CHAPTER I

INTRODUCTION

Many researchers have paid considerable attention to the role of technical change and innovation in providing a solid base for economic growth. Amongst a set of policy tools, establishing science parks and incubators (and their derivatives) has received widespread attention. Especially after the 1980s many countries have established science parks and incubators for stimulating the flow of knowledge and technology amongst universities, research and development (R&D) institutions and companies, i.e., stimulating interaction within and between agents in the economy.

It is believed that incubators are well-suited especially for countries that have rather weak national innovation systems (NIS) (Colombo and Delmastro, 2002). The Turkish NIS can be characterized by low technology intensity and low levels of interaction. Thus incubators are basically formed to deal with such shortcomings. Establishing incubators are also one of the main elements of Small and Medium Sized Enterprise (SME) policy. It is supposed that the SME policy should aim at SME births, survival and success. Incubators are important mechanisms in this sense. It is further believed that through networking, both SMEs and New Technology Based Firms (NTBFs) can overcome their weaknesses associated with their small size. Since a number of similar firms are clustered into a physical entity, incubators can also serve as a special type of network.

The main objective of this thesis is to evaluate whether Technology Development Centers (TEKMERs), which are incubator like institutions established by the Small and Medium Size Industry Development Organization (KOSGEB), are successful in boosting the performance of NTBFs both in terms of economic and technological aspects. For this purpose data on 48 on-incubator and 41 off-incubator firms is gathered

through face-to-face interviews. This assessment covers the characteristics of founders as well. Data on founders comprises information on 79 on-incubator and 61 off-incubator founders.

Questionnaires were conducted in TEKMERs to form the on-incubator sample. Later these on-incubator firms were matched with their off-incubator counterparts. Three indicators are used to form the off-incubator sample: geographical location of the firm, main business activity (sector) of the firm and number of employees. These types of studies have been open to two major criticisms. First, differences observed between on- and off-incubator firms could reflect the motivations of the firms as well as the benefits of being located in an incubator (Löfsten and Lindelöf, 2002a). Second, firms that perform well may tend to open to exchange information so that the samples might be biased (Colombo and Delmastro, 2002). Although considerable attention is directed to form the samples, it is not possible to claim that our samples are not affected from such biases. However we manage to get high responses from the on-incubator firms, so we are quite confident that the on-incubator sample can be regarded as a representative of the population. The findings of this thesis offer important clues about the structure of the on-incubator firms and about the environment they belong.

Evidence on the economic and technological effectiveness of incubators is still considered to be ambiguous even for the developed countries. Some researchers believe that there are some positive effects (Colombo and Delmastro, 2002; Löfsten and Lindelöf, 2002a, Mian 1996a) and some have questioned policies aiming to cluster similar businesses (Bezdek, 1975; Galbraith, 1985, cited in Löfsten and Lindelöf, 2002a). Various institutions are established in an incubator and there can be considerable differences in their aims, which make the evaluation harder (Löfsten and Lindelöf, 2002a). Another factor that causes difficulty is that the value-added contributions of incubators are not easy to observe. For example, they may have diverse effects on the capability and behavior of the firms. Building capability can be viewed as the most important contribution, however it is very hard to assess. The value-added in this thesis refers to those specific ways that an incubator program enhances the ability of its tenants to grow in business (Allan and Bazan, 1990, cited in Mian, 1996a) It is very important to make a distinction between gross and net impacts achieved by incubators and science

parks. The long-term impact on employment and wealth creation are far more important (European Commission, 2002). The concept of *opportunity cost* is vital in this sense. Therefore a better assessment of the impact of incubators in Turkey can be made in the long run, well after some time has elapsed. This thesis aims to pave the way for further research. It should be kept in mind that the evaluation process is one of the important factors behind the success of these institutions.

This thesis makes a couple of contributions to the literature. First, different from the existing literature this study is conducted in a developing country prone to market failures and macroeconomic and political instability. Second, the information gathered in this thesis solely rests on face-to-face interviews. I conducted the face-to-face interviews with the founders or with an authorized employee. This process not only enabled high response rates but also provided valuable informal information extracted during the interviews. Many interviwees have provided important informal information on the firm behavior and the evaluation of the policies on SMEs as well as TEKMERs.

This thesis is organized as follows. The second chapter comprises a brief summary of the current situation of Turkey regarding science and technology indicators and tries to answer why science parks and incubators might be important for Turkey. This chapter also provides a theoretical background of technology policy and a brief literature survey as well. Chapter 3 describes the methodology used throughout the thesis. Some important definitions and main hypotheses to be tested are presented in this chapter. Chapter 4 present the main results. It gives information on characteristics of firms and founders, and evaluates the success of incubators. Chapter 5 concludes the thesis.

CHAPTER II

SCIENCE PARKS AND INCUBATORS: FOUNDATIONS, THE CURRENT SITUATION AND IMPORTANCE

This chapter presents the major concepts that this thesis rests on. It starts with a brief summary on the theories of technology policy, neo-classical and evolutionary. The second section covers the history of science and technology policy in Turkey. Section three presents science and technology indicators for Turkey. This section also offers information about science parks and incubators in Turkey. The importance of science parks and incubators in the Turkish science and technology policy is analyzed in section four. This chapter also provides a short summary of the European Union (EU) experiences. The chapter closes with a short literature review.

2.1 Technology Policy: The Neo-Classical and Evolutionary Theories

Starting with the 1990s technology policy has become quite an important tool for countries trying to foster economic growth. Technology policy rests on a set of policy tools initiated by the government that aims to affect the process of technical change by intervening in the path and diffusion of technical change. In this sense it is important to state the basic features of the two leading approaches that shape technology policy; the neo-classical and the evolutionary approach.

The neo-classical view rests on the assertion that since a market failure might occur in the process of creating technological knowledge and innovation –mainly due to *non-excludable* and *non-rival* characteristic of knowledge- the government should interfere to allocate resources efficiently and to increase productivity. The three important characteristics of technological knowledge set the basic argument behind the

government intervention in the neo-classical view. Technological knowledge is both *non-excludable* and *non-rival* possessing public good characteristic in this sense. If a use of a piece of knowledge in one application makes its use by someone else no more difficult, then it is said to be *non-rival* (Romer, 1996). For example a piece of mathematical knowledge can be used infinitely many times, so it is never exhausted. A good is non-excludable if it is not possible to prevent others from using it. These two together enables externalities to arise. The third characteristic is *transparency*. *Transparency* is the availability of perfect information when the actors are making rational decisions. If there is *transparency* then there is no need to pay for a particular piece of knowledge since all agents know it. However if there is no transparency then no one knows the value of that piece of information and a market for it will not formed. This last characteristic is known as the *Arrow dilemma* (Taymaz, 2001).

By using these simple expressions the underlying reasons behind government intervention in the neo-classical approach can now be posed (Taymaz, 1993). The first reason is that government should establish the legal and regulatory mechanisms in order to ensure that the market mechanism works. This can be set for example by establishing intellectual property rights so that in a way a piece of technological knowledge is departed from its public good characteristic. The second argument is that technological activities on public goods provided by the government cannot be handled in the market. So the government should interfere to foster technological advance for example in the defense industry. The third reason mainly rests on the three characteristics of knowledge that results in market failure. In short these characteristics result in, i) under-investment in R&D activities, ii) the possibility of repetition in investment, iii) the slow diffusion of technological knowledge. So the government should interfere in order to increase the private return on technological activities relative to the social return (Taymaz, 2001).

Whereas the neo-classical view takes the technological resources and capabilities of the firm as given and proposes policy tools to maintain efficient resource allocation, the evolutionary view –greatly inspired by the works of Schumpeter- focus on the improvement of the capacity and capability of the firm. The basic assertion of the evolutionary view is that the process of technical change is not linear. It is established more on a complex system composed of different firms and related economic agents

interacting with each other. It is this complex system that is in the core of the evolutionary view on technology policy. The approach is focused on the improvement of the capability of the firm and the system as a whole. In this sense the following policy objectives are raised (Taymaz, 2001):

- Setting the environment for entrepreneurship and innovation,
- Encouraging firms and economic agents to interact with each other,
- Increasing the capability of the firms,
- Enabling the transfer of knowledge through network type organizations,

It is appropriate now to relate our main topic with the above assertions. Within a set of policy tools science parks and incubators have emerged to be one of the most important tools in a country's science and technology policy. Especially after the 1980s many countries have established science parks and incubators for certain aims, which will be discussed in detail in the section 3.1. This policy tool is rooted from both evolutionary and neo-classical perspectives. As an example, one aim common to both building science parks and incubators is to improve the transfer of technology between higher education institutions and industry, and benefit from agglomeration economics. This aim apparently conforms to the evolutionary view. Another aim is to support the firm with both direct subsidies to R&D and indirect forms of subsidies like tax-exemptions. This is nothing but increasing the private return over social return, which is in line with the neo-classical view. Underlying arguments in this two approaches can be summarized by a single sentence:

> "….There are two ways to make more with less: improve resource allocation and redesign the process." (Best, 2001:preface, xvi)

2.2 Science and Technology Policy in Turkey: A Short History

There is not a long record of science and technology policy in Turkey. Although there were some early developments starting in 1960s, the major attempts and progress is very recent.

Two main achievements that took place prior to the 1980s were the establishment of Scientific and Technological Research Council of Turkey (TUBITAK) and the TUBITAK- Marmara Research Center (MRC). Founded in 1963, TUBITAK acts with a mission to coordinate, organize and support research in the basic and applied sciences and still plays a crucial role in the science and technology policy make-up in Turkey. In the planned economy period prior to the 1980s there were many goals that were set for example: to promote basic research and research in higher education, to improve R&D productivity, to increase R&D personnel, to send students to foreign countries for PhD etc. However there was not so much progress in this period.

The first major attempt came in 1983 with the establishment of the *Supreme Council of Science and Technology* and with the publication of *Turkish Science Policy 1983 – 2003* which can be viewed as the first written document of science and technology policy in Turkey. The major aim was to set a coherent science and technology policy on the grounds of economic and social development, and national security. However the progress in reaching these objectives was rather slow. The most serious attempts were in the 1990s. The document *Turkish Science and Technology Policy 1983 – 2003* was accepted in 1993 and placed in the *VII. Five Year Development Plan*. It can be said that there was remarkable achievements after this development. The establishment of the Patent Institute, National Metrology Institute, Turkish Science Association, Technology Development Foundation of Turkey (TTGV), and Turkish Accreditation are all very recent achievements in establishing the national innovation system in Turkey (Taymaz, 2001).

However it should be emphasized that Turkey still lacks a serious policy make-up in these aspects and also has certain problems in implementing the codified policy initiatives and in reaching the goals and targets that are set.

2.3 Science and Technology Indicators for Turkey

At this stage of the study it is important to present the current situation in Turkey regarding science and technology issues. This section also covers the recent experience of building science parks and incubators.

The evaluation of science and technology matters in Turkey can be made on the grounds of four indicators. However it should be kept in mind that Turkey is still in the very early phase in science and technology issues relative to EU countries. So the indicators and figures presented below aim to give a framework. Future science and technology policy should aim to achieve at least the standards of EU.

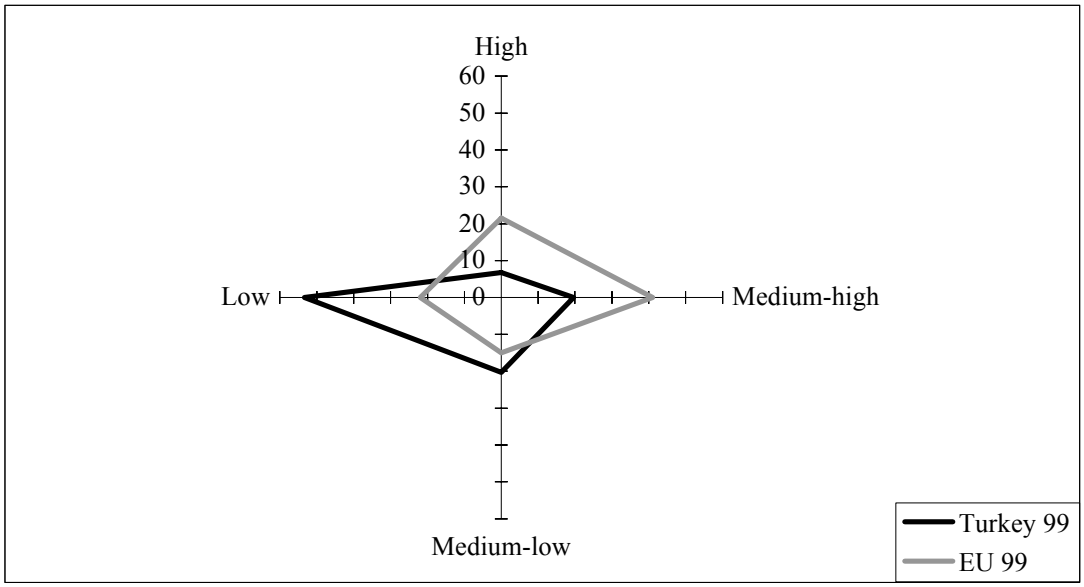
First of all high-technology industries[1] are often seen as key industries that have positive effects on productivity and competitiveness, therefore play crucial role in future economic development (OECD, 2001). It can be expected that the larger the share of high-technology industries, the larger the income to be generated hence the more prosperous will be the country. So the skewness of the diamond in Figure 2.1 towards high and medium-high technologies represents a possible better record in future economic development. By looking at Figure 2.1 it can be seen that the diamond is skewed towards north-east for EU, however it is skewed towards south-west for Turkey reflecting the lower share of high-technology and medium high-technology industries in total manufacturing exports. Figure 2.2 presents the progress made between 1990-99 in Turkey. There is slight improvement and a movement towards high and medium-high technologies, however this is not a major progress when compared to other countries such as Sweden, the Netherlands and Ireland.

A second generally used indicator is R&D expenditures as a percentage of Gross Domestic Product (GDP). However R&D expenditures as a percentage of GDP by main sectors of performance is more useful in the sense that for example, R&D conducted by universities is expectedly specialized on basic research, whereas R&D conducted by business enterprises is expectedly more on applied research and experimental development. So an assertion that can be made on the grounds of this argument is that the higher the share of R&D conducted by the business sector the higher the new product development. However it should be kept in mind that applied research and experimental development should be backed by basic research. Figure 2.3 clearly expresses that the triangle is skewed towards business enterprises in the case of EU, however it is skewed towards higher education in Turkey. The smallness of the total

[1] For the classification of manufacturing industries by technology intensity see OECD (2001) p. 139.

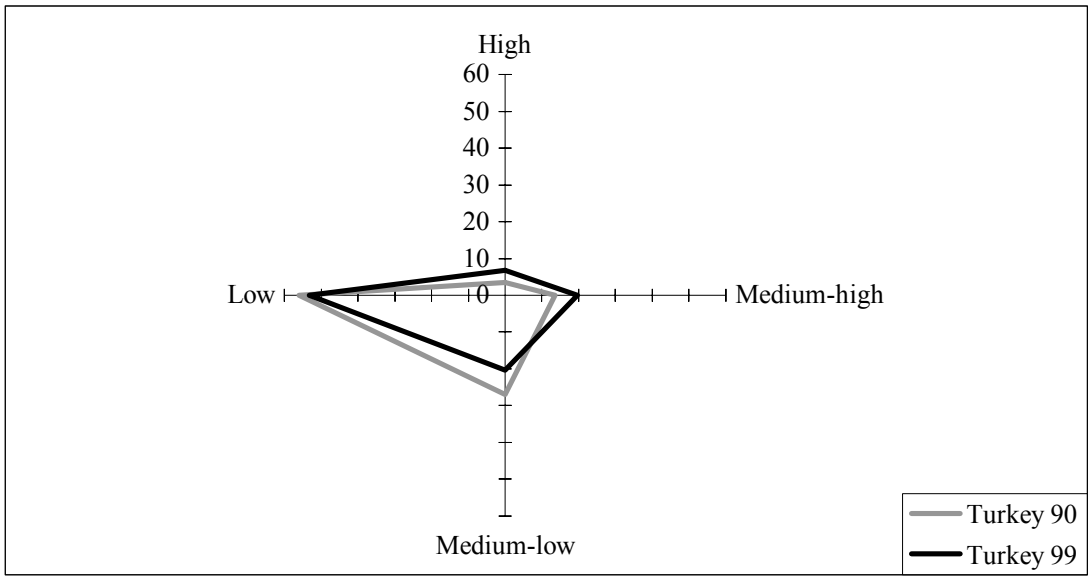
R&D expenditure as a share of GDP in Turkey relative to EU is also visible from the figure. It should also be stated that the progress towards business conducted R&D is very modest in Turkey perhaps for reasons generally associated with macroeconomic instability.

Third, an important factor in the knowledge-based economy is the skill base. The quality as well as the quantity of human resources is critical in paving the way for the innovation and diffusion of technology. So an indicator related to the previous one is the researcher per thousand labor force by sector of employment. As the figures represent, there are certain similarities between Figure 2.5 and Figure 2.3. A great deal of the researchers in Turkey is employed by higher education institutions, whereas the business sector in EU that is in charge. Another feature is that the number of researchers per thousand labor force is significantly lower when compared to EU countries.



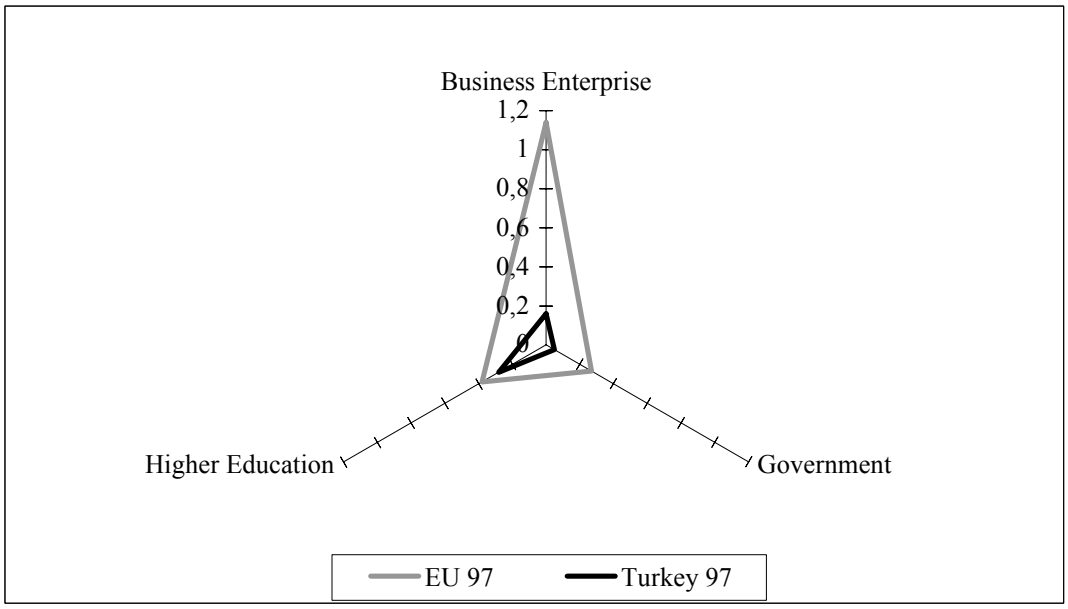
Source: OECD (2001)

Figure 2.1: Share of Industries in Total Manufacturing Exports, Turkey vs EU



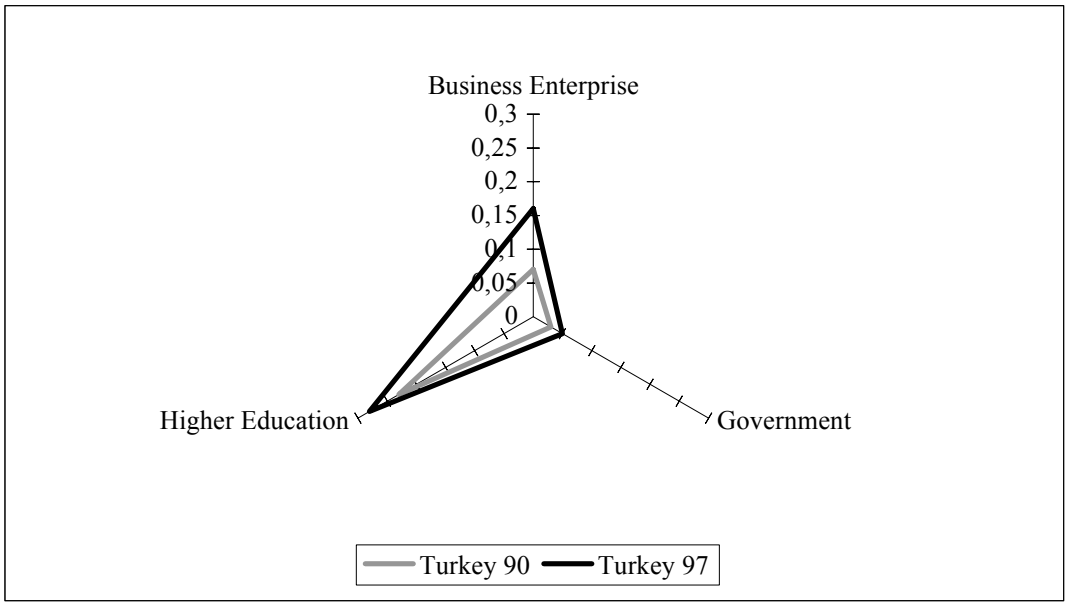
Source: OECD (2001)

Figure 2.2: Share of Industries in Total Manufacturing Exports, Turkey 1990 - 99



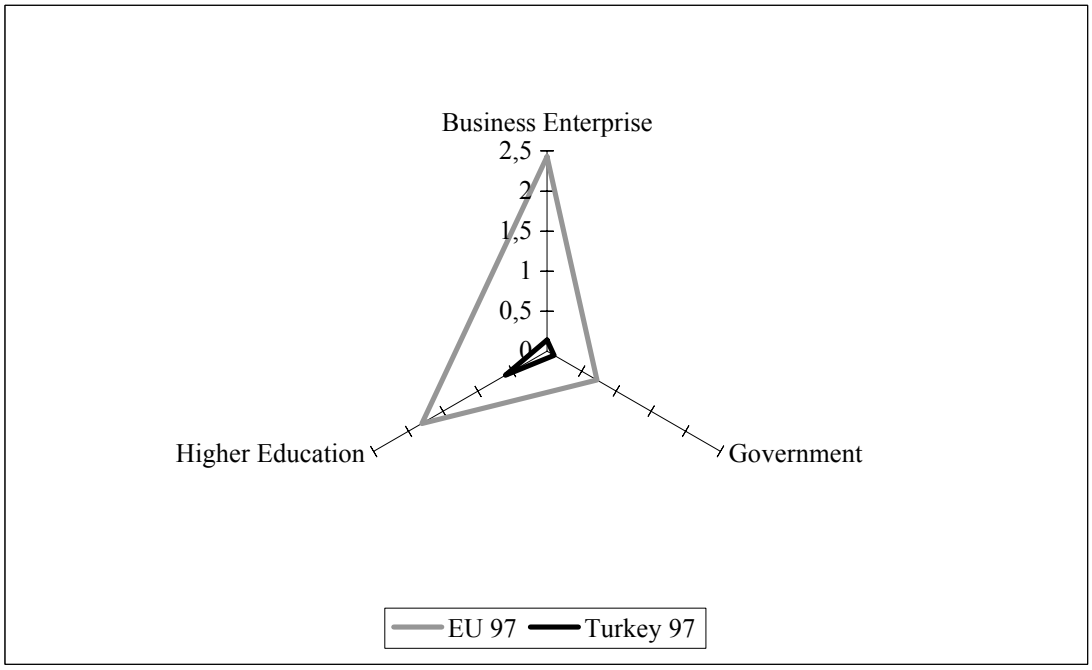
Source: OECD (2001)

Figure 2.3: R&D Expenditures as a Percentage of GDP, Turkey vs EU



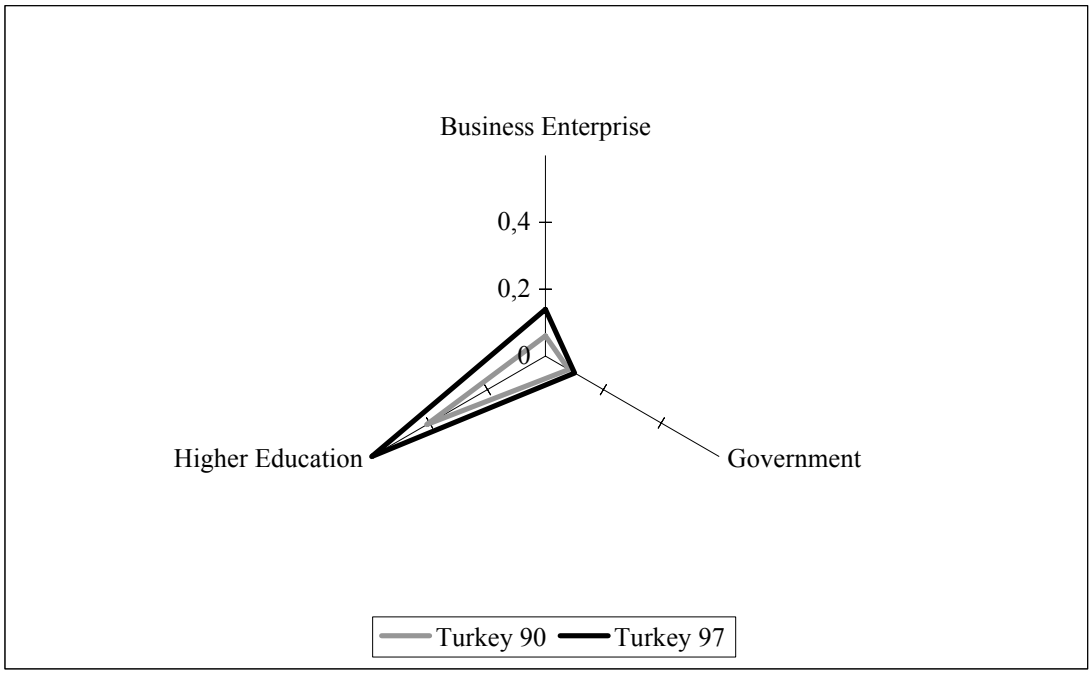
Source: OECD (2001)

Figure 2.4: R&D Expenditures as a Percentage of GDP, Turkey 1990-97



Source: OECD (2001)

Figure 2.5: Researchers per Thousand Labor Force by Sector of Employment, Turkey vs EU



Source: OECD (2001)

Figure 2.6: Researchers per Thousand Labor Force by Sector of Employment, Turkey 1990-97

Finally, according to a study conducted by OECD (1998), Turkey still lacks a serious policy make-up in almost all aspects regarding innovation, science and technology policy. Table 2.1 shows that Turkey needs well-structured improvements and policy adjustments. However it should be emphasized that the situation in Turkey is not as much different as in some other EU member countries such as Italy, Greece and Portugal (see Table 2.1).

Although science parks and incubators are very new to Turkey, it seems that they will play an important role in transferring scientific and technological knowledge within the various actors in the economy in the near future. Science parks have found their legal status with the enactment of the law on *Technology Development Districts* (no: 4691) in 2001 and its implementation regulation in 2002. This law regulates the establishment, development, management and supervision of *Technology Development Districts*..

Table 2.1: Overview of Best Policy Practices: Innovation and Technology Policy

	Institutional framework for policy formulation and implementation	Evaluation	Managing the science base	Financial incentives to industrial R&D efforts	Technology diffusion policies	Promoting new technology based firms	Facilitating growth in new demand		High performance workplaces and intangible assets
							Internet-based	Environment	
Denmark	+	+	++	+	++ / +	+	+	+	++
Finland	++	+	++	++ / +	+	++	++	++	++ / +
France	+	+	-	++ / -	++ / +	++ / -	+	+	+
Greece	-	-	-		++ / -	-	-	-	-
Hungary		-	-		-	-		-	
Italy	-	-	-	-		+	-	-	-
Japan	-	+	++ / -	-	++ / +	-	++ / +	++	++ / -
Korea	+	-	-	+	++ / -	-	+	-	+
Mexico	-	-	-	++ / -	-	-	+	-	-
Netherlands	++ / +	+	++	+	++ / +	+	++	++	++
Portugal	-	-	+				-	-	-
Spain	-	-	++ / -	-	++ / -	-	-	-	-
Turkey	-	-	-	+	+		-	-	-
UK	+	++	++ / +	++ / +		+	++	+	++ / -
US	-	++ / -	++ / +	++ / +	++ / +	++	++	++ / -	++ / -

Source: Adopted from OECD (1998:31)

Key: - *Represents major weakness calling for policy adjustments*

\+ *Represents minor policy recommendations*

++ *Represents case of best policy practice*

A blank means that available information was insufficient to draw conclusions

Currently there are only four active science parks in Turkey. The biggest of them is the METUTECH established within the campus of Middle East Technical University (METU) in the city of Ankara. Currently there are about 100 companies with almost 1000 employees working in the existing 20.000 square meters of office space in METUTECH. The KOSGEB TEKMER in METU is established within the area of METUTECH and serves as an incubation center. By 2020, METU-Technopolis aims to establish 500 firms with a human resource staff of 4000 and a R&D budget of 200 million dollars a year.

Bilkent University has just activated a science park established within the borders of its campus: the Cyberpark. It has a planned science park area of about 550 thousand square meters of which 200 thousand square meters to be physical spaces within 10 years. It is foreseen that at the end of ten years Cyberpark will employ 400 firms and more than 10.000 qualified employees. Hacettepe University in Ankara also has serious attempts in establishing a science park. The science parks in the borders of the three universities in Ankara – METU, Bilkent and Hacettepe- will form a so-called *technology triangle* in the near future.

Another one is the GOSB-Technopark. It is located inside the Gebze Organized Industrial District (GOSB), Gebze – Kocaeli. Its structure is mainly based on the Israeli model of science parks. In fact %48 of the ownership belongs to Stef Wertheimer, who has established four science parks in Israel. The GOSB-Technopark follows a different path of development from the other science parks in Turkey. It first aims to be a center of attraction for the big firms and later for the SMEs and micro firms. Perhaps that is why the current number of tenant firms is only two, but it should be noted that these are the leading firms in Turkey in their area of business. It is expected that transferring knowledge, know-how and experience from the Israeli partner might help to speed up the process of creating synergy.

Another science park in Turkey is located in TUBITAK- Marmara Research Center (MRC) in Gebze, which is Turkey's biggest and most developed research center. The only technology free zone (TEKSEB) in Turkey is also one of the units of TUBITAK-MRC. Companies in both the MRC Science Park and TEKSEB have the opportunity to make use of MRC's technical infrastructure and to collaborate with the

researchers. In addition to this, the firms located in TEKSEB have certain privileges made available by the *free zones law*. Currently there are a number of firms and R&D branches of large firms established in TEKSEB. The attempts show that in a couple of years the number will increase.

The attention of this thesis is devoted to incubators. The data collected are mainly from the firms in TEKMER, which are incubator like institutions established by KOSGEB in a number of university campuses. TEKMER aim to help people trained in scientific and technological fields to become entrepreneurs, to foster the creation of new technology-based enterprises, to support the activities of existing SMEs, to foster commercialization of R&D efforts, to help efforts of development and diversification of regional economic activities and to strengthen university-industry cooperation. By providing strong support and managerial, technical and administrative consultancy mechanisms, TEKMER aim to create NTBFs and to establish suitable environment for enabling these enterprises to survive. Currently there are ten active TEKMER (see Table 2.2). The oldest TEKMER is eleven years old and the youngest is one year old. They generally have a hybrid organization meaning that they support both firms physically established in the incubator building and firms outside the incubator building on behalf of projects in their own places (incubator without a wall). A total of 128 firms are graduated in these ways, and a total of 149 are still being supported.

Another institution that shares some common characteristics with incubators in Turkey is the Ericsson Mobility World (former known as the Crea-World) located in Istanbul. This cannot be identified as an incubator because the main objective is neither to facilitate new high-tech firm creation and development, nor the transfer of technology from universities and the commercialization of research. It aims to encourage firms and entrepreneurs to develop, test and commercialize wireless mobile internet applications and services. Like incubators, administrative and technical supports as well as training are made available by the institution. A solid infrastructure and physical working units are also provided. Firms within the Ericsson Mobility World are either supported on a project basis or can obtain the privilege of being a partner. However it should be emphasized that the Ericsson Mobility World does not fit into the concept of incubators.

Table 2.2: KOSGEB Technology Development Centers in Turkey.

Name	Location
Ankara University TEKMER	Ankara
METU TEKMER	Ankara
Bosphorus University TEKMER	Istanbul
Istanbul University TEKMER	Istanbul
ITU TEKMER	Istanbul
Yıldız Technical University TEKMER	Istanbul
Dokuz Eylul University TEKMER	İzmir
Erciyes University TEKMER	Kayseri
Gebze Institute of Technology TEKMER	Kocaeli
Blacksea Technical University TEKMER	Trabzon

Source: KOSGEB

2.4 Science Parks and Incubators: Importance for Turkey

During the last decade many countries have increasingly engaged in establishing science parks and incubators for various reasons ranging from supporting NTBFs to regional development. Turkey is one of the countries that also follow this route. Science parks and incubators as policy tools for Turkish science and technology policy are important for several reasons.

First, the key word in the modern learning economy is *interaction* and science parks and incubators mainly serve for setting the link between university, industry and other actors taking part in the economy. In this sense they can be viewed as special versions of networks and clusters. It is a fact that Turkey has certain interaction, coordination and organization problems within and between the institutions. So the policy option of establishing science parks and incubators can be a way out for Turkey in this sense.

Second, it is widely accepted that the SMEs are important in creating income and employment. Their flexible structure enables them to adapt quickly to changes in economic environment and technology. Many politicians believe and economists have the intuition that new possibilities for growth, innovation and creating jobs will come from small and new firms (Thurik and Wennekers, 1999). Hence they can play a vital role in achieving economic growth especially in the developing countries and less

developed countries (LDCs). One important point here is that all industrial support policies with the exception of promotion of SMEs, local development and R&D activities are forbidden by World Trade Organization (WTO) regulations. Therefore supporting SMEs and R&D through various tools and mechanisms seems to be one of the main policy tools available for Turkey and other countries as well. However SMEs have several disadvantages. SMEs are generally unable to obtain benefits from economies of scale both from the output and input side. Small size is an important constraint for technology and product innovation, which is the core of recent competitiveness (European Commission, 2001a). They also have various problems in gaining access to resources and in the development of R&D intensive sectors possibly because of their limited access to scientific knowledge (United Nations, 1996). The UN here argues that apart from other policies, SME policy should be based on policy tools that foster SME births, survival and success. That is why science parks and especially incubators are important mechanisms. Science parks and incubators can be a remedy for the disadvantages that SMEs encounter in the sense that, apart from providing numerous facilities and services, incubators definitely foster SME births and survival.

Third, an important aim behind incubation is establishing a protective environment for firms in the start-up period. Besides ordinary problems that are present in any other developed country, Turkish SMEs face another significant obstacle that is the unstable macroeconomic environment. Incubators may assist to overcome this instability in the start-up phase.

Fourthly, it is a fact that developing countries and LDCs have limited resources both in terms of technological and human resource capacity. Incubators can assist in the use of resources in a more efficient way. For example many incubators have machinery and equipment for the use of all tenant firms. So firms will not have to direct resources towards provided facilities. This facilitates firms to use their available funds in more productive means. Another fact is that the success of NTBFs is uncertain due to the risk component embodied in conducting R&D. Incubators in a way pool this risk. By investing simultaneously in a portfolio of early start-ups, the incubator lowers the overall investment risk compared to the unique risk associated with each individual company (European Commission, 2002). A single successful project initiated by a tenant firm

may create the necessary value added – and even more- to cover the costs incurred from the unsuccessful ones.

Another point is that, Turkey imports high-technology products, so policy towards supporting NTBFs that produce high-technology products will perhaps result in import-substitution and by this way limited resources will not be given away and can be diverted to more productive uses. Science parks and incubators by nature enable this.

Finally, Turkey is one of the countries that suffers from brain drain. Every year many well-educated technical and scientific personnel move to other countries for reasons associated with better opportunities. Science parks and incubators may be at the very least an attempt in reversing this situation by enabling these people to implement their knowledge and skills within the borders of Turkey.

2.5 The EU Context: Incubators in the EU

Turkey being a candidate country to the EU, has to conform also to policy initiatives about incubators in the EU as well as other related fields. Perhaps earlier experiences will constitute policy lessons for Turkey. The EU is recently trying to develop a set of common definitions and quality standards for European business incubators. In order for the European Commission to realize these efforts a survey on business incubators in the EU has been conducted– Benchmarking of Business Incubators (European Commission, 2002). At this stage it will be useful to review the basic outline of the policy and experience of EU member countries.

It is believed that the business incubation process adds value by accelerating the start-up of new businesses and helping to maximize their growth potential in a way that is more difficult for alternative SME support structures to achieve (European Commission, 2002). Currently there are about 900 incubators in the Europe, which have diversified fields of activity, various country specific support mechanisms and different management types. Table 2.3 summarizes the results and key points for 12 EU countries that take part in the survey. The results of the survey claim that incubators in the EU make significant contribution to job and wealth creation. Some other results are:

- EU policy on incubators take its power from the policies that aim to promote SMEs and framework programs
- Incubators should not be stand alone institutions, but rather interact with other organizations to be an element of a broader strategic framework
- The quality of the services provided are key to value-added contribution
- More successful incubators are the ones that have particular technology and business focus, a clearly defined target market, a clearly defined purpose and that monitor the client firms well.
- The interaction with the graduate firms is important to ensure full impact.
- Business incubators are cost-effective instruments relative to other policy tools.
- Long term job and wealth creation effects should be the focus point on incubator evaluation. The net impacts are important.

The results of the questionnaire further show that;

- Incubators are non-profit organizations, however for-profit incubators are increasing in number (currently about %20 of all incubators in Europe)
- Different partners are involved in setting up incubators such as EU, public agencies, private sector, universities and science parks.
- An average incubator unit is about 5800 square meters and assists 25 firms on average, %70 of the firms located in incubators are individual start-ups.
- The most general services provided are pre-incubation (entrepreneurship), business planning, help in raising finance and networking.

Table 2.3: Overview of the EU Policy on Incubators

Country	No of Incubators	Incubator Finance	Best Policy Practice	Country Specific Points
Austria	63	▪ EU and national funds (start-up) ▪ Rental income from tenants and partially charges for services provided (operational)	▪ Incubators are a part of strategy to develop clusters of new-technology based activities. ▪ Networking between incubators is important. ▪ Initiatives to improve the quality of the services provided by an incubator	According to the results of a survey %79 of the firms that are in an incubator are engaged in high-tech activities, %51 of the firms employ less than 5 people, %61 is a start-up.
Belgium	13	▪ EU and national funds (start-up) ▪ Rental income from tenants and partially charges for services provided (operational)	Considerable emphasis on marketing, on networking amongst incubator members and on follow up of graduate firms	
Denmark	7	▪ Publicly funded (start-up) ▪ Rental income from tenants and partially charges for services provided (operational)	▪ Strong policies on commercializing R&D. ▪ A developed venture capital market: state funded venture capital is provided in the first instance aiming to attract private funds later. ▪ Strong networking initiatives both with universities and other businesses.	All incubators are located inside a science park. The department of Business Promotion, which is a part of Ministry of Trade and Industry, is responsible from incubators.
France	192	▪ Rental income from tenants and partially charges for services provided (operational)	▪ Strong measures in entrepreneurial promotion and entrepreneur training. ▪ Strong policies on commercializing R&D. ▪ Initiatives to improve the quality of the services provided by an incubator. ▪ Rigorous evaluation and monitoring system.	The French National Association of Business Incubators ELAN set a minimum standard definition of business incubator. Only about 50 of them meet the minimum standard definition.
Finland	26	▪ Rental income from tenants and partially charges for services provided (operational)	▪ Incubators are a part of strategy to develop clusters of new-technology based activities. ▪ Networking between incubators is important. ▪ Strong measures in entrepreneurial promotion and entrepreneur training. ▪ Strong policies on commercializing R&D.	Public sector researchers in Finland retain the intellectual property rights to their research which allows them to exploit the commercial applications of their work

Table 2.3: Overview of the EU policy on Incubators (continued)

Country	No of Incubators	Incubator Finance	Best Policy Practice	Country Specific Points
Germany	300	▪ EU and national funds; Leasing premises form local authorities (start-up) ▪ Rental income from tenants and partially charges for services provided (operational)	▪ Incubators are a part of strategy to develop clusters of new-technology based activities. ▪ Networking between incubators is important. ▪ Strong policies on commercializing R&D. ▪ Initiatives to improve the quality of the services provided by an incubator. ▪ Rigorous evaluation and monitoring system. ▪ Strong business support services	No special business training is provided because the fundamentals are taught as a part of most university courses
Ireland	6	▪ Attracting public and private partnership to cover initial capital investment funded by EU and national state (start-up) ▪ Rental income from tenants and partially charges for services provided (operational)	▪ Strong venture capital and seed capital initiatives. ▪ Strong measures in entrepreneurial promotion and entrepreneur training. ▪ Strong business support services	Irish Business and Innovation Centers (BICs) seed capital fund is designed to help commercially viable business with an innovative focus to get started and set-up their operations.
Italy	45	▪ Mostly funded by EU (start-up) ▪ Rental income from tenants and partially charges for services provided (operational)	▪ Strong measures in entrepreneurial promotion and entrepreneur training. ▪ Rigorous evaluation and monitoring system.	
Portugal	23	▪ EU, public and private funds; Attracting private sector investment in land and buildings by discounting costs (start-up) ▪ Rental income from tenants and partially charges for services provided (operational)	▪ Strong business support services. Evaluation of entrepreneurial skills	

Table 2.3: Overview of the EU policy on Incubators (continued)

Country	No of Incubators	Incubator Finance	Best Policy Practice	Country Specific Points
Spain	38	▪ EU and national funds (start-up) ▪ Rental income from tenants and partially charges for services provided (operational)	▪ Strong measures in entrepreneurial promotion and entrepreneur training. ▪ Strong business support services. ▪ Strong policies on commercializing R&D.	There are benchmarking meetings between business incubators in Spain
Sweden	39	▪ EU and national funds (start-up) ▪ Rental income from tenants and partially charges for services provided (operational)	▪ Strong measures in entrepreneurial promotion and entrepreneur training. ▪ Strong policies on commercializing R&D.	University spin-off characteristic is strong and there are initiatives to foster internationalization of new start-ups.
UK	144	▪ EU, public and private funds; borrowing funds to convert old buildings with a view to eventual capital gain (start-up) ▪ Rental income from tenants and partially charges for services provided (operational)	▪ Strong measures in entrepreneurial promotion and entrepreneur training. ▪ Initiatives to improve the quality of the services provided by an incubator	
Greece	7			
Luxemburg	2			
Netherlands	6			
Total	*911*			

Source: Adapted from Benchmarking of Business Incubators (European Commission, 2002)

2.6 Review of the Previous Research

It is appropriate to classify the growing literature on science parks and incubators into two broad areas. The first set of studies deals with the theory and try to answer questions such as, how science parks and incubators are formed; how they are managed; what are their aims; how are they planned? etc. The second set of studies deals with the evaluation of science parks and incubators. These works mainly focus on whether they have achieved their economic and technological goals. This study certainly belongs to the later group and tries to assess whether the TEKMER of KOSGEB in Turkey are successful in encouraging new firm creation and survival.

Although much of the attention in this study is diverted to the concept of an incubator, within a set of studies about science parks three of them worth noting. First of all, Castells and Hall (1994) start by stating that "productivity and competitiveness are increasingly based on the generation of new knowledge and on to access to, and processing of appropriate information". In this sense their study is rooted from the theoretical basis of formation of technopolises – the term covering a set of derivations: technology park, science park, science city, technopolises – and covers case studies that qualitatively evaluates different technopoles of the world on the basis of two indicