koschatzky, 1999, Grotz and Braun, 1997). In other words, the medium or large firms have constituted large amounts of global linkages, as regional networks are more important for SMEs. Integration into regional networks supports SMEs to overcome their weaknesses, such as lack of financial resources, less R&D activities

and more uncertainties in their survival (Tödling and Kaufmann, 2001). Although external networks and external knowledge are important for the competitive and innovative capacity of firms especially SMEs, have many barriers in order to integrate global networks (Fuellhart, 1999, Eraydın, 2002).

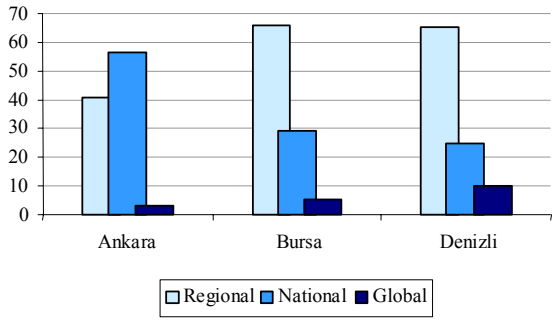

Figure 6.1 Comparison of Ankara, Bursa, and Denizli according to geographical focus of linkages.

Source: Calculated from survey data

The database of the case study shows that regional linkages are dominant in small firms and the share of global linkages is very limited. On the other side, the share of regional networks decreases and the share of national and global linkages increase in medium sized firms compared with the small firms. Among small firms, regional networks with 58 percent, has the highest share. Moreover, national linkages follow them with 38 percent, and global networks follow them with the smallest share of 4 percent (Figure 6.2). The regional networks decrease to 40 percent and the global networks reach to 10 percent in medium sized firms. Although within the design of the case study large firms have been excluded from the sample area, differences among small and medium sized firm gave important outcomes about the relationship between firm size and network relations. Hence, the results of the case study approve the hypothesis about relationship between firm size and levels of network relations.

Figure 6.3 represents the relationship between sectors and geographical levels of network relations. According to the density of network relations, in high technology sectors, national networks are dominant and the density of regional networks has a lower value than in low technology sectors. It could be said that electronic sector in Ankara with high national linkages increases the density of national networks in high technology sector. On the other hand, in low technology sectors, regional networks gain importance. High-technology and low-technology sectors have similar densities

in global networks. In this result, unique stories of regions are effective. For example Denizli, growth of which generally depends on textile sector, has the highest share in the global linkages and this situation increases the share of global networks in low technology sectors (Figure 6.1).

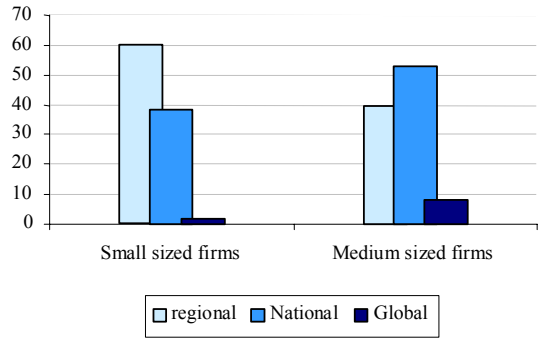

Figure 6.2 Different Levels of Linkages according to Size

Source: Calculated from survey data

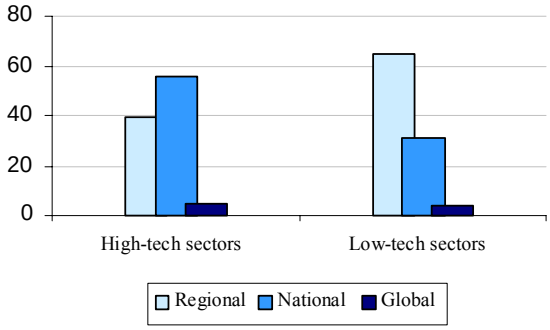

Figure 6.3 Different Levels of Linkages according to Sector

Source: Calculated from survey data

It could be concluded that small and low technology firms have dense regional networks (Figure 6.1, Figure 6.2, and Figure 6.3). In addition, in Bursa and Denizli the density of regional networks is higher than low technology sectors. On the other hand, larger firms and firms from high technology sectors has higher national and global linkages and they are less embedded in regional networks according to small firms.

Having discussed the total density of network relations, the sample SMEs have been grouped according to network relations, through which it is possible to discuss different geographical levels of linkages. Similarly, many empirical studies, which have already been discussed in the Chapter Three, have grouped the firms according to

their network relations (Freel, 2003, Keeble, et. al., 1998, Arndt and Sternberg, 1999). The study of Arndt and Sternberg (2000) on different regions of Europe has differentiated SMEs into four categories: (1) firms performing regional networks, (2) firms performing regional and inter-regional networks, (3) firms performing interregional networks and (4) firms with a low network intensity. Keeble et. al. (1998) has also categorized SMEs as nationalist or internationalist firms. Thus, these studies have discussed different levels of network relations through these firm groups.

In this study, however, three groups have been defined: (1) firms with dense regional networks, (2) firms with dense national networks, (3) firms with dense global networks. To classify each firm within these three groups, the data is proceeded with a two step method. First, for each firm the dominant network level is defined according to the density of the relation numbers of the firm. Second, to test whether the dominance is relevant, the solutions are compared with the regional averages for each network level. Furthermore, these grouping provided the chance to compare different production and innovation behaviors of sample SMEs that embedded in different levels of networks in the following sections.

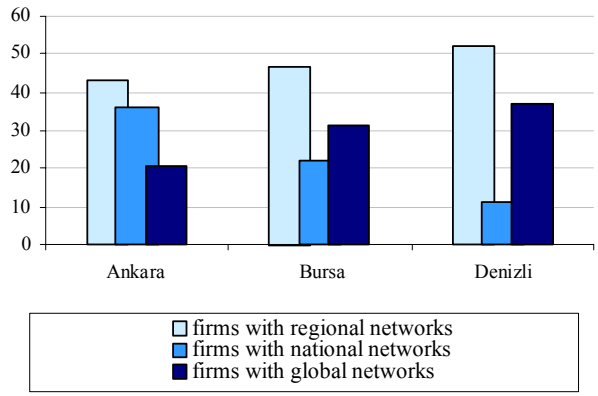

Figure 6.4 Comparison of Ankara, Bursa, and Denizli according to different types of SMEs
Source: Calculated from survey data

Figure 6.4 points that the share of firms with regional linkages, which have the highest share among other groups, falls in the range of 40-55 percentages in all sample regions. On the other hand, firms with dense national networks and firms with dense global networks show different patterns in sample regions. The share of firms with regional networks is highest in Denizli with 51.9 percent, at the same time the share of firms with global linkages is also highest in Denizli with 37 percentage (Table 6.6).

Ankara with 36,1 percentage has the highest share of firms in national networks compared with other sample regions. In Bursa the percentage of firms with regional networks has the highest value with 46,9 percent and the firms with national networks has the lowest value with 21,9 percent, which is also two times higher than Denizli (Figure 6.4). Although the total number of global linkages is very low according to other levels of networks in sample regions, the share of firms engaged to global networks is high.

Table 6.6 Spatial Agglomeration of Different Type of SMEs in Ankara, Bursa and Denizli

	Types of SMEs according to their Networks			
	Firms with Regional Networks (%)	Firms with National Networks (%)	Firms with Global Networks (%)	Total (n)
ANKARA	43,1	36,1	20,8	72
BURSA	46,9	21,9	31,3	32
DENİZLİ	51,9	11,1	37,0	27
Total (n)	60	36	35	131
(%)	45,8	27,5	26,7	100

Source: Calculated from survey data

Having measured different levels of networks, the reasons behind regional and external networks have been questioned in the field survey. Advantages of similar work organization in the region, regional trust and inability to find work in other regions and countries are reported in the field survey as the main reasons of regional networks. The share of firms, which stated that being in the same region makes work easier, goes up to 68 percent in Ankara, 68 percent in Bursa, and 85 percent in Denizli. This reason is important for all sample regions so that statistically meaningful difference could not be found in the analysis.

Advantages of similar working styles in region and regional trust, as reasons of regional networks, show statistically meaningful difference among sample regions with 0.03 and 0.01 chi-square probability values (Table 6.7). While about 66,7 percent of firms in Denizli advocate the importance of regional trust, this share falls to 48,4 percent in Bursa and to 25,0 percent in Ankara. Similarly, parallel-working styles is stated as important reason for being a member of regional networks in Denizli. Hence, the regional loyalty and collaborative environment increases the importance of being in the same region and regional trust base. In Bursa, with its rooted industrialization history, the importance of trust has lost its significance compared with Denizli.

Table 6.7 Reasons for working with regional firms in Ankara, Bursa and Denizli*

	ANKARA (n=72)		BURSA (n=32)		DENİZLİ (n=27)		ChiSq	P-value
	%	no	%	no	%	no		
Being in the same region makes work easier	68,1	49	67,7	21	85,2	23	2,24	0,33
Our working styles are similar in the region	26,4	19	25,8	8	55,6	15	**7,23**	**0,03**
Trust	25,0	18	48,4	15	66,7	18	**15,57**	**0,01**
We couldn't find firm to work in other regions	13,9	10	12,9	4	11,1	3	1,17	0,88
We couldn't find firm to work in other countries	26,4	19	29,0	9	40,7	11	1,64	0,44

* These values represent the percentage of answers obtained for each question in the three regions. Moreover, percentages show positive answers.
Source: Calculated from survey data

The survey in Denizli shows that although Denizli has the highest global linkages, the regional relations are also important in the production process. At the same time, many entrepreneurs in Denizli reported that "we couldn't find firms to work in other countries, this is the reason to work with regional firms". One of the managers of small firms in Denizli with high regional networks report that:

> "We couldn't find enough firm to work outside Denizli, especially from other countries. However, my colleagues and I believe that we could learn many things from foreign production partners and we could transfer what we would learn from these partners to the other firms in Denizli."

Table 6.8 Reasons for working with Firms from external regions in Ankara, Bursa, and Denizli*

	ANKARA (n=60)**		BURSA (n=29)**		DENİZLİ (n=24)**		ChiSq	p-value
	%	no	%	no	%	no		
Insufficient quality systems of regional firms	13,3	8	17,2	5	37,5	9	**13,74**	**0,01**
Insufficient technological level of regional firms	26,7	16	31,0	9	41,7	10	3,02	0,55
Production and organization structure of regional firms are not fit to us	18,3	11	17,2	5	41,7	10	8,27	0,08
Absence of skilled employees in region	13,3	8	20,7	6	37,5	9	8,01	0,09
External relations provide new external knowledge	51,7	31	48,3	14	45,8	11	0,68	0,95
We couldn't find firm for working in region	23,3	14	24,1	7	16,7	4	0,62	0,96

* These values represent the percentage of answers obtained for each question in the three regions. Moreover, percentages show positive answers.
** 17 firms have not answered these questions due to absence of external relations.
Source: Calculated from survey data

The inability of region in technology, quality systems, skilled employees and the importance of external knowledge are main reasons of external networks. According to the field survey, the most important reason for entering external networks in all three regions is to access to the external knowledge. 51 percent of firms in Ankara, 48,3 percent in Bursa and 45,8 percent in Denizli reported that the external network relations provide the external knowledge, which is important for the success and competitive capacity of firms (Table 6.8). Among the reasons, insufficient technological level is an other important issue to integrate external networks for Ankara, Bursa and Denizli. Insufficient quality systems of regional firms as a reason to integrate to the external networks shows statistically meaningful difference among sample regions with 0,01 probability. Although this is not significant for the firms in Ankara, it gains importance in Denizli (Table 6.8). Moreover, other reasons to integrate to the external networks for regional incapability is not an issue for firms in Ankara. This result is related with the regional characteristics of Ankara, which provide an attractive position among the sample regions.

These discussions about different levels of networks reveal that the size, sector and region affect the geographical levels of networks. Besides these indicators, different types of networks require different geographical levels. In the following part sample firms and regions will be re-examined according to different types of network relations.

6.3.1 Different Types of Networks and Their Geographical Levels

Previous section shows that sectoral differentiation, size of firm and regional differentiation creates differences in the levels of network relations. Many experiences from the world reveal that types of networks also affect the geographical level of linkages (Sternberg, 1999, Koschatzky, 1999, Keeble, at.al., 1999, Freel, 2003). In this Chapter, production, service, marketing and knowledge networks are studied as different types of networks. As relations with suppliers and subcontractors constituted the production networks, relations with consultancy firms, technical service firms and universities are determined as service networks. On the other hand, linkages with customers and mediators are defined as marketing networks and relations with sectoral leader firms, competitors, cooperators and associations provide the different types of

knowledge to the firms and are named as knowledge networks. In this section, these different types of networks are analyzed separately within the sample regions.

In Ankara, the share of national linkages, as the most important network level of the region, goes up to 56.16 percent, regional networks to 40.95 percent and global linkages to 2.88 percent. This is also a result of the nationally oriented production system of Ankara. Figure 6.5 represents the density of different geographical levels in each type of networks. In production, service and knowledge networks, the regional linkages have been dominant in Ankara. Only in marketing, national networks could became dominant. In service networks, the share of regional linkages is close to 90 percent and the share of national and global linkages came close to zero. The global linkages have the highest share in production and knowledge networks (Figure 6.5).

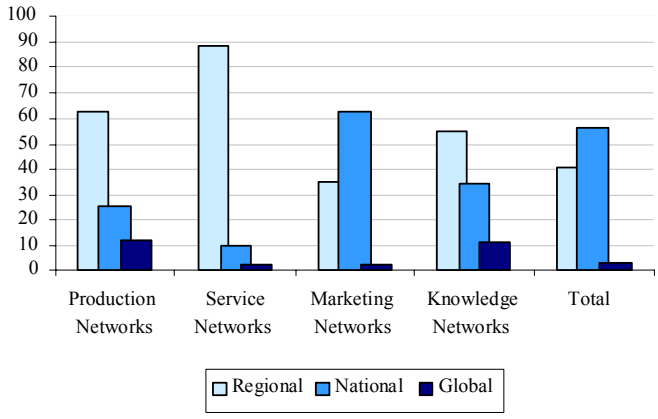

Figure 6.5 Geographical Focus of different type of relations in Ankara
Source: Calculated from survey data

In Ankara, regional networks mainly involve marketing and production activities. The share of customer linkages holds 67,34 percents of all regional linkages and supplier linkages follows the customer networks with 18,43 percent. On the other hand, relations with universities have the smallest share in all regional linkages. However, in university and service relations, regional linkages are more important according to national and global networks in Ankara. This result may be caused by the role of Ankara as capital of Turkey, which provide most of the services at national scale.

Linkages at national level are more important in customer linkages with 90,46 percent. This finding shows that customer networks constitutes the nearly total number of national networks in Ankara. Most of the SMEs in engineering sectors have

established network relations with firms from Istanbul in both customer and supplier activities. Furthermore, in these linkages Izmir, Bursa, Konya and Kayseri regions, as the important production nodes of Turkey, follow Istanbul. In previous chapter, it has already been emphasized that firms in Ankara utilize their geographical closes to inner regions in the country. In networks of textile and clothing SMEs, Denizli become important in the supplier relations beside Istanbul, Bursa and Izmir (Table 6.10). Firms in Ankara constitute its limited external service relations with only Istanbul.

Table 6.9 Geographical Focus of Different Type of Relations in Ankara

	Regional		National		Global		Total	
	no	*%*	no	*%*	no	*%*	no	%
Suppliers	1181	*18,43*	469	*5,34*	213	*47,23*	1863	*11,90*
using subcontractor	138	*2,15*	47	*0,53*	4	*0,89*	189	*1,21*
Subcontracting for	47	*0,73*	31	*0,35*	12	*2,66*	90	*0,58*
Consultancy	127	*1,98*	9	*0,10*	2	*0,44*	138	*0,88*
technical services	81	*1,26*	17	*0,19*	3	*0,67*	101	*0,65*
universities	20	*0,31*	0	*0,00*	0	*0,00*	20	*0,13*
customer	4316	*67,34*	7951	*90,46*	148	*32,82*	12415	*79,33*
mediators	254	*3,96*	168	*1,91*	21	*4,66*	443	*2,83*
competitors	54	*0,84*	93	*1,06*	19	*4,21*	166	*1,06*
local leader firms	38	*0,59*	9	*0,10*	12	*2,66*	59	*0,38*
associations	90	*1,40*	12	*0,14*	3	*0,67*	105	*0,67*
cooperators	63	*0,98*	31	*0,35*	14	*3,10*	108	*0,69*
total	6409	*100,00*	8837	*100,00*	451	*100,00*	15697	*100,00*

Source: Calculated from survey data

In Ankara, global linkages are production, market and knowledge oriented. In global level, customer relations loose their importance and supplier linkages with 47.3 percent have the first rank. This result also represents the feature of production as import oriented rather than export oriented. Furthermore, linkages with subcontractors, mediators, competitors and sectoral leader firms also have an important share in all global connections. This suggests that in global level diversity of linkages is higher than national and regional levels (Table 7.9).

In high technology sectors, supplier networks with firms from Germany, UK and USA has the highest density. Besides them, France, Italy East Asia Countries, Israel and Ukraine are also important countries in supplier networks. On the other hand, Germany, UK and Italy are also important countries in export. In addition, Turki Republic Countries, Syria, Egypt, East Asia, Iran, Iraq provide important markets for

export (Table 6.10). These geographical addresses show the increasing importance of east countries within recent years.

Table 6.10 Geographical Position of Network Partners in Ankara in High Technology and Low-Technology Sectors

	High Technology Sectors in Ankara (n=56)					
	National Networks			Global Networks		
	Dense	Medium	Weak	Dense	Medium	Weak
Supplier	Istanbul (39)	Izmir (8) Bursa (5) Kayseri (2) Konya (3)	Aydın Manisa Zonguldak	Germany (15)	France (5) Italy (5) UK (9) USA (9)	Sweden Finland East Asia Spain Israel Ukraine
Subcontractor		Istanbul (4) Bursa (3)	Adana İzmir Konya Tokat			Romania
Subcontracting for		Istanbul (4)	Bursa Çorum Eskişehir			USA France Germany UK Israel
Consultancy		Istanbul (6)	Izmir			UK
Tech-Services		Istanbul (3)				Holland
Universities			Istanbul			
Customers	Istanbul (30)	Izmir (9) Bursa (5) Adana (3) Konya (3)	Antalya Balıkesir Gaziantep Mersin Muğla Samsun		Germany (2) Italy (3) UK (2)	Russia Switzerland Iraq Iran Syria Egypt East Asia
Mediator		Istanbul (10)	Antalya Bursa Eskişehir Konya Urfa			Iraq Nigeria Turki Repub. China Belgium France
Competitor		Istanbul (6)	Izmir			France Italy
	Low Technology Sectors in Ankara (n=16)					
Supplier	Istanbul (10)	Bursa (3) Konya (3) Denizli (3) Kırşehir (2)	Çorum Eskişehir İzmir Nevşehir		France (2)	Italy East Asia Italy
Subcontractor		Istanbul (3)	İzmir Isparta			
Subcontracting		Istanbul (3)	Bursa İzmir		Germany (2)	Sweden Greece
Consultancy						
Tech-Services						Israel
Universities						
Customers		Istanbul (6) İzmir (2)	Antalya Bursa Çorum Konya		Germany (3)	USA France Cyprus
Mediator		Istanbul (2) Izmir(2)				Germany USA
Competitor		Istanbul (4)	Bursa			

In Bursa, the share of regional networks as the most important geographical level is 56,5 percent, while the share of national networks is 36,6 percent, and the share of global networks has the lowest value with 6,9 percent. Figure 6.6 shows that in service, marketing and knowledge networks regional linkages are dominant according to other network levels in Bursa. However, in production activities national networks become dominant. It is not surprising to see that the global networks have their highest share in marketing activities (Figure 6.6).

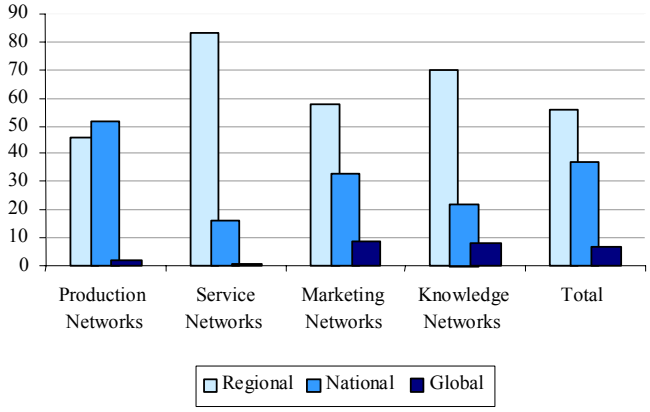

Figure 6.6 Geographical focus of different types of networks in Bursa
Source: Calculated from survey data

Table 6.11 Geographical Focus of Different Type of Relations in Bursa

	Regional		National		Global		Total	
	No	%	No	%	No	%	No	%
suppliers	507	*16,03*	668	*32,62*	22	*5,73*	1197	*21,39*
using subcontractor	94	*2,97*	31	*1,51*	1	*0,26*	126	*2,25*
subcontracting for	27	*0,85*	8	*0,39*	0	*0,00*	35	*0,62*
consultancy	43	*1,36*	12	*0,58*	0	*0,00*	55	*0,98*
technical services	27	*0,85*	2	*0,09*	1	*0,26*	30	*0,54*
universities	2	*0,06*	0	*0,00*	0	*0,00*	2	*0,03*
customer	2130	*67,73*	1164	*56,83*	326	*84,89*	3620	*64,70*
mediators	129	*4,08*	99	*4,83*	10	*2,60*	238	*4,25*
competitors	110	*3,48*	31	*1,49*	12	*3,12*	153	*2,73*
sectoral leader firms	18	*0,57*	7	*0,34*	1	*0,26*	26	*0,46*
associations	32	*1,01*	6	*0,29*	0	*0,00*	38	*0,68*
cooperators	44	*1,39*	20	*0,97*	11	*2,86*	75	*1,34*
total	3163	*100,00*	2048	*100,00*	384	*100,00*	5595	*100,00*

Source: Calculated from survey data
Source: Calculated from survey data

Table 6.12 Location of Network Partners in Bursa in High Technology and Low-Technology Sectors

	High Technology Sectors in Bursa (n=12)					
	National Networks			Global Networks		
	Dense	Medium	Weak	Dense	Medium	Weak
Supplier	Istanbul (11)	Izmir (2)	Adana Ankara Aydın Eskişehir Konya		Germany (3)	Holland UK
Subcontractor	Istanbul (4)		Ankara			
Subcontracting for		Istanbul (3) Adana (2)	Ankara			
Consultancy	İstanbul (4)					
Tech-Services			Istanbul			Italy
Universities			Istanbul			
Customers	Istanbul (12) Ankara (8) İzmir (7)	Konya (3)	Adana Adapazarı	Germany (5) UK (4)	Italy (2)	France Russia Sweden Romania Greece Lebanon Jordan
Mediator	Istanbul (7)	Izmir (3) Konya	Adana Ankara Afyon Antalya			Norway
Competitor	Istanbul (4)		Kayseri Izmir Samsun			USA Germany Italy
	Low Technology Sectors in Bursa (n=19)					
Supplier	Istanbul (6)	Adana (2) Denizli (2)	Ankara Gaziantep İzmir Konya Urfa Uşak			Italy Japan Switzerland
Subcontractor			Uşak			
Subcontracting for		Istanbul (2)	Adapazarı Izmir			Switzerland
Consultancy			Ankara Balıkesir Istanbul			
Tech-Services			Istanbul			
Universities						
Customers		Istanbul (5) Denizli (2)	Adana Izmir			Germany Italy Greece Bulgaria
Mediator		Istanbul				Greece
Competitor						

In regional networks, Bursa represents similar patterns with Ankara, while regional customer linkages with 67,73 percent, and supplier networks with 16,03 percent are the most dense networks (Table 6.11). This finding shows that regional networks are more dominant in customer relations, and national market gains importance in supplier networks in Bursa. University linkages have the lowest share in all types of linkages.

At national level, customer linkages with 57,7 percent are dominant, and with 32,6 percent supplier linkages follow them. In marketing activities, relations with mediators gain importance at national level, as mediator relations are constructed by the firms with firms from Istanbul. Furthermore, in production and marketing networks, Istanbul is the first rank region for Bursa. These results show that the spatial proximity play an important role in dense networks between Istanbul and Bursa. In supplier relations, on the other hand, Adana and Izmir are important regions in both textile and automotive sectors (Table 6.12). The old textile tradition of Adana may be the reason for this network relation. However, in the related literature, it is advocated that firms prefer geographically close firms in subcontracting relations. For example, according to the study of Koschatzky (1999) in Baden, Saxony and Lower Saxony regions spatial proximity plays an important role in subcontracting relations. Hence, in textile sector, the supplier and customer networks between Denizli and Bursa come into agenda.

At the global level, again customer networks have the first rank position with 80,9 percent. Suppliers, mediators and competitor networks are the other types of leading networks in global level. The density of global customer linkages shows that export capacity of Bursa is higher than Ankara. In automotive sector of Bursa, similar to engineering sectors of Ankara, Germany, UK and Italy are most important export countries. In addition to these countries Romania, Greece, Russia, Jordan provide important export markets for firms of Bursa. In textile industry, Germany, Italy and Greece are important countries in both supplier and customer networks.

In Denizli, as the last sample region, 65,2 percent of linkages occur in regional level, and only 26,9 percent of linkages are in national level, which is nearly half of the national linkages of Ankara. The remaining 7,9 percent of linkages are established at global level, which is the highest value among sample regions. Figure 6.7 represents that in production, service, marketing and knowledge networks, the geographical focus in Denizli is on regional networks. In knowledge networks, the percentage of regional networks reach above the regional average and in marketing networks decrease below the average. In service and marketing networks national level gain importance compared with global linkages. The share of global linkages reaches to its highest level in both production and marketing networks.

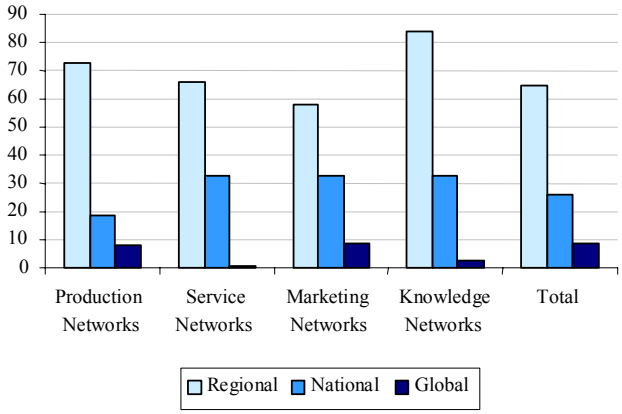

Figure 6.7 Geographical Focus of different type of relations in Denizli

In Denizli, regional linkages are dispersed among different types of networks more equally according to Ankara and Bursa. Similar to Ankara and Bursa, customer linkages have the first rank in other types of networks with 45,8 percent in Denizli. However, the share of regional customer linkages is higher than in Ankara and Bursa. This figure indicates that SMEs in Denizli use external networks in customer relations more effectively according to other sample regions. Besides customer relations, supplier and subcontracting networks have also important share among other types of linkages. In contrast to other regions, subcontracting relations gain importance in production activities in Denizli.

Table 6.13 Geographical Focus of Different Type of Relations in Denizli

	Regional		national		global		total	
	No	*%*	No	*%*	No	*%*	No	*%*
suppliers	410	*16,86*	200	*19,90*	20	*6,83*	630	*16,89*
using subcontractor	266	*10,94*	5	*0,50*	1	*0,34*	272	*7,29*
Subcontracting for	176	*7,24*	24	*2,39*	71	*24,23*	271	*7,27*
Consultancy	37	*1,52*	23	*2,29*	0	*0,00*	60	*1,61*
technical services	24	*0,99*	9	*0,90*	1	*0,34*	34	*0,91*
universities	6	*0,25*	2	*0,20*	0	*0,00*	8	*0,21*
customer	1115	*45,85*	589	*58,61*	190	*64,85*	1894	*50,78*
mediators	128	*5,26*	113	*11,24*	5	*1,71*	246	*6,60*
competitors	86	*3,54*	27	*2,69*	1	*0,34*	114	*3,06*
Sectoral leader firms	52	*2,14*	9	*0,90*	1	*0,34*	62	*1,66*
associations	36	*1,48*	3	*0,30*	0	*0,00*	39	*1,05*
cooperators	96	*3,95*	6	*0,60*	3	*1,02*	105	*2,82*
total	2432	*100,00*	1005	*100,00*	293	*100,00*	3730	*100,00*

Source: Calculated from survey data

It is interesting to observe that in Denizli the share of university linkages in total (regional, national and global) is higher than Ankara and Bursa. Moreover, the density of regional university linkages is slight lower than Ankara, which is considered as a city of service and university, but dramatically higher than Bursa. The other important side of university linkages in Denizli is the relations with other universities in different regions, especially with universities in Ankara. On the contrary, both in Ankara and in Bursa, all university linkages have been realized only in regional level.

Unlike regional networks, national networks are very limited in Denizli according to other sample regions. After customer linkages, supplier and mediator linkages have significant densities in national level. In previous Chapter, it has been already discussed that mediators in Istanbul assist relations between the textile firms in Denizli and foreign firms. Due to the mechanism of export, importance of national mediator in Denizli with a percentage of 11,24 is extremely higher than Ankara (3,96 percent) and Bursa (2,83 percent) (Table 6.13). In supplier, subcontractor and customer networks, Denizli has dense relations with Izmir. In addition, Gaziantep, Bursa and Adana as the important textile centers of Turkey within the history also play an important role in the supplier networks of Denizli (Table 6.14).

In global networks of Denizli again customer networks have the first rank as regards to densities. It is interesting to note that the share of global subcontracting networks is extremely high in Denizli. In the evolution of production process in Denizli, subcontracting relations with foreign firms has been the main inducement of economic growth and regional development (Erendil, 1998, Pınarcıoğlu, 1999). It is a fact that many firms in Denizli produce as subcontractor of foreign firms and produce for labels of foreign firms, instead of producing and selling with their own name. Due to this fact in global levels Denizli is competitive in subcontracting market, rather than end-product market.

Consequently, the global linkages of Denizli are higher than Ankara and Bursa, because of the dense global customer and subcontractor linkages. Textile firms in Denizli produce for USA, European Nations (Germany, Italy, Spain, and UK) and also for Turki republics. One entrepreneurs in Denizli expressed that:

> "We have constituted subcontracting relations with Turki Republics for the last ten years. Especially, after China has entered in USA markets with its efficient products, we have started to search for new markets in the World."

In customer and supplier networks, on the other hand, the global linkages of Denizli are more expended, which include Israel, Canada, Japan, Pakistan, etc.

Table 6.14 Location of Network Partners in Denizli in High Technology and Low-Technology Sectors

	High Technology Sectors in Denizli (n=4)					
	National Networks			Global Networks		
	Dense	Medium	Weak	Dense	Medium	Weak
Supplier	Istanbul (3) Izmir (3)	Ankara (2)	Konya			UK Italy Belgium
Subcontractor						
Subcontracting for						
Consultancy		Istanbul (2)	Izmir			
Tech-Services			Ankara			
Universities						
Customers						
Mediator						
Competitor			Istanbul Kayseri			
	Low Technology Sectors in Denizli (n=23)					
Supplier	Istanbul (10)	İzmir (6) Gaziantep (6) Antalya (4)	Adana Ankara Bursa Isparta Kayseri Malatya Uşak		Germany (3) UK (3) USA (2) Pakistan	Holland Japan
Subcontractor		Istanbu (3)	İzmir			
Subcontracting for		İstanbul (4)	Aydın Gaziantep İzmir		USA (3) Turki Republic (2)	Germany Italy Spain UK
Consultancy		Izmir (4) İstanbul (3) Ankara (2)				
Techn-Services		İzmir (4) İstanbul (3)	Ankara			Italy
Universities		İzmir (2)				
Customers	İstanbul (8)	Izmir (6)	Ankara Bursa Gaziantep		USA (5) France (4) Germany (3) UK (3) Italy (3) Canada (2) Australia (2)	Spain Holland Israel
Mediator	Istanbul (9)		Bursa Tekirdağ			
Competitor	Istanbul (9)		Bursa Gaziantep			Germany Italy China

The data of three regions show that regional networks, depending on regional mutuality and trust, keep their significance. Nevertheless, the data reveals that

interfirm relations tend to extent beyond the boundaries of regions. Similar result has been advocated by most empirical studies (Staber, 1996, Koschatzky, 1999, Braun, at.al., 2002, Patrucco, 2003). It is the fact that firms constitute their networks in regional, national or global levels according to the spirit of work.

Table 6.15 Frequency of Regional and External Networks

	Regional Networks				External Networks			
	Everyday or weak	Every month	Every year	Never	Everyday or weak	Every month	Every year	Never
Supplier	74,4	14,4	0,8	10,4	51,2	26,4	2,4	20,0
Subcontractor	53,6	11,2	0,8	34,4	21,6	10,4	0	68,0
Service firms	44,0	29,6	3,2	23,2	12,0	13,6	3,2	71,2
Universities	0,8	8,8	7,2	83,2	0	1,6	1,6	96,8
Customers	86,4	4,0	0	9,6	71,2	7,2	0	21,6
Associations	16,0	33,6	10,4	40,0	5,6	7,2	3,2	84,0
Cooperators	32,8	26,4	2,4	38,4	18,4	10,4	1,6	69,6

Source: Calculated from survey data

In this section, the density of different types of networks has been handled in detail. Besides densities, frequencies are also important indicators of network relations, and Table 6.15 presents the frequency levels of different types of networks. Supplier, subcontractor and customer networks, with the highest density among other types of networks, require daily or weakly interrelation. In contrast, at the relations with associations and universities the frequency of linkages is monthly and in the external networks the share of daily and weakly linkages is lower according to regional networks.

The survey has pointed out that network relations of SMEs are highly expended in national and global space. Among different types of linkages, production and marketing networks, such as supplier, customer and subcontracting networks are highly expanded in global space. In the production networks, subcontracting linkages are more space specific according to supplier and customer linkages. Similarly, the share of external networks sharply decrease in relations with service firms. This result shows that service networks are spatially more bounded according to other types of networks.

6.3.2 Contributions of Using ICTs to Network Relations of SMEs

In the literature, many studies have argued that in the geographical expansion of production activities electronic networks (ICTs) are playing an important role. Within this context, the relationship between the usage of ICTs and external network relations is analyzed, and Internet, telephone and face to face communication in network relations have been discussed in this section. In the related literature, it is assumed that the diffusion of new information and communication technologies (ICTs) also increases the diffusion of knowledge in inter-regional and global networks, and the integration between regions, nations and continents. (Capineri and Romei, 1999, Kitchin, 1999, Castells, 2001).

In the methodology chapter, it has already been discussed that KOSGEB provides the important electronic infrastructure and services for SMEs in Turkey. KOBINET as a project of KOSGEB has been analyzed in order to understand the capacity of SMEs to use Internet and technology infrastructure in their production processes, especially in inter-regional production networks. Similar projects on electronic infrastructure have been realized in different countries under the leadership of related public institutions. In this section, the capacity of SMEs to use ICTs, and KOBINET as an electronic SME network are discussed in order to analyze the relationship between external networks and ICTs.

Capacity of SMEs to Use ICTs

Internet is an important tool for firms, especially for SMEs, to communicate with different actors in production process. Inadequate internal capacity of SMEs requires external partners at production. At that point, Internet enables SMEs to take indirect advertising, to get rapid feedback from customers, to improve responsiveness to customers, to access to government data sets, and to accelerate corporate communication, all of which improve the knowledge capacity of SMEs.

However, although Internet is a rapidly developing and spreading tool, the connectivity capacity of SMEs in Turkey is far behind the levels of European nations and USA (Castells, 2001). The limited Internet ownership in Turkey is mainly the result of limited usage of computers. Furthermore, the Internet connectivity level differentiates according to regions and sectors and the use and the accessibility of

Internet among SMEs in Turkey is also not equally developed (Table 6.16). In this analysis, the Internet connectivity level has been calculated according to computer number per worker that is connected to the Internet. At the analysis sample firms have been grouped into three categories according to Internet connectivity level: (1) no connection with 0 Internet per worker, (2) low connection with 0-0,4 Internet per worker, and (3) high Internet connection with more than 0,4 Internet per worker.

Table 6.16 Internet Connectivity Level according to Regions and Sectors

	Internet Number per firm	No Internet connection (%)	Low Internet connection (%)	High Internet connection (%)	Total (n)
Regions					
ANKARA	7,6	3,7	63,9	32,4	72
BURSA	7,1	0,0	77,4	22,6	32
DENİZLİ	6,7	5,6	88,9	5,5	27
Sectors					
High-technology sector	8,0	1,3	65,8	32,9	79
Low-technology sectors	6,3	7,8	82,4	9,8	51

Note: Internet connectivity = Internet connected computer number / total number of workers
Source: Calculated from survey data

Table 6.16 represents the high ICTs usage capacity of SMEs in Ankara, and the extremely low capacity of Denizli. In this concept, Bursa has the average value. Computer numbers per firm, which connect to the Internet, is also higher in Ankara with 7,6 Internet connection per firm than in Bursa and in Denizli. Again, in Ankara the average firm size is 43 employees. Therefore, 5,6 employees have one computer with Internet connection in a firm. This percentage falls to 7 employees per computer with Internet connection in Bursa and only 16 employees per computer with Internet connection in Denizli. Thus, Internet per worker is three times lower in Denizli than in Ankara. 32,4 percent of firms in Ankara, 22,6 percent of firms in Bursa, 5,5 percent of firms in Denizli has high Internet connection. On the other hand, 5,6 percent of firms in Denizli has no Internet connection, this value decrease to 3,7 percent in Ankara. All firms in Bursa have more or less Internet connection.

Furthermore, interviews in Denizli show that the second generation has accepted the importance of communication technologies and they use them more effectively. One entrepreneur from Denizli reported that:

> "… we started to use Internet very recently, but this tool provide us cost reduction. We could continue our connection with foreign companies through Internet without going there. I do not know to use both computer and Internet but my son, who has recently come from Istanbul after finishing his education, helps us to use computer and Internet".

In Internet space, e-mail, e-data exchange and e-commerce are important activities of production process. Among these activities, e-mail usage is widespread in three regions. Almost all sample firms use e-mail in their work. However, e-commerce is not as popular as e-mail and its share is around 30 percent. Most of the entrepreneurs stated that:

> "… in order to increase export capacity, e-commerce is an efficient way. However to establish trust is difficult in electronic space according to face to face relations. In order to spread the e-commerce the reliable institutions should be determined and background of trust should be constituted in the Internet."

E-data exchange, which allows long distance cooperation in production, is rarely known and used in three regions. The usage of e-data exchange changes between 5 to10 percentages among regions, within which the share of Ankara is highest, and the share of Denizli lowest. This result is not a surprise if the low information and communication capacity of Denizli is taken into consideration.

Success of KOBINET and Alternative Electronic Networks to KOBINET

The capacity of SMEs to use ICTs could be induced by some programs like KOBINET. The aim of the KOBINET is to increase the capacity of SMEs to use ICTs and to extent the global markets of SMEs through electronic networks and infrastructure. Furthermore, with the help of ICTs the mediators in export could be eliminated, and firms could find foreign companies to export with the help of electronic networks. For this reason, KOSGEB as the home institution of KOBINET provides services, such as preparation and revision of web sides, free e-mail services, knowledge bank, announcement of cooperation and collaboration proposals from all over the world.

The methodology Chapter reveals that in the determination of case sample, one of the main criteria was the KOBINET membership. Therefore, among sample firms KOBINET members have been analyzed, and reasons to participate to KOBINET have been questioned. Results of the survey reveals that many SMEs could not explain and

does not remember their reasons to participate to KOBINET. For three regions the most important reason to integrate to KOBINET is the importance of KOBINET services. In Ankara, the share of this reason goes up to 31 percent, in Bursa 43,8 percent, in Denizli 41,7 percent (Table 6.17). On the other hand, the image of being a member of KOBINET is rather important for SMEs in Denizli (33,3 percent). The existing subscribers are also important for SMEs in Denizli. At that point, it is interesting to observe that Denizli has weak information and communication infrastructure compared with the other sample regions. Many entrepreneurs emphasize that, in addition to these reasons, being a KOBINET member becomes the institutional obligation to take state credits. Moreover, one entrepreneur from Bursa declared that

> "… we have to be a member of KOBINET, because the first requirement to take investment credit from Public Bank is to be a member of KOBINET. We are member but in fact we do not know any thing about the services of KOBINET "

Therefore, as the requirement of Public Bank increases the number of subscribers, SMEs do not any expectations from the services of KOBINET in Turkey.

Table 6.17 Reasons for participation to KOBINET in Ankara, Bursa and Denizli (%)*

	ANKARA	BURSA	DENİZLİ	Total (n=70)	
High percentage of already subscribers in your regions	16,7	12,5	25,0	17,1	(n=12)
High percentage of already subscribers in other regions	21,4	31,3	25,0	24,3	(n=17)
Importance of KOBINET services for your firm	31,0	43,8	41,7	35,7	(n=25)
Competitors in the same sector were connected	14,3	18,8	8,3	14,3	(n=10)
Image effect	21,4	25,0	33,3	24,3	(n=17)

* These values represent the percentage of replies obtained for each question in the three regions.
Source: Calculated from survey data

Among the KOBINET services, e-mail usage is more widespread in Ankara, Bursa and Denizli. Due to the limited usage of ICTs in Denizli, the use of KOBINET services is very limited in this region. Although almost every firm uses e-mail, they do not use their KOBINET e-mail addresses. Only 28,6 percent of SMEs in Ankara, 37,5 percent in Bursa, and 25 percent in Denizli use their KOBINET e-mail every day or every week (Table 6.18). Moreover, during the survey of this study, it has not been possible to reach entrepreneurs through KOBINET e-mail addressees. All of them

prefer to use their own private e-mail addresses to communicate during this field survey. This experience is also important to understand the meaning and significance of KOBINET among SMEs. For sample SMEs in Ankara, the most useful service of KOBINET is e-databank (Table 7.18). However, SMEs in Denizli are not aware of the contribution of this type of knowledge. This situation may be caused by the inadequate capacity of SMEs to learn through Internet. In the light of these analysis it is not surprising to observe that among three regions satisfaction degree of SMEs from KOBINET services is lower than 40 percent. Ironically, although Denizli have the lowest ICTs capacity among other sample regions, this region has the highest satisfaction degree in the KOBINET.

Table 6.18 Frequency of using KOBINET services in Ankara, Bursa and Denizli

	ANKARA		BURSA		DENİZLİ		Total (n=70)	
	Never (%)	Always* (%)	Never (%)	Always (%)	Never (%)	Always (%)	Never	Always
Visiting other firms web pages	45,2	26,2	56,3	18,8	50,0	16,7	34	16
Updating your web page	59,5	0,0	50,0	6,3	75,0	8,3	42	2
Using e-mail	64,3	28,6	50,0	37,5	75,0	25,0	44	21
Using e-commerce	83,3	7,1	75,0	18,8	66,7	8,3	55	7
Using data bank	38,1	31,0	62,5	25,0	58,3	8,3	33	18

* Always = Every day or every week
Source: Calculated from survey data

In spite of using KOBINET, firms prefer to create their own close electronic networks. In the literature, it is advocated that firms using these linkages are more innovative and productive in the production processes. Among the three regions, the share of firms that is subscribed to electronic networks is highest in Bursa with about 55 percent. Ankara is the following region with about 40 percent, and Denizli with about 33 percent has the third rank.

The interviews show that being in the same electronic network with other partners provides time and cost saving in production process. For example, with the mediation of e-data exchange (EDI) firms could see their subcontractors and customers stock information and organize their production according to the productions of their cooperative firms. This synchronization enables cooperative firms to produce as if they form an entity without spending additional time and money. Therefore, this electronic communication system increases the productivity of production process by

eliminating time waste. In addition, private electronic networks could be constructed in the large companies spreading these benefits also within the firm.

The interview with one network company in Istanbul shows that the demand for electronic network comes from small firms rather than large firms. According to the statement of the firms, the connections established through these networks are used to organize vertical production relations such as subcontracting relations and consumer-producer relations, instead of producing new technologies. Although, today, this type of electronic networks is very limited among SMEs, their importance in the production cooperation is obvious.

It is clear that the area of this thesis is neither an organizational analysis of KOBINET nor other electronic networks, but these analyses provide the information about the capacity of sample firms to use ICTs. The more important issue for the context of the thesis is the effect of ICTs on external network relations of SMEs.

Assistance of ICTs to Network Relations

It has been already advocated that information and communication technologies increase the chance of SMEs to integrate interregional networks. For this reason, the relation between Internet connectivity, being KOBINET subscriber, and density of network relations have been examined in this section. As the proxy of ICT using capacity, Internet connectivity level has been defined. On the other hand, SME groups, which have been classified according to network density of SMEs, have been used in order to analyze the relationship between networking and ICTs relation. Within this classification, SMEs with regional networks (60), SMEs with national networks (36), and SMEs with global networks (35) have been determined in the section 6.3.

Table 6.19 Relations between Internet connectivity level and Network Relations

	Internet Connectivity Level of SMEs		
	Low (n=42)	Medium 1 (n=35)	High (n=29)
Firms with Regional Networks (%) (n=60)	38,3	29,4	32,3
Firms with National Networks (%) (n=36)	33,3	29,2	37,5
Firms with Global Networks (%) (n=35)	20,0	25,7	54,3

ChiSq=8,31, P-value=0,05 (Calculated through real numbers, not percentages)
Source: Calculated from survey data

In the theoretical part, it is hypothesized that ICTs increase the chance to integrate interregional networks. Table 6.19 reveals that there is a correlation between geographical levels of networks and Internet connectivity level (Chi-square probability = 0,05). Table 6.19 also shows that high level of Internet connectivity also increases the national and global networks. Firms with regional networks have low Internet connectivity level (38,3 percent) according to the firms with global networks (20 percent). Firms with global networks have the highest share (28,6 percent) in the high Internet connectivity level compared with other types of SMEs (Table 6.19). This suggests that the ICTs are important infrastructures that connect agents from long distance and the data of sample firms supports the hypothesis about the relationship between ICTs and external network relations.

In this case, it is also interesting to note that this general result, driven from the total of the sample firms, is not true for each sample region, among which Ankara shows different characteristics. Bursa and Denizli show the similar trend with Table 6.19 and use the ICTs in order to integrate to global markets. In contrast, in Ankara, the share of ICTs usage in production process is higher than Bursa and Denizli. Moreover, in Ankara both low and high Internet connectivity levels are higher in firms with regional networks compared with nationally and globally linked firms. It could be concluded that are not the unique reason to integrate global linkages.

In Ankara, the usage of ICTs is high but the integration to global networks is low. In electronic and computer sectors, which are dominant in the sample of Ankara, integration into the global networks require more than information and communication infrastructure, and necessitate globally competitive technology and new knowledge of innovation. On the other hand, related infrastructure has been used in the communication of regional firms. Entrepreneurs in Ankara indicate that this regional integration is important in the production process especially in software sectors, which depends on knowledge capacity. It could be expected that in the later steps of economic development, internationalization could be achieved by firms in Ankara. At that time, the existing ICTs will ease the global communication of this region.

Among the existing network infrastructure KOBINET has an insignificant position. Table 6.20 indicates that to be a member of KOBINET could not induce the international networks. Therefore, being a KOBINET member is more widespread among regionally embedded firms, rather than globally integrated firms. More than

half of the globally linked SMEs is not KOBINET subscribers and 61.7 percent of regionally embedded firms are KOBINET members (Table 6.20).

Table 6.20 Relation between Being KOBINET Member and Network Relations

	Not KOBINET Member (n=59)	KOBINET Member (n=72)	Total
Firms with Regional Networks (%)	38,3	61,7	60
Firms with National Networks (%)	49,0	51,0	36
Firms with Global Networks (%)	51,4	48,6	35

ChiSq=5,21, P-Value=0.31 (Calculated through real numbers, not percentages)

Source: Calculated from survey data

However, not only electronic networks but also face to face relations are used in regional and inter-regional networks. ICTs could not be substituted by face to face relations completely and visa versa. Table 6.21 shows that in regional networks face to face relations are more dominant according to ICTs, as in external networks ICTs are used more frequently than face to face relations. The preferences of electronic networks and face to face relations change according to types of networks. In regional networks, the share of ICTs usage has reached the highest share in supplier networks. This result could be explained through the main characteristics of supplier networks, which does not highly depend on tacit knowledge (Table 6.21). On the other hand, university networks has the lowest share (5,7 percent) at using ICTs in regional level. This finding could be the result of hard knowledge base of university linkages. It is not interesting to note that the usage of ICTs is low in regional networks according to external networks.

Table 6.21 ICTs versus Face to face Relations in Regional and External Networks (%)

	Regional Networks				External Networks			
	No Linkages	ICTs	Face to face	Face to face and ICTs	No Linkages	ICTs	Face to face	Face to face and ICTs
Supplier	11,4	26,0	42,3	20,3	18,7	66,6	4,9	9,8
Subcontractor	37,4	17,1	39,8	5,7	63,4	32,5	1,6	2,4
Service firms	21,1	20,3	42,3	16,3	73,2	19,5	1,6	5,7
Universities	83,7	5,7	7,3	3,3	95,9	1,6	0	2,4
Customers	13,8	15,4	43,9	26,8	21,1	43,1	13,0	22,8
Associations	45,5	19,5	28,5	6,5	81,3	11,4	4,9	2,4
Cooperators	39,0	16,3	34,1	10,6	71,5	17,9	4,9	5,7

Source: Calculated from survey data

At the analysis of national and global networks, as the external linkages, the importance of ICTs has increased, while the share of face to face relations have decreased. Nevertheless in external networks, the share of ICTs has the highest level in supplier linkages. Customer and subcontracting relations follow supplier relations with dense usage of ICTs in external networks. However, in the external networks, the importance of face to face relations does not loose its importance completely. Moreover, sample firms indicate that ICTs are not enough to communicate in external networks and coexistence of face to face relations and ICTs are still preferred similar to regional networks (Table 6.21). One entrepreneur from Bursa stated that:

> "… Internet, telephone and fax will not replace the face to face relations completely in the future. However, we should accept that the frequency of our business travels to foreign countries was more frequent before using Internet effectively. This type of electronic relations provides money and time saving to us…"

Sternberg (1999) in his study in Baden and Saxony regions has found similar results. His study shows that spatial proximity and face to face relations can not simply be replaced by contacts via the new information and communication technologies, such as Internet. Nevertheless, the importance of Internet in the relations of firms is also accepted, especially in national and global network relations.

In conclusion, it is not possible to advocate the uniqueness of ICTs in the increasing importance of external networks. However, with the help of increasing information and communication technologies, external networks of firms increase and become more dense. Today, in these debates, the significance of regionally embedded networks is discussed and in stead of regional embeddedness, non-local embeddedness and open knowledge systems are strongly emphasized (Grabher and Stark, 1997, Lynson, 1999). At that point of discussion, interrelationship between regional and global networks gains importance.

6.3.3 Regionally Embedded Networks Versus Global Networks: Whether the Global Linkages Affect Regional Linkages in Ankara, Bursa and Denizli or Not

This case study shows that not only regional but also national and global linkages are enough in the production and innovation processes of SMEs. There is a wide literature about the importance of regional networks on development and innovativeness.

However in more recent studies, the increasing significance of inter-regional networks, and especially global networks come in to agenda. Therefore, one question gains importance: "*whether the increasing global linkages affect the existing regional networks negatively or not*". The answer of this question is important, because SMEs could not entirely give up regional networks, which are so important especially in the initial phases of development and in the dissemination of innovation knowledge among regional actors.

In the field survey, effect of global networks on regional networks could not be analyzed directly due to the absence of time serious data on this issue. Thus, the importance of different levels of linkages and interrelationship between regional and global networks has been asked to entrepreneurs in interviews in sample regions. They have evaluated this issue according to their individual experiences. Therefore, in the field survey, firstly the importance of different geographical levels of network relations for the competitive and innovative capacity of SMEs has been questioned. For this reason, the question "*which levels of relations are so important for your competitiveness and innovativeness*" has been asked to the entrepreneurs.

Table 6.22 Which types of relations important for firms' competitive and innovative capacity in Ankara, Bursa and Denizli.

		Level of Linkages		
		Regional relations	National relations	Global relations
ANKARA	High-technology sector	53,6	57,1	66,1
	Low-technology sector	62,5	62,5	73,3
	Total	**55,6**	**58,3**	**67,6**
BURSA	High-technology sector	78,9	52,6	84,2
	Low-technology sector	75,0	66,7	66,7
	Total	**77,4**	**58,1**	**77,4**
DENIZLI	High-technology sector	25,0	0	75,0
	Low-technology sector	78,3	56,5	69,6
	Total	**70,4**	**48,1**	**70,4**

Source: Calculated from survey data

Among three geographical levels, regional and global linkages are seen as the most important levels in Bursa and Denizli (Table 7.22). It is interesting to note that in Ankara the percentages of firms that emphasize the importance of global linkages in competitive and innovative capacity has the highest degree among the percentages of firms that report the importance of other levels. Moreover, national linkages are seen

as very important relations after global networks. This result is true for both high technology and low technology sectors in Ankara. Among the sample regions the importance of national linkages has the lowest value in Denizli. In Bursa and Denizli, for firms in high-technology sectors, global networks are accepted as more important than regional networks. However, for firms in low technology sectors, regional networks are more important than other types of linkages (Table 7.22).

After re-handling the importance of regional and global networks for entrepreneurs, the positive and negative effects of national and global networks on regional networks have been analyzed in the case study. For this reason, the question: "*with the introduction to new global networks has the intensity of your relationship has increased, decreased or remained constant?*" is asked to entrepreneurs. In Bursa and Ankara, more than half of the entrepreneurs stated external linkages, neither negatively nor positively, affect the regional networks and regional collaborative environment. However, in Denizli 70,4 percent of entrepreneurs believed that there is an effect of external linkages on regional collaborative environment positively or negatively (Table 6.23).

Table 6.23 How external relations effect regional relations in Ankara, Bursa and Denizli.

		No effect	increase	Decrease	Total
ANKARA	High-technology sector	60,7	37,5	1,8	56
	Low-technology sector	50,0	31,3	18,8	16
	Total	**58,3**	**36,1**	**5,6**	**72**
BURSA	High-technology sector	73,7	15,8	10,5	19
	Low-technology sector	58,3	33,3	8,3	12
	Total	**67,7**	**22,6**	**9,7**	**31**
DENİZLİ	High-technology sector	50,0	50,0	0	4
	Low-technology sector	26,1	56,5	17,4	23
	Total	**29,6**	**55,6**	**14,8**	**27**

Source: Calculated from survey data

In all sample regions, the share of firms, which advocated that global networks increase the role of regional networks, is higher than the share of firms believing that global networks decrease the importance of regional networks. This share has the highest value in Denizli with 56,5 percent. However, many studies about Denizli (Eraydın, 2001, Pınarcıoğlu, 1999) show that although in the initial stages of regional development, strong regional networks are very important in order to resist crisis conditions during the economic crisis. However, in the internationalization process,

with the increasing global networks, the strong networks give their place to more weak ties and regional networks have lost their importance. Among the sample regions, only 14,8 percent of entrepreneurs have worried about the decreasing role of regional networks (Table 6.23).

The data of this thesis shows that although Denizli is loosing its collaborative structure, today Denizli has not totally lost its unity in regional networks compared with Ankara and Bursa. For Bursa, the reality is different and their regional ties are looser than Denizli. The studies about evolution process in development of Bursa support this finding (Eraydın, 1992, Pınarcıoğlu, 1999). On the other hand, in the regional development experience of Ankara regional networks are more flexible and loose. Therefore, it is difficult to state an opinion about collaborative regional environment in Ankara, in which relations with other cities of Turkey, especially with Istanbul and Anatolian regions, have the core position in production and innovation activities in stead of regional relations.

Entrepreneurs in three sample regions believe that the existence of national and global networks increase the density of regional networks. Those who believe that external networks may strengthen regional networks are approximately four times more than those who think that they would weaken the regional networks (Table 6.23). These results express that SMEs with strong regional networks have higher interregional and global networks than SMEs with weak regional networks.

This case study also shows that there are inter-relationship between the regional and global network relations. Similar to the findings of this thesis, the results of Sternberg (1999) also approve this hypothesis. In Baden, the regional linkages have a high level, together with the share of international linkages that have the highest level. Similar result has also been obtained in Denizli case. Among three regions, Denizli has the highest density of regional network at the same time with the highest density of global networks. Moreover, many entrepreneurs reported that the strong regional networks have provided important opportunities to integrate global networks.

6.4 Innovation and Networking: The Contribution of Networks to Innovative Capacity of SMEs

The core issue of the thesis is to analyze the relationship between innovativeness and networking. Many writers advocated that SMEs are rarely capable to innovate with no network relations and the high density of networks creates a synergy to induce innovative activities (Asheim and Cooke, 1997, Arndt and Sternberg, 2000, Camagni and Capello, 2000, Collinson, 2000, Freel, 2000, Koschatzky and Bross, 2001, Lawson and Lorenz, 1999, Patrucco, 2003). Moreover, according to this theoretical frame, networking is an essential mean of knowledge exchange and uncertainty reduction, and to a certain extends, networking compensate lack of internal resources. Therefore, successful innovation depends on the knowledge creation capacity of firms, as well as entering network relations in regional, national and global levels (Koschatzky, 2000).

Innovation networks are seen as coordination of various agents such as research institutions, regional agencies and universities, which participate to create and develop new products, processes and organizations. Moreover, these interactions occur in different geographical levels of networks, such as regional, national and global networks, which are already discussed in previous parts.

In the networking and innovation relationship, there are two sides of the coin. On the one side, all types of network relations unconsciously contribute to the innovative capacity of SMEs as knowledge sources. On the other side of the coin, there are innovation networks, which are constituted consciously to improve innovativeness. Consequently, within this perspective, two different analyzes are followed in order to understand the relationship between innovativeness and networking. On the one hand, it may be hypothesized that SMEs with more networking relations have higher innovative capacity. On the other hand, it is possible to analyze innovation networks, which are cooperation or alliances, founded in order to be innovative.

In this section, the contribution of regional, national and global networks to innovative capacity of SMEs have been analyzed in three sample regions: Ankara, Bursa and Denizli. In the following part of the Chapter, relationship between networking capacity and different types of innovation have been analyzed. After that, innovation networks of SMEs have been handled with its types and geographical levels.

6.4.1 Regional, National and Global Networks to Improve the Innovative Capacity of SMEs

In studies of innovation networks different levels of networks have been handled and analyzed. In the literature there are many studies about importance of regional networks in the innovation activities (Asheim and Cooke, 1997, Arndt and Sternberg, 2000, Camagni and Capello, 1999, Cooke and Morgan, 1998). In recent years, the importance of external networks and external knowledge has increasingly been emphasized especially in empirical studies (Koschatzky, 2000, Collinson, 2000, Patrucco, 2003).

In the theoretical part of the thesis, the contribution of regional network relations to innovative activities has been discussed with reference to different experiences from the world. Regional networks provide the common culture and trust, and provide the necessary knowledge accumulation of innovation activities in the region. Therefore, in light of many empirical studies (Keeble, at, al. 1998, Koschatzky, 1999, Arndt and Sternberg, 2000), it is hypothesized that "*SMEs in manufacturing sector with dense regional linkages are more successful in innovation activities than SMEs with little connection to their region*".

In order to analyze the relationship between density of regional networks and innovative capacity of sample SMEs, firstly the sample firms have been re-grouped as regards to regional networks. The average number of regional networks is 89 in Ankara, 98 in Bursa and 90 in Denizli. SMEs, which are below these average numbers, have been described as SMEs with low regional networks. Similarly, SMEs that are above these average numbers have been named as SMEs with dense regional networks. According to this classification, 54 SMEs have low regional networks, and 76 SMEs have dense regional networks. On the other hand, innovative capacity of sample firms is measured in terms of the number of development and changes in products and processes in last three years. There are four categories as measures of innovation capacity of firms, which are 0 innovation as no innovation, 1-5 innovations as low innovation, 6-10 innovations as medium innovation and 11 and more innovations as high innovation capacity.

Table 6.24 represents the relationship between the density of regional networks and the innovative capacity of SMEs. Thus, according to this table, it is possible to argue

that there is a positive correlation between the density of regional relations and innovativeness (Chi-square probability for entire sample = 0,002). Among SMEs with low regional networks, the innovative capacity is low compared with firms with dense regional networks. For example, 29,6 percent of SMEs that have low regional linkages have not realized any innovation. However, this percentage is extremely low for highly regionally connected SMEs (9,2 percent) (Table 6.24).

Table 6.24 Innovation Capacity of SMEs, with dense and low regional linkages.

		Innovation Capacity of SMEs*					ChiSq ***	P-value
		No innovation	Low innovation	Medium innovation	High innovation	Total (n)		
ANKARA	SMEs with low regional networks (%)	29,4	44,1	17,6	8,8	34		
	SMEs with dense regional networks (%)	7,9	26,3	36,8	28,9	38		
	Total (%)	**18,1**	**34,7**	**27,8**	**19,4**	**72**	**12,36**	**0,006**
BURSA	SMEs with dense regional networks (%)	23,1	30,8	30,8	15,4	13		
	SMEs with high regional networks (%)	5,6	22,2	44,4	27,8	18		
	Total (%)	**12,9**	**25,8**	**38,7**	**22,6**	**31**	2,89	0,40
DENİZLİ	SMEs with dense regional networks (%)	42,9	28,6	14,3	14,3	7		
	SMEs with high regional networks (%)	15,0	40,0	25,0	20,0	20		
	Total (%)	**22,2**	**37,0**	**22,2**	**18,5**	**27**	2,35	0,50
ENTIRE SAMPLE	SMEs with dense regional networks (%)	29,6	38,9	20,4	11,1	54		
	SMEs with high regional networks (%)	9,2	28,9	35,5	26,3	76		
	Total (%)	**17,7**	**33,1**	**29,2**	**20,0**	**130****	**14,51**	**0,002**

*Degree of Innovative Activities: no innovation=0, Low innovation=1-5, Medium innovation=6-10, High innovation=11+ innovation in the last 3 years.
** Data about one firm is missing. *** ChiSq values calculated through real numbers, not percentages
Source: Calculated from survey data

When the relationship between regional networks and innovative capacity of SMEs is handled according to the sample regions, it gives some differences. Hence, it is interesting to note that in Ankara the difference between innovative capacities of SMEs with little connection to their region and SMEs with strong regional networks is

statistically meaningful (Chi-square probability = 0,006). In Ankara 29,4 percent of SMEs with low regional networks have no innovation and 44,1 percent of them have low innovation capacity. Only 8,8 percent of SMEs with low regional networks show high innovation capacity, but this value increases to 28,9 percent in SMEs with dense regional networks (Table 6.24). In Bursa and Denizli, there are similar patterns in innovation capacities, but the difference is not as obvious as that in Ankara. In Bursa 23,1 percent of SMEs with low regional networks have no innovation, which decreases to 5,6 percent in firms with high regional networks. On the other hand, this difference is not recorded in high innovation capacity (Table 6.24). In Denizli almost half of the firms with low regional networks have not any innovation and in this group 14,3 percent of firms have high innovation capacity. However, the share of high innovation capacity is not so high in SMEs with high regional networks which is only 20 percent.

Consequently it is observed that regional networks are important for innovative capacity of SMEs. This assumption has also been confirmed by many empirical studies in the literature (Koschatzky, 1999, Arndt and Sternberg, 2000). The main concern behind this thesis is to discuss the positive effects of external networks in innovative capacity of SMEs. For this reason, after having discussed the importance of regional networks, the significance of different levels of network relations in innovation processes come into agenda. Therefore, in the thesis it is hypothesized that "*SMEs with dense global networks have higher innovative capacity than SMEs with strong regional networks*".

In the literature, limited studies confirm this hypothesis. For example, Keeble et. al (1998) have analyzed Cambridge and Oxford regions and concluded that one third of the SMEs have collaborative research with firms outside the UK. Larrson and Malmberg (2000) and Koschatzky (1999) have also emphasized the importance of global networks during the innovation process in their empirical studies. On the other hand, the study of Lyons (2000) about Richardson region (Texas) emphasizes the importance of national networks, in addition to regional networks, for economic development and innovativeness.

Table 6.25 represents the relationship between different geographical levels of networks and innovative capacity of SMEs. The share of firms with no innovation is lowest for the firms with strong regional networks, as SMEs with global networks

follow them. Among the different levels of innovative capacity, SMEs with dense regional networks have the highest share in low innovation level with 40 percentage and the share of globally linked firms in low innovation group is only 17,1 percent (Table 6.25). On the other hand in high innovation category, the share of SMEs with regional networks is 13,3 percent, as the share of SMEs with national networks is 22,2 and the share of SMEs with global networks is 34,3 percent (Table 6.25). Therefore, these results also approve the hypothesis: "SMEs with dense global linkages are more innovative than SMEs with strong national and global linkages".

Table 6.25 Innovation Capacities of Different Types of SMEs

		Innovation Capacity of SMEs*					ChiSq	P-value
		No innovation	Low innovation	Medium innovation	High innovation	Total (n)		
ANKARA	SMEs with regional networks	19,4	38,7	25,8	16,1	31		
	SMEs with national networks	15,4	42,3	23,1	19,2	26		
	SMEs with global networks	13,3	20,0	33,3	33,3	15		
	Total (%)	**16,7**	**36,1**	**26,4**	**20,8**	**72**	3,54	0,74
BURSA	SMEs with regional networks	6,7	33,3	40,0	37,5	15		
	SMEs with national networks	28,6	14,3	42,9	12,5	7		
	SMEs with global networks	10,0	0	50,0	40,0	10		
	Total (%)	**12,5**	**18,8**	**43,8**	**25,0**	**32**	7,06	0,31
DENİZLİ	SMEs with regional networks	14,3	50,0	35,7	0	14		
	SMEs with national networks	33,3	0	0	66,7	3		
	SMEs with global networks	30,0	30,0	10,0	30,0	10		
	Total (%)	**22,2**	**37,0**	**22,2**	**18,5**	**27**	**12,26**	**0,05**
ENTIRE SAMPLE	SMEs with regional networks	15,0	40,0	31,7	13,3	60		
	SMEs with national networks	19,4	33,3	25,0	22,2	36		
	SMEs with global networks	17,1	17,1	31,4	34,3	35		
	Total (%)	**16,8**	**32,1**	**29,8**	**21,4**	**131**	8,83	0,18

*Degree of Innovative Activities: no innovation=0, Low innovation=1-5, Medium innovation=6-10, High innovation=11+ innovation in the last 3 years.
*** ChiSq values calculated through real numbers, not percentages
Source: Calculated from survey data

In Ankara, SMEs with regional networks has higher share in non-innovative category according to SMEs with strong national and global networks. In the high innovative category, SMEs with regional networks has the lowest share with 16,1 percent, as

SMEs with national networks has the 19,2 percent and the share of high innovation firms among the SMEs with global networks has the highest share with 33,3 percent. Although globally linked firms are more innovative, the importance of national networks is again obvious in the innovation capacity of SMEs in Ankara. In the high level of innovation category, SMEs with strong global networks has the highest share compared with other SMEs with regional and national networks in Ankara (Table 6.25).

However, in Bursa the innovative capacity of SMEs with national networks are very low according to regionally and globally linked firms. In the high innovation category, SMEs with national networks with 12,5 percent has the lowest share and SMEs with global networks has the highest share with 40 percent (Table 6.25). In Denizli case, the representation degree of SMEs with national networks is very limited with only 3 firms and the results for this group is not reliable. In Denizli, it is interesting that among globally linked firms with 30 percent have not innovated in last three years. This share decreased to 14,3 percent in SME with dense regional networks. It is also interesting that the share of SMEs with regional networks is zero in high innovation category, and the share of globally linked firm is 30 percent, which represents the importance of global networks in innovative capacity of firms in Denizli.

Table 6.26 Relationship between Different Types of Innovation and Network Relations.

	Types of SMEs according to Network Relations			ChiSq**	Pvalue
	SMEs with regional Networks (%)	SMEs with National Networks (%)	SMEs with Global Networks (%)		
Product Innovation					
No innovation	20,0	19,4	22,8		
Low innovation capacity	53,3	41,7	22,9		
High innovation capacity	26,7	38,9	54,3	**9,55**	**0,04**
Process Innovation					
No innovation	38,4	36,1	37,1		
Low innovation capacity	48,3	44,4	31,4		
High innovation capacity	13,3	19,5	31,5	6,19	0,18
Total (n)	60	36	35		

*Degree of Innovative Activities: no innovation=0, Low innovation=1-5, High innovation=5+ innovation in the last 3 years. ** ChiSq values calculated through real numbers, not percentages
Source: Calculated from survey data

In three types of SMEs with regional, national and global networks, the share of product innovation is extremely higher than the share of process innovation. The number of SMEs with no product innovation has similar shares in different types of SMEs. Moreover, within this group the share of SMEs with global networks is higher

than the share of SMEs with regional networks. On the other hand, more than half of the SMEs with global networks has high innovation capacity. In process innovation, different types of SMEs have similar shares in no innovation category. Similar to product innovation, in process innovation, globally linked firms have higher innovation capacity (Table 6.26). Consequently, there are no certain differences between product and process innovations.

At the end of this section it could be concluded that two important hypothesis of the thesis have been approved by the data of the field survey. One is "*SMEs in manufacturing sector with dense regional linkages are more successful in innovation activities than SMEs with little connection to their region*", and the second one is "*SMEs with dense global networks have higher innovative capacity than SMEs with only strong regional networks*". Therefore, these results show that not only regional but also global networks are important and essential in innovation capacity of SMEs.

6.4.2 Innovation Networks of SMEs

Having discussed the effects of network relations on innovation capability, in this section, innovation networks, to which SMEs have consciously participated, are analyzed according to their types and geographical levels. Moreover, agents of innovation networks and their role in innovation processes have been examined. In the literature, innovation networks have been defined as coordination of various innovative actors such as manufacturing firms, R&D institutions, universities, service providers, in order to create, produce and sell new products and to develop new processes in production and organization (Arndt and Strenberg, 2000, Koschatzky, 2000, Freel, 2003). In fact, many empirical studies show that "*the vertical relations are more significant in innovation processes than horizontal relations.*"

In this study, in order to analyze the innovation networks, innovative SMEs have been chosen from the sample firms. 90 percent of SMEs, which has made at least one innovation in last three years (119 firms), have been asked for about the most important partners in their innovation processes. Figure 6.8 represents the most important innovation partners of sample firms, each of which point out more than one actor. In three sample regions, according to the answers of entrepreneurs the most important partners are customers, which have two times higher percentage than other types of networks (Figure 6.8).

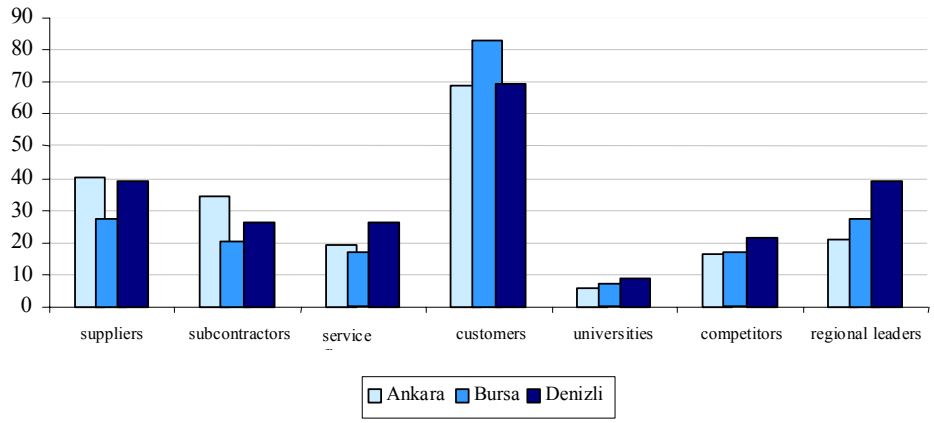

Figure 6.8 Significance of different types of innovation networks in Ankara, Bursa, and Denizli

Source: Calculated from survey data

Following the customer networks, supplier and subcontracting relations are seen as important agents in the sample regions. Although the share of customer relations in Bursa is higher than in Ankara and Denizli, the share of supplier and subcontractor relations in Ankara and Denizli is higher than Bursa (Figure 6.8). In the literature it is assumed that subcontracting with large firms can enable SMEs to innovate without having to invest for initial research (Freel, 2003). Similarly, in the case of Denizli, foreign subcontractors demand implementation of quality principles and production processes, which are important improvements for SMEs. Furthermore, in Denizli, relations with regional leader firms are as important as relations with suppliers. The importance of regional leader firms is lower in Bursa than Denizli and is the lowest in Ankara. This is the expected result due to the collaborative environment of Denizli, which has already discussed in Chapter 5.

In innovation studies, "*relations with universities have been considered as the most important network to be innovative*". For example, at both Route 128 and Silicon Valley, there is a dense relation between manufacturing firms and universities. Moreover, it has already been discussed that Romijn and Albu (2002) have examined university as the main agent of innovation networks in their empirical studies about

Oxford and Berkshire. Although the importance of universities in innovation process has been generally accepted, cooperation with universities generally has the smallest share among other type of innovation networks. Therefore, the data of this thesis, like most of other empirical studies, show that cooperation with universities has the smallest share in the total linkages of SMEs (Table 6.27). In each region, there is a university. The sample SMEs reported that difficulties in communication and common language have been stated as the reasons for this unwillingness to cooperate with universities in innovation process. Moreover, one entrepreneur from Ankara reported that:

> "We could not develop a common language with universities at the definition of production problems. I believe that there is an important gap between the theory and real problems of companies in Turkey. The development of common language between universities and industry requires a historical background, and as I see this has not been established in Ankara yet."

In university, competitor and service networks, the share of Denizli is higher than other two regions. It was expected that the share of university and service networks would be higher in Ankara due to the regional identity depending on universities and public institutions. However, It has been interesting to witness that one textile firm in Denizli goes on common project with METU in order to improve their productivity and production quality. The manager of this textile firm reported that:

> "We have a common project with chemistry department of METU. This collaboration is extremely important for our innovative capacity. Moreover, we want to take place in other common projects with METU and also with other related universities in Turkey."

The results of this study support the findings of the studies about different European regions (Grotz and Braun, 1997, Koschatzky, 2000), and show that production and marketing relations as vertical networks are more significant in innovation processes than horizontal relations. However, recent development models such as regional innovation systems and learning regions advocate that untraded interdependencies and horizontal cooperations become more important in the innovation process. Within this context, Denizli with its more collaborative regional environment, is more close to these development models as regards to many aspects. Due to the strong local collaborative environment of Denizli, compared with Ankara and Bursa, the importance of collaborative relations between local firms is obviously high. The

importance of regional cooperative relations with regional leader firms (39,1 percent) and the share of relations with cooperators (21,7 percent) as the main indicators of horizontal innovation networks in Denizli are extremely higher than the share in Bursa and Ankara (Table 6.27).

Table 6.27 The Importance of Different types of Innovation Networks for Innovative SMEs

	Importance of Innovation Networks			
	Not Important	Important	Most important	Total (n)
ANKARA				**67**
Supplier	29,9	29,9	40,3	
Subcontractor	58,2	7,5	34,3	
Service firms	68,7	11,9	19,4	
Customers	11,9	19,4	68,7	
Universities	88,1	6,0	6,0	
Competitors	62,7	20,9	16,4	
Regional leaders	62,7	16,4	20,9	
BURSA				**29**
Supplier	37,9	34,5	27,6	
Subcontractor	44,8	34,5	20,7	
Service firms	62,1	20,7	17,2	
Customers	10,3	6,9	82,8	
Universities	86,2	6,9	6,9	
Competitors	55,2	27,6	17,2	
Regional leaders	51,7	20,7	27,6	
DENİZLİ				**23**
Supplier	17,4	43,5	39,1	
Subcontractor	43,5	30,4	26,1	
Service firms	56,5	17,4	26,1	
Customers	13,0	17,4	69,6	
Universities	82,6	8,7	8,7	
Competitors	34,8	43,5	21,7	
Regional leaders	21,7	39,5	39,1	

Source: Calculated from survey data

Therefore, customer, subcontractor and supplier relations are seen as the most important relations among the innovation networks (Table 6.27). The importance of research institutions, universities, and competitors in innovation networks is lower than production and marketing networks. Moreover, the associations and NGOs do not play any role within the innovation process.

On the other hand, in the Third Chapter it is hypothesized that "*the coexistence of different types of linkages increases the innovative capacity of firms and regions"*. However, Table 6.28 shows that only customer networks have a share of more than 50 percent, supplier linkages are close to the 50 percent, and other types of linkages change between 5 to 35 percentages. Therefore, it is possible to state that the

differentiation of networks is very limited in the sample according to the experiences, which has been handled in the Third Chapter.

Table 6.28 Spatial Distribution of Innovation Networks of Innovative SMEs in Ankara, Bursa and Denizli.

	Location of innovation sources (%)							
	No relation	Regional	National	Global	Regional national	Regional global	Local National global	Total
ANKARA								**63**
Supplier	18,3	21,7	11,7	13,3	20,0	10,0	3,3	
Subcontractor	48,3	26,7	6,7	3,3	10,0	1,7	5,0	
Service firms	53,3	25,0	6,7	1,7	5,0	3,3	5,0	
Customers	5,0	16,7	8,3	16,7	23,3	5,0	25,0	
Universities	81,7	15,0	1,7	0	0	0	1,7	
Competitors	60,0	13,3	11,7	8,3	6,7	0	0	
Sectoral leader firms	56,7	8,3	8,3	13,3	8,3	1,7	3,3	
BURSA								**28**
Supplier	32,1	14,3	10,7	7,1	21,4	3,6	10,7	
Subcontractor	35,7	25,0	3,6	3,6	28,6	3,6	0	
Service firms	53,6	28,6	3,6	3,6	10,7	0	0	
Customers	0	14,3	21,4	21,4	14,3	0	28,6	
Universities	78,6	17,9	0	0	0	0	3,6	
Competitors	46,4	14,3	3,6	10,7	21,4	0	3,6	
Sectoral leader firms	46,4	14,3	3,6	14,3	14,3	0	7,1	
DENİZLİ								**23**
Supplier	17,4	34,8	13,0	4,3	26,1	4,3	0	
Subcontractor	39,1	30,4	12,0	8,7	8,7	0	0	
Service firms	43,5	30,4	17,4	4,3	0	0	4,3	
Customers	4,3	17,4	4,3	43,5	13,0	0	17,4	
Universities	78,3	13,0	4,3	0	0	0	4,3	
Competitors	34,8	34,8	4,3	8,7	8,7	4,3	4,3	
Sectoral leader firms	26,1	19,8	5,4	9,9	9,9	1,8	3,6	

Source: Calculated from survey data

Besides differentiation of types, it is also important to integrate different geographical levels of innovation networks. Table 6.28 represents the geographical locations of innovation cooperators. According to Table 6.28, in three sample regions, regional relations and regional actors have an important position as the innovation cooperators. National and global innovation networks follow regional linkages.

The importance of regional linkages is higher in Denizli in innovation activities compared with Ankara and Bursa. Only in university linkages, regional linkages have lower share in Denizli than Ankara and Bursa, because in the innovation process, firms in Denizli use national linkages in addition to regional university relations. It has already been discussed that in Ankara density of national linkages has an

important position among other types of geographical levels. However, in innovation networks national networks loose their importance in Ankara, and regional networks become the most important levels in innovation process. In Bursa, as customer and supplier linkages are significant in regional and national networks, in global level relations with customers, competitors and sectoral leader firms gain importance. In Denizli, pattern of networks is different than Bursa. In national level linkages with supplier, subcontractor and service firms have been important instead of other types of networks. However in global level, customer networks are dominant compared with other types of linkages (Table 6.28).

Nevertheless, Table 6.29 also shows that entrepreneurs do not indicate only one level of network in the innovation processes. Besides local, national and global networks alone, entrepreneurs have reported the importance of the coexistence of different levels of networks in the innovation process. Especially, in customer networks coexistence of all three network levels gains importance.

This section, which has discussed innovation networks, reveals that in the production process there are different types and levels of linkages. Consequently, although the importance of universities have been strongly emphasized in many studies, the data of survey reveals that production and marketing networks are the most common linkages as the innovation networks. Moreover, it could be concluded that not only regional, but also national and global linkages are adequate for the competitive and innovative capacity of SMEs, and the coexistence of different types and levels of networks is essential for the success of SMEs.

6.5 Comparison of Ankara, Bursa and Denizli with reference to the Findings of the Field Survey

Ankara, Bursa and Denizli represent different types of regions in the analysis of innovativeness and networking. Among sample regions, Denizli, as being a highly specialized cluster of textile and clothing sectors, has the highest employment growth rate. Bursa, specialized in textile and automotive industries, follows Denizli in terms of growth rate. Ankara as the specialized region in engineering sectors has the lowest growth rate. In contrast to employment growth capacities, Ankara has the highest share of skilled employees in total employment. Denizli has the lowest rank in the share of skilled employees opposite to its high growth rate. In fact, this is an expected

result because high technology sectors have relatively less growth capacity and have higher share of skilled employees than low-technology sectors.

In sample regions, there is not any positive and direct relationship between innovation indicators and innovation activities of SMEs. Among sample regions, Ankara ranks first ranks with reference to most of the indicators. There are many national institutions, such as research institutions like TUBITAK, development institutions like KOSGEB and universities, which support the R&D studies of SMEs in Ankara. Therefore, the share of skilled employees and the share of R&D expenditure as the main indicators of innovation have the highest values in Ankara, which is followed by Bursa and Denizli. However, it has been unexpected to find out that average patent number, as an indicator of innovation, is higher in Denizli and Bursa than that in Ankara. According to the entrepreneurs of sample firms in Bursa and Denizli, the regional cooperative and competitive environment forced to take patent for their innovations in order to protect them against replicas.

Thus, according to these indicators, it is expected that Ankara has the highest innovation activities. Denizli has the lowest rank among sample regions. However, number of innovation per firm has the highest value in Bursa, not in Ankara. This result emphasizes the significance of the regionally embedded network relations and regionally embedded knowledge systems in the innovation processes. On the other hand, only regional collaborative environment is not enough to increase regional innovation potential, science base and codified knowledge is significant. Therefore, innovative activities have the lowest share in Denizli, in spite of its strong collaborative environment. In Ankara, Bursa and Denizli, product innovation is higher than process innovation. According to the results of this case, improvement of existing products or processes is more widespread than introducing new products or processes to the sector or to the firm. Development of new product for the sector, which is highly scarce among sample regions, has the highest share in Ankara. This result again emphasizes the strong science base of Ankara.

Table 6.29 Networking and Innovation Activities in Sample Regions

	ANKARA	BURSA	DENİZLİ
Specialization areas	High-tech sectors	Both low-tech and high-tech sectors	Low-tech sectors
Employment growth	Low employment growth	High employment growth	Extremely high employment growth
Innovation			
Innovation Indicators	Highest innovation capacity according to indicators		Lowest innovation capacity according to indicators
Share of engineers	High	Medium	Low
Share of R&D expenditure	High	Low	Medium
Patent number	Low	High	High
Number of Quality Certificate	High	Low	Medium
Innovation Activities	High level innovation activity but slight lower than Bursa	High level innovation activity	Low innovation activity
Type of Innovation	The high capacity in process innovation	The high capacity in product innovation	_
Degree of Innovation	The highest capacity in introducing new products to the sector	The highest capacity in introducing new products to the firm and improvement of existing one	_
Networking			
Dominant Network Levels	National	Regional	Regional
Regional networks	Lowest share	Highest share	Highest share
National networks	Highest share	Medium	Lowest share
Global networks	Lowest share	Medium	Highest share
Main Reasons of Regional Networks	Being in the same region makes work easier	Being in the same region makes work easier Trust	Being in the same region makes work easier Trust Similar working styles
Main Reasons of External Networks	Access to external knowledge	Access to external knowledge Insufficient technological level	Access to external knowledge Insufficient technological level Absence of skilled worker
Types of Networks			
Regional	Customer and supplier networks dominant Proximity important in production, knowledge and service relations	Customer supplier and mediator networks dominant Proximity important in service, knowledge and marketing relations	Customer supplier and subcontracting and mediators networks dominant Proximity important in all types of relations
National	Customer and supplier networks dominant Important in marketing relations	Customer supplier and mediator networks dominant Important in production, marketing and knowledge relations.	Customer supplier and mediator networks dominant. Important in marketing, service and knowledge relations.
Global	Customer, supplier, mediator and competitors networks dominant. Important in production and knowledge relations.	Customer, supplier and competitor networks dominant Important in marketing and knowledge networks	Customer, subcontracting and supplier relations dominant. Important in marketing and production networks
ICTs	High Internet connectivity	Medium Internet connectivity	Low Internet connectivity
KOBINET	Lowest satisfaction degree	Medium satisfaction degree	Highest satisfaction degree
Interrelationship among different levels of networks	External networks do not effect regional networks	External networks do not effect regional networks	External networks increase regional networks
Networking and Innovation			
Most important innovation cooperators	Customer, Supplier and Subcontractor relations	Relations with Customer, Supplier and regional leaders	Customers, Regional leader firms, suppliers, competitors subcontractors, service firms
Diversity in innovation networks	No diversity in relations	No diversity in relations	Diversity in types of networks

The other important interest area is network relation of firms. Density of regional and national network is extremely higher than density of global networks in all sample regions. Moreover, in Bursa and Denizli, the density of regional linkages is higher than other types of linkages, as national linkages are dominant in Ankara. In global networks, Ankara has the lowest, and Denizli has the highest share. In other words, in Denizli the number of firms with regional networks is higher, as the share of firms with global linkages is also high.

The reasons for the differentiation of regional and external networks between the sample regions are due to their production organization and historical differences. In regional networks, being in the same region is important for each three sample regions in order to make the work easier. In addition to this reason, regional trust is important both in Bursa and Denizli, in where regional collaborative environment is more improved than Ankara. The reasons of entering to external networks are also different from the reasons of regional networks. In all sample regions, especially in Ankara, to obtain new knowledge is the most important reason in external networks. In addition to new external knowledge, insufficient technological level is also an important reason of external networks in both Bursa and Denizli. On the other hand, institutional background and science bases provide necessary skilled workforce and technological environment in Ankara. Thus, according to entrepreneurs in Ankara there is no problem with regional institutions and technological infrastructure. However, in Denizli, regional inability such as lack of skilled employees, low technology and quality level forces the firm into external networks.

Behavior and preferences of firms in network relations differentiate according to types of linkages. Although spatial proximity and regional networks are important, some type of linkages does not require spatial proximity and face to face relations. For example, as customer and supplier networks are the most dense linkages in all levels of networks, proximity is very important in knowledge and service networks in all regions. However, In Ankara, in addition to knowledge and service networks, spatial proximity is required also in production networks. Among service networks, university linkages are mostly constituted in regional level in all sample regions. However, in university linkages the problem is not spatial distance, but cognitive distance. Therefore, in all sample regions there are weak relationship between universities and industry. In national linkages, on the other hand, marketing networks

gain importance. Among national marketing relations, relations with mediator firms from Istanbul have an important position in Bursa and Denizli. Finally, in global linkages, customer, supplier and competitors linkages gain importance. Most of the firms see firms from different countries as the competitors but they have dense relations with them. Furthermore, in global level In Denizli, besides customer linkages, subcontractor networks are very significant for the regional production environment.

The data about three regions shows that regional networks, depending on regional mutuality and trust, keep their significance. In addition, the data reveals that interfirm relations tend to extent beyond the boundaries of the region. In this geographical expansion of production activities, ICTs play an important role. Within the ICTs, Internet connectivity has the highest value in Ankara, and has the lowest value in Denizli. In this context, Bursa has the medium position. Among the Internet services, most of the firms use only e-mail. E-data exchange and e-commerce are not as widespread as e-mail. In e-data exchange, Ankara has the highest value and Denizli has the lowest value. It should be emphasized that SMEs with dense global linkages have higher Internet connectivity than SMEs with national and regional networks in all sample regions. KOBINET as an electronic network of SMEs, could not achieve its purpose and its satisfaction degree among subscribers is extremely low. Ironically, although Denizli has the lowest ICTs capacity among other sample regions, this region has the highest satisfaction degree in the KOBINET. On the other hand, Ankara with the highest ICTs, has the lowest satisfaction degree in KOBINET. Therefore, in Ankara, firms prefer to use their private electronic networks.

Regional, national and global linkages constitute a network system, within which interrelationship among different levels of networks gains importance. In Bursa and Ankara, most of the entrepreneurs stated that external linkages neither negatively nor positively affect the regional networks and regional collaborative environment. However, in Denizli entrepreneurs believed that there is an effect of external linkages on regional collaborative environment. In all sample regions, the number of firms that believed that global networks increase the importance of regional networks is greater than the number of firms that argued that global networks decrease the role of regional networks. This share has the highest value in Denizli. However, in various studies on Denizli (Eraydın, 2001; Erendil, 1998; Pınarcıoğlu, 1999) it is stated that with the

increasing global networks, the strong regional networks give their place to more weak ties within the internationalization process. The outcomes of this thesis point that although Denizli is loosing its collaborative structure, today the collaborative environment of Denizli is not dispersed compared with Ankara and Bursa. In Bursa, the reality is different and their regional ties are looser than Denizli. On the other hand, in the regional development experience of Ankara regional networks are more flexible and loose.

In the context of the case study, the relationship between the density of regional networks and innovation capacity of SMEs is analyzed. The data reveals that there is a statistically positive relationship between them. Among SMEs with low regional networks, the innovative capacity is low compared with firms with dense regional networks. The data also shows that in Ankara there is a wide gap between SMEs with low regional networks and SMEs with dense regional networks in terms of innovation capacity, which shows the importance of regional networks. The gap between the shares of two types of SMEs in high innovation capacity groups becomes smaller in Bursa and Denizli. In all sample regions, SMEs with global networks has the highest share in high innovation capacity compared with SMEs with regional networks. However, in Ankara SMEs with national networks have higher share than SMEs with regional networks. The opposite is true in Bursa and Denizli.

In the innovation networks, some types of relations gain importance than others, and some agents are preferred to cooperate. Following the customers, supplier and subcontracting firms are seen as important agents of innovation in the sample regions. Although the share of customer relations in Bursa is higher than in Ankara and Denizli, the share of supplier and subcontractor relations in Ankara and Denizli is higher than Bursa. It is interesting to observe that the share of innovation networks with service firms and competitors is higher in Denizli than Ankara and Bursa. The data of this thesis shows that although each sample regions has a university, cooperation with universities has the smallest share among the total linkages of SMEs. In the share of university linkages Denizli has the highest share and Ankara follows Denizli. Consequently, firms could not use regional advantages effectively in innovation processes in Ankara.

Differentiation is very limited in all network relations, especially in innovation networks. Among the sample regions, Denizli has a higher diversity than Bursa and

Ankara. Besides differentiation of types, it is also important to integrate different geographical levels of innovation networks. In three sample regions, regional relations and regional actors have an important position as the innovation cooperators. The importance of regional linkages in innovation activities is higher in Denizli than in Ankara and Bursa. As it has already been discussed, density of national linkages has an important position among other types of geographical levels in Ankara. However, in innovation networks, national networks loose their importance and regional networks become the most important levels in innovation process also in Ankara. Hence, in the production process there are different types and levels of linkages. It could be concluded that not only regional, but also national and global linkages are enough to improve the competitive and innovative capacities of SMEs. Moreover, the coexistence of different types and levels of networks are essential for the success of SMEs.

CHAPTER 7

EVALUATION AND CONCLUSION

The main interest area of this thesis is to analyze the role of regional and inter-regional networks in development and innovativeness. For this reason, recent rise in innovation and networking paradigm, which provide essential theoretical and policy implication for regional development, are evaluated critically. After the theoretical review and the empirical study, the aim of this concluding chapter is to provide a disquisition to what extend this thesis has satisfied its hypothesis. The main interest areas of the hypothesis are related to the innovative capacity and innovation activities of SMEs, the geographical levels of network relations, the role of spatial proximity in network relations, and the interaction between networking and innovativeness. Moreover, it is also important to provide new discussion areas in regional development and regional policy in the end of the thesis.

Within the recent regional development models, SMEs are defined as important agents of regional network relations and innovation activities. According to these models, SMEs should take place in regional networks during the innovation process to decrease the uncertainty and to increase the flexibility towards changing market conditions. Therefore, SMEs are defined as the core agents of the thesis, due to the reason that they are highly related to both innovation and networking within the regional development process.

Although the recent regional development approaches that are depended on innovation and networking concepts constitute the theoretical frame of this study, a critical question is still on the agenda: *whether the regionally embedded networks can be a response to the new global agenda, or not.* Within the context of the thesis, it is

accepted that internal assets and regional network relations are not enough to sustain the competitive capacity of the region in the globalisation era. Regional environment, which depends only on regional networks and tacit knowledge, generates irreversible patterns and choices for the region and creates regional lock-in effect, within which firms and institutions fail to establish their own conditions of growth. Therefore, in contrast to the main notion of development models, regional knowledge potential, regional institutions and regional networks alone could not give response to the global competitiveness.

Contemporary global transformations, improvement in communication and transportation facilities, and increasing network types of production organizations have required radical and continues transformation in the firm and region. It could be hypothesized that in order to achieve radical and continues transformation, interregional and global networking and external knowledge are highly required in the innovation activities and economic development, besides regional networks (Freel, 2003, Patrucco, 2003, Romijn and Albaladejo, 2002, Koschatzky and Bross, 2001). One of the sub-objectives of this thesis is to analyze the contribution of information and communication technologies (ICTs) to the increasing global networks through which the dissemination of codified knowledge over long distance become possible. It has already been discussed that information and communication technologies (ICTs) allow the rapid information transfer and allow spatially and temporarily fluid production and consumption (Kitchin, 1998, Antonelli, 1999).

However, all actors could not equally access ICTs and integrate to global networks easily. For example, SMEs with fewer resources, less R&D and more uncertainties have been defined as the most important agents of regional development, but they have many barriers to integrate into interregional networks (Tödling and Kaufmann, 2001). Although regional networks provide the new knowledge to SMEs, their collective learning process, which is locked into regional tacit knowledge, cause some limitations for innovative and development capacities in the long term. Only using regional tacit knowledge, and only taking place in the regional networks could prevent the firm from adapting global shifts. In the global system, while interregional networks increase with the help of information and communication technologies, locally based inter-firm networks, which depend on regional mutuality and trust, maintain their significance. While regional networks constitute common production

culture and trust, and provide uncertainty reduction, interregional networks reduce the risk of lock-in in development process. Therefore, not only regional relations, but also external relations are crucial for regional development. Both of them are necessary, and they complement each other in the generation of new knowledge and success of firms and regions.

As stated above, the main concern of the thesis is to analyze the interaction between innovation and networking in regional development. SMEs as the core agents of this study are rarely capable of innovating in a vacuum (Cooke and Morgan, 1998, Florida, 1995, Koschatzky, 1999, Sternberg, 1999). Therefore one question gains importance: *whether the high level of linkages of SMEs positively affect innovation activities, or not*. Successful innovation depends on the knowledge creation capacity of firms, and on entering to external relations with other agents in regional, national or international levels. Furthermore, in innovation networks, besides the inter-firm linkages, relations with research institutions, education institutions, technology transfer centers, universities, and related associations are also significant, since plurality of actors in innovation process is necessary in order to have access to different kinds of knowledge and competencies. Therefore, complementary networks of SMEs are the key source of innovation.

It has been noted that the theoretical and empirical discussions provide the broad framework for the case study. Although theoretical approaches provide the regionally restricted view to the development, some recent studies emphasize the significance of external linkages. Within the context of the thesis it is repeatedly indicated that in addition to regional networks, external networks are essential in order to be competitive in the globalisation era. For this reason, besides regional networks, national and global networks of SMEs with different agents are analyzed in this study. Moreover, the case study provides the empirical evidence of the existence of a positive correlation between the different types and levels on network relations and the innovative outputs of SMEs. Which type of linkages require spatial proximity, and which types are spatially unbound, are scrutinized with reference to their meaning and impacts in the innovation processes. These analyses also provide a critical perspective to the recent development theories.

These analyses are realized in three sample regions, each of which has different development characteristics. Ankara as *innovative 'regions with low growth rate'* is

mostly specialized on engineering industries, such as machinery, defense industry, electronic and software. Bursa as the '*innovative growth regions'* is the traditional center of textile and automotive industry, which is in its later stages of development according to new growth regions. Moreover, Bursa seems to be one of the most promising regions in terms of innovation capacity and export activities. Its regional collaborative environment is relatively loose compared with Denizli. While Bursa represents hierarchical production environment, Denizli shows more collaborative environment that depends on dense and frequent regional networks. Denizli as the last region of this case is considered as the growth miracle in Turkey. Denizli as '*growth region'* is specialized on textile industry, but its innovative capacity is not as improved as its growth capacity.

Main Discussion Areas In relation to Results of the Field Survey

With reference to the research hypothesis introduced in the methodology chapter, the empirical analysis and survey data in these sample regions indicate a number of interesting results. In addition, it is possible to compare main findings of this study with other experiences from the different parts of the world. The expected contribution of the case study is to explain to what extend these findings are included in theoretical discourse and to what extend they provide new research areas in regional development. It is also possible to state that Ankara, Bursa and Denizli cases provide necessary contributions to main assumptions of regional development in Turkey.

Role of Innovation in Development

One of the main assumptions of this thesis is that there is a positive relationship between innovation and development, in which innovation is defined as the main factor of development. Although in recent literature there are many theoretical and empirical studies that encourage the growing importance of innovation activities in development, the relationship between them has not been so clear yet.

In many cases, especially from less developed countries, innovation capacity could not explain all types of success stories. In most of the industrial regions, especially in regions of developing countries, the reason behind the growth and integration to global markets is the traditional factors of development rather than innovative capacity. In fact, the innovation discourse is unique to a limited number of developed

regions in the world. However, the increasing emphasis on innovation within development literature on these regions makes it meaningful to analyze it in order to understand the role of innovation in development process.

In the case study, innovative capacity of sample SMEs are analyzed according to some indicators, such as quality of employees, R&D expenditure, and capacity to use ICTs. With reference to these indicators, Ankara is the first rank region, and Bursa and Denizli follow Ankara. All empirical and theoretical studies show that among the indicators the most important one is the engineer capacity of firms. Freel (2003) in his study about Northern Britain finds a positive association between the proportion of engineers in total employment and innovativeness. Arndt and Sternberg (2000), and Romijn and Albu (2001) have also find similar results about different regions of Europe. In the light of these studies (Grotz and Braun 1997, Sternberg 1999, Koschatzky and Bross 2001), there is a positive relationship between these indicators and innovative activities of firms.

Therefore, it was expected that Ankara with its sectoral advantages and human capital background would be a first rank region in innovation activities. However, the empirical results do not approve this expectation. Although almost every indicator has the highest value in Ankara, the innovation activities has the highest value in Bursa. The case of Ankara stresses that only the existence of skilled labor and R&D institutions is not enough for innovativeness, because these indicators of innovation are extremely related with scientific knowledge base and codified knowledge capacity of firms. However, in the innovation process, tacit knowledge and network relations of firms play an important role. In Ankara, which is in the first stages of its development as a high-tech industrial cluster, regional network relations and regional synergy has not matured yet. However, the existing institutional and scientific infrastructure of Ankara is promising to constitute regional innovation system for the future. Therefore, it could be concluded that only scientific knowledge is not enough to be innovative, in addition interaction among agents are also necessary.

Furthermore, according to the results of the case study, there is negative relationship between growth capacity and innovation indicators. Although as regards to innovation activities Ankara and Bursa have high innovation capacity compared with Denizli, the growth rate has the highest value in Denizli among sample regions. Moreover, Denizli is not the only growth region with low innovation capacity In Turkey. These

peripheral regions perform economic growth, and integrate to global markets, although their innovation capacity is extremely low compared with success regions depending on innovative SMEs from the developed central areas. In the peripheral regions, the main dynamics behind the growth are specialization on low-technology, labor intensive sectors, low labor wages, and subcontracting relations with foreign large firms. Therefore, it is necessary to analyze innovativeness together with other factors of development in the regional development studies.

Network Relations of SMEs: National Networks are Still Important in the Globalised World

"Firms are not an island", and they take place in the network relations with different actors in all terms of production process. In network studies, it is difficult to define all actors involved in the network. In other words, there are difficulties to determine networks as close systems in economic environment and complexity of the economic system prevents the researchers to go beyond linkage studies. Therefore, in many network studies, instead of defining close networks, linkages and externalities of these linkages have been examined (Staber, 2001, Koschatzky, 2000). This study also analyzes the linkages of sample firms at regional, national and global geographical levels, instead of close network system.

Regional, national and global networks as the possible spatial levels of network relations are analyzed in this case. The integration into different levels of networks changes according to firm size and sector. The outcomes of the case study show that most of the small firms (10-49 employees) profit from intra-regional networking. However, a group of small businesses exists as well, which maintain both intra- and inter-regional relationships. In fact, the medium firms have more dense national and global relations compared with small ones that are embedded in regional network relations. Hence, these results approve the hypothesis that there is a relationship between firm size and levels of network relations. This result is also supported by many empirical studies from different regions (Koschatzky, 1999, Grotz and Braun, 1997, Sternberg, 1999). Furthermore, in Bursa and Denizli the density of regional networks is higher in low technology sectors. On the contrary, larger firms and firms from high technology sectors have more dense national and global linkages.

In addition to the size and sector, the type of network relations creates difference in the geographical level of network relations (Sternberg, 1999, Koschatzky, 1999, Keeble, at.al., 1999, Freel, 2003). The survey findings show that network relations of SMEs are highly expended in national and global space. The diffusion of relations in space and the role of spatial proximity are highly related with the type of the relations. Supplier and customer linkages as production and marketing networks are highly expanded in global space. In contrast, subcontracting relations are more space specific. Similarly, in service and knowledge based relations, the share of external networks sharply decreases, and regional linkages are preferred if the region provide necessary conditions, if not national linkages come into agenda. According to results of the survey, national linkages follow regional linkages and are more dominant than global networks in knowledge relations. In other words, lack of sufficient regional services increases national linkages in sample areas.

The results of case study show that national linkages are very important in the success and innovation capacity of SMEs. However, it is important to state that in regional development models regional networks are overemphasized, while in the recent network studies the role of global linkages are stressed. It is the fact that the national level has not been taken into account as one of the core levels in the contemporary development studies. Although globalisation become visible in every sides of life, nation state still sustains its viability and legitimacy in many issues. State policies are still dominant in social and economic life and are still influential in the success of industrial regions. For example, incentives of central government for export activities help the regional economic development. Especially in developing countries, most of the industrial decisions are given by national institutions. Moreover, regional institutions do not have power and financial authority, and this situation requires the dependence to national institutions. Therefore, this increases the national linkages in service and knowledge networks, which are constituted generally with central state institutions.

The inadequacy of support institutions in development leads to individual actions, and increases the importance of network relations in different geographical levels, especially in regional level. Due to the lack of support in development, and particularly in the export process, most of the producers could learn only through their

social networks. The lack of adequate real services, finance, and education has appeared to be the weaknesses of newly growth industrial regions in Turkey.

Role of ICTs in the Increasing Inter-regional Networks

In the geographical expansion of production activities electronic networks (ICTs) are playing an important role, and they make easier to realize and to continue external network relations in the production process. In many case studies from different parts of the world, it is argued that the diffusion of new information and communication technologies (ICTs) increases the diffusion of knowledge through interregional and global networks (Capineri and Romei, 1999, Kitchin, 1999, Castells, 2001). According to the survey results, the ICTs usage capacity of SMEs has the highest value in Ankara, and has the lowest value in Denizli. In this context, Bursa has the medium position. Through the ICTs, firms use e-mail, e-data exchange, and e-commerce, among which e-mail is highly widespread at sample firms. On the other hand, the usage of e-data exchange and e-commerce are relatively higher in Ankara, as their usage is very limited in Denizli.

The use of ICTs increases the chance to integrate inter-regional networks. The results of this case approve the correlation between density of inter-regional networks and Internet connectivity level. Firms with global networks have high Internet connectivity level compared with the firms with regional networks. This suggests that the ICTs are important infrastructure to connect agents from long distance. In regional and interregional networks, not only electronic networks, but also face to face relations are used. Therefore, ICTs can not substitute face to face relations completely and visa versa. Consequently, the findings stress the importance of ICTs in inter-regional networks.

The Contribution of Network Relations to the Innovative Capacity of SMEs: Global Networks versus Regional Networks

Results of the field survey show that innovation activities of firms are higher than expected values. Despite the fact that scientific innovation indicators are very limited, the number of innovation is extremely high in sample regions. This may be the result of different types and levels of networks, rather than formal R&D studies and scientific knowledge base. Moreover, in this study, the innovative activities are

defined as a network process, in which the relationships with other partners from inside and outside the region play important roles.

Networking is an essential mean of knowledge exchange, and to a certain extend networking compensates the lack of internal resources. Successful innovation depends on entering to network relations in regional, national and global levels and on the knowledge creation capacity of firms (Koschatzky, 2000). As regional institutional endowment and innovation activities can never be sufficient to guarantee high level of innovative capacity, regional economies need to be linked up to national and global networks in order to stay innovative in long run.

Parallel to regional development models, in this thesis it is assumed that SMEs with dense regional linkages are more successful in innovation activities than SMEs with little connection to their region. The results of the field survey reveal this hypothesis, which indicates that regional networks are important for the innovative capacity of SMEs. This assumption has also been confirmed by many empirical studies in the literature (Koschatzky, 1999, Arndt and Sternberg, 2000).

Friendship, family, kinship and communitarian relations constitute large amount of the regional relations in Turkey, especially in traditional industrial centers like Denizli. This type of traditional collaboration causes the imitation behavior of entrepreneurs. Imitation in production is one of the advantages of spatial proximity and agglomeration because the knowledge and know-how diffuse through these traditional relations. Thus, the number of innovation activities of SMEs increases although there are no R&D expenditures and R&D department in the firm. On the other hand, regions with R&D activities and national and international networks have important advantages at achieving to new knowledge and know-how that supports the innovativeness in these regions compared with Denizli type growth regions.

Consequently, the main concern behind this thesis is to discuss the positive effects of the external networks in innovative capacity of SMEs. According to the results of the case study, SMEs with dense global networks have higher innovative capacity than SMEs with strong regional networks. The share of firms with no innovation has the lowest share among the firms with strong regional networks, and SMEs with global networks follow them. In addition, SMEs with dense global networks have the highest share in high innovation level. In the literature, the limited number of studies that

confirm this hypothesis has increased in the last years from different parts of the world (Keeble et. al, 1998, Larrson and Malmberg, 2000, Koschatzky, 1999, Lyons, 2000).

Furthermore, some types of relations have central position in the innovation process. The findings of the case study at Ankara, Bursa and Denizli reveals that the vertical relations are more significant in innovation processes than horizontal relations. According to the results, following the customer networks, supplier and subcontracting relations are seen as important innovation networks in the sample regions. In the literature it is suggested that subcontracting with large firms can enable SMEs to innovate without having to invest initial research (Freel, 2003). Similarly in the case of Denizli, which has dense foreign subcontracting relations, foreign firms force to implement some quality principles and production processes, and this provide new technology and knowledge of innovation to SMEs.

In the innovation studies, relations with universities have been considered as the most important network to be innovative among the different types of networks. For example, there is a cooperation tradition between manufacturing firms and universities at Route 128 and Silicon Valley. Although the importance of universities in innovation process is obvious, many studies show that cooperation with universities has the smallest share among other type of innovation networks (Grotz and Braun, 1997, Patrucco, 2003, Camagni and Capello, 2000). Correspondingly, the data of this thesis show that cooperation with universities has the smallest share in the total linkages of SMEs, although each of the three sample regions has a university.

Hence, the results of this case support the findings of the studies from different European regions (Grotz and Braun, 1997, Koschatzky, 2000) and show that production and marketing relations as vertical networks are more significant in innovation processes than horizontal relations. The importance of research institutions, universities, and competitor is lower than production and marketing networks. Moreover, the associations and NGOs do not play any role within the innovation process according to the data of field survey.

In three case regions, the growing role of global networks in the innovation process has been strongly emphasized. However, the global integration is generally realized in customer and subcontracting relations, which are based on a single-sided relation, and do not include cooperation in innovation processes. This type of global linkages

represents fragile relations rather than highly integrated relations of equals. For example, Denizli, with the highest global linkages, works as the subcontractor for large foreign firms or export to different countries. The field survey reveals that most of the entrepreneurs see these relations as important in innovation activities. However, this type of relation is not the cooperation of equals, and within these relations firms of Denizli have to implement the same standards of foreign firms, without producing new knowledge.

In the light of these findings, it could be advocated that global linkages in the innovation process could not be used effectively in the industrial regions in Turkey. Global integration only in marketing and subcontracting relations is not efficient in the innovation processes. The coexistence of different types of linkages in global level is required in order to increase innovative capacity of firms and regions. It is possible to state that the differentiation of network relations is more limited in the sample regions than that in the experiences from different parts of the world. Not only regional, but also national and global linkages are inadequate in the competitive and innovative capacity of SMEs, and the coexistence of different types and levels of networks are essential for the innovation activities.

The Main Contribution of this Framework to the Comparison of Traditional and New Development Approaches

Recent development approaches, which depend on knowledge creation and innovation, provide the theoretical perspective of this thesis. Some central hypotheses of recent development models are confirmed by the results of this survey and some are criticized. Therefore, the comparison of traditional and new development approaches is important for the constitution of new development policies. Traditional and recent development approaches argued that each involves different dimensions that enhance regional economic development and capability to cope with changing conditions. These differentiated dimensions are listed in Table 7.1. While some points gain importance in traditional approaches, some are retarded, this is also true for new development discourse.

According to the traditional development approaches of 1950s and 1960s, capital accumulation and investment are the main factor for regional development. The state and external large firms play a crucial role at starting and sustaining the development.

The state is responsible to provide the infrastructure, to makes direct investments to production and to supply incentives to other investments. These investments would create input-output capacities that result in agglomeration and scale economies. Small firms were not seen at a central position at these development approaches. Furthermore, knowledge and innovation were implicit factors of production and were not been discussed at the traditional approaches. The main problematic in traditional approaches is the accumulation of capital and investment to production activities instead of knowledge creation and innovation, due to scarcity of capital at the post war period.

Table 7.1 The Comparison of Traditional and New Development Approaches

	Regional Development Approaches	
	Traditional Approaches	Recent Approaches
Production Processes	Mass production Production for national markets	Flexible production Production for global markets Regional sectoral specialization
Source of regional development	External Sources (State, TNCs)	Endogenous Sources (Regional potentials)
Dynamics of Regional Development	Accumulation of capital, investments Output growth Labour Input-output linkages Scale economies and agglomeration economies	Innovation, knowledge creation Quality rather than quantity Human Capital Un-traded interdependencies Network externalities
Main Actors of Regional Development	Large firms State	Small firms (regional interaction of small firms) Regional institutions
Government Instruments in Regional Development	Regulation on capital and labour Direct investment to production activities	Innovation systems Regional networks

Sources: Tekeli, 2003, Plummer and Taylor, 2001.

During the last twenty years, in new development approaches, the main factor of the production has shifted to knowledge creation, and innovation is accepted as a crucial element for economic success. Within these approaches job creation, output growth, and investment are handled as implicit dimensions of development. Furthermore, SMEs and SME networks also gain importance as important actors of knowledge creation and innovation, which are considered as interactive and cumulative processes that take place within the region. In this perspective, human capital plays a prominent role in stimulating development and innovation. Within these conditions, the state is no more the dominant actor that regulates the economy. Instead of direct investments,

the state supports the knowledge creation processes and supplies their infrastructure, cooperates with other actors to improve innovation systems, and supports regional and national networks.

Some central hypotheses of recent development models are confirmed by the results of this survey. Examples include importance of innovation in development, the important role of intra-regional linkages in innovation activities of SMEs, increasing importance of human capital in development and innovativeness. However, the outcomes show that the existing interregional linkages are not enough to explain success of firms in economic development and innovation activities.

After 1990, according to the recent development approaches the firms are represented as nodes of both regional and global networks. The approaches of 1980s, which were based only on regional networks such as innovative milieu and learning region, could no more explain the complexity of network relations at development processes. Hence, the relations are no more limited with regional actors and the national and global linkages gain importance. Therefore, national and global networks should also be included in development theories and models, and policy implications should take into account these network relations.

Further Remarks and Important Factors in Policy Implications

The findings of this case have also some implications for regional development strategies. The empirical results illustrate that it is ineffective to encourage regional development that only depends on regional networks. Moreover, supporting different geographical levels of networks improves the innovative capacity of firms. Therefore, to improve innovativeness the regional development policies should encourage firms to integrate interregional, especially global networks, in addition to strengthening the regional collaborative environment.

The results of the case study, and many experiences from different parts of the world, show that innovation activities are advanced in high technology, knowledge intensive sectors. However, in Turkey, many success stories depend on low-technology, labor intensive sectors. Therefore, high-tech industries should be supported by development and innovation strategies in Turkey in order to support innovativeness. Especially science parks and technoparks play a crucial role at supporting the innovative sectors.

These parks may also be a solution to the cognitive distance between universities and industry. Moreover, the results of case study reveals that strategies for the foundation of technoparks should be aware of, and sensitive to the diversity of networks.

The findings of the case study shows that necessary scientific base of innovation such as R&D expenditure, R&D studies and employees, is very limited in sample regions, especially in Denizli. Unexpectedly, the entrepreneurs have reported that innovation in products and processes is important for their success, and they have realized many improvements in their production. Moreover, for most of the entrepreneurs, the innovation networks have an important place in the production processes and innovation activities. These innovation performances of SMEs are important potentials for regional development and should be supported by national and regional institutions. However, the results of the survey reveal that the regional and national institutions established to improve the innovation capacity of SMEs could not be used effectively by firms in Turkey.

Yet, to catch up global knowledge economy and to compete with high-tech industries without the support of any infrastructure of innovation, such as the universities, the information and communication infrastructure, and R&D institutions, is not possible. The infrastructure of innovation is mostly nonprofit, which requires huge investments, and are mostly free to public use due to their characteristics. The private sector does not want to construct these institutions, and it is inefficient and insecure to leave these infrastructures to the control of private sector alone. To set an example, in many countries, particularly in European Countries, these services and infrastructure have been provided by well-developed national and regional institutions. Hence, in Turkey, national innovation system should be found and related innovation strategies should be developed through related national and regional institutions.

On the other hand, in the light of the case study result, to provide the necessary ICTs is crucial for the development strategy in order to increase interregional and global innovation networks. In Turkey, KOSGEB tries to provide the necessary infrastructure of electronic networks with the KOBINET Project, but this program is not enough and well-developed for the focus user groups. Therefore, efficient institutions and projects are required in order to spread the usage of ICTs among SMEs in Turkey.

The results of the case study have shown that the coexistence of different types and geographical levels of linkages have an important role at innovation processes. Therefore, in policy implications, it is essential to establish the coexistence of different types of linkages, and especially service and knowledge networks may provide more effective results in innovation processes. Moreover, decentralized innovation networks, and diversified industrial networks require institutional 'network moderators' at the implementation process of the policies. Inter-firm linkages act as learning processes, in which regional and central governments should work as moderator to bring technology developers together with potential users. Although there is need for cooperation between the national and regional institutions and industry, today in Turkey there is a huge cognitive distance between R&D institutions, universities and industry. The implementations of new policies could overcome the cognitive distances and the 'network mediators' as important agents could establish the necessary cooperation between the universities and industry.

It differs between sample regions in how SMEs use the regional, national, and global resources, and linkages in the innovation processes, due to the fact that the importance of different geographical levels differentiates in each region. Therefore, it is impossible to create one type of policy for every region. The importance of regional, national, and global linkages changes from case to case, and a standard concept of spatial organization structure for innovation cannot be recommended. Corresponding to the regional and sectoral specialization, the structure of firm size, and the regional environment, each region requires specific strategies in national and regional innovation systems.

These policy intervention issues are not discussed in detail in the context of this study. As they go beyond the boundaries of this study, it was not possible to cover up all of these points, and therefore, they are left out for further studies. Like policy intervention, there are no development theories and models to response to open knowledge and development systems. However, recent improvements in global linkages, due to the organization of production and increasing ICTs, require more globally integrated systems as well as regionally embedded relations. Consequently in this study, some clues about development strategies are presented for further studies.

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APPENDIX

QUESTIONNAIRE USED IN FIELD SURVEY

The name of the firm:……..
The name of the interviewed person:…….
Address: ……..……
The sector:……..……..

What are the reasons for being member of KOBINET? (Rank them in order of importance 1=least important 5 most important)

The high number of KOBİNET membership	1	2	3	4	5
The importance of services supplied by KOBİNET	1	2	3	4	5
The membership of leader firms	1	2	3	4	5
The membership of competing firms	1	2	3	4	5
The prestige of being a member of KOBINET	1	2	3	4	5

2. How much do you use the KOBINET services?

	I Don't use	Daily	Weekly	Monthly	Annual
Searching web sites of KOBINET members					
To update KOBINET web site					
KOBINET e-mail					
KOBINET e-commerce					
KOBINET data bank					

3. Have you established any cooperation through KOBINET within the last 5 years?
( )Yes ( )No
If yes;

Issue	Number	Country/Province
Cooperation at production		
Cooperation at investment		
Cooperation at producing and transferring technology		

4. Does KOBINET fulfill your requirements? ( )Yes ( )No
What is the main deficiency of KOBINET?

…….

5. Are you member to any other electronic communication network than KOBINET? ( )Yes ( )No
If yes, what are its name, purpose and address?

……

6. What ICT hardware and services do you use?

Hardware	Number	Services	I use	I do not use
Computer		Video conference		
Computer with Internet		EDI		
CAD/CAM		e-mail		
Fax		e-commerce		

7. What are the innovations made in your firms in last three firms?

	Number
Innovation new to the sector	
Innovation new to the firm	
Improvement of existing product in the firm	
Process innovation in the firm	
Improvement of existing processes	
Number of patents	
Number of quality certificates	

8. What is the role played by firms and institutions at your innovation processes in last three years? (Rank their level of importance as 1 least important and 5 most important, and their origin)

	Level of importance					Your province	Other provinces	Abroad
Raw material suppliers	1	2	3	4	5			
Subcontractors	1	2	3	4	5			
Service suppliers	1	2	3	4	5			
Customers	1	2	3	4	5			
Universities	1	2	3	4	5			
Competitors	1	2	3	4	5			
Leader firms	1	2	3	4	5			

9. How many technical staff do you have, and what are their origins?

	Number	Your province	Other provinces	Abroad
Technician				
Engineer				
R&D staff				
Designer				

10. How did the indicators given below changed in last three years? (With current prices)

	2000	2001	2002
Total employee			
Total technician, engineer, R&D staff, and designer			
Total production value (million TL)			
Total added value (million TL)			
Total sales value (million TL)			
Total Input expenditure (million TL)			
Annual R&D expenditure (million TL)			
Total expenditure (million TL)			

11. What is the number of firms you are in relation, and their origin?
(List he first three firms according to their importance for each origin.)

	Your province	Other provinces		Abroad	
	Number	Number	Name of first 3 province	Number	Name of first 3 country
PRODUCTION RELATIONS					
Raw material supplier firms					
Subcontractors					
Parent firms, which the firms is serving as subcontractor					
Supplier					
SERVICE RELATIONS					
Consultancy firms					
Private banks					
Public banks and financial institutions					
Technical services and technology transfer firms					
Public technical services					
Universities					
Private technical education services					
Public training					
MARKETING RELATIONS					
Customers					
Intermediate firms					
Chain stores					
Foreign trade companies					
Cooperative marketing firms					
KNOWLEDGE RELATIONS					
Competitors					
Leader firms					
Customers and machinery suppliers					
Institutions, chambers, associations					
Trust circles					

12. What is the role of relation types for the success and competitive capacity of your firm
(1= least important 5 most important)

Relations with firms in your province	1	2	3	4	5
Relation with firms in other provinces	1	2	3	4	5
Relation with firms abroad	1	2	3	4	5
Combination of all the relation types mentioned above	1	2	3	4	5

13. How does the increase at relations with firms in other provinces and abroad affect the intensity of relationship among the firms in your province?
Does not have any effect ( ) increases ( ) decreases ( )

14. If you prefer to work with firms in your province, what are the reasons for this?
(1= least important – 5 most important)

Being in the same region makes work easier	1	2	3	4	5
Face to face relations,	1	2	3	4	5
Your working styles are similar within the region	1	2	3	4	5
Easier to trust	1	2	3	4	5
Difficulty at finding firms from other provinces	1	2	3	4	5
Difficulty at finding firms from abroad	1	2	3	4	5

15. If you prefer to work with firms from other provinces, countries, what are the reasons for this?
(1= least important – 5 most important)

Insufficient quality systems of regional firms	1	2	3	4	5
Insufficient technological levels of regional firms	1	2	3	4	5
Production and organization structures of regional firms do not fit to you	1	2	3	4	5
Absence of skilled employees in region	1	2	3	4	5
External relations provide new external knowledge	1	2	3	4	5
Difficulty at finding firms from your region	1	2	3	4	5

16. In what frequency and through which way do you contact with firms that you are in relation?

	Your province				Other provinces and abroad			Your province				Other provinces and abroad		
	Daily	Weekly	Monthly	Annual	Daily	Weekly	Monthly	Annual	Tel fax	Internet	Face to face	Tel fax	Internet	Face to face
PRODUCTION RELATIONS														
Raw material supplier firms														
Subcontractors														
Parent firms, which the firms is serving as subcontractor														
Supplier														
SERVICE RELATIONS														
Consultancy firms														
Private banks														
Public banks and financial institutions														
Technical services and technology transfer firms														
Public technical services														
Universities														
Private technical education services														
Public training														
MARKETING RELATIONS														
Customers														
Intermediate firms														
Chain stores														
Foreign trade companies														
Cooperative marketing firms														
KNOWLEDGE RELATIONS														
Competitors														
Leader firms														
Customers and machinery suppliers														
Institutions, chambers, associations														
Trust circles														

VITA

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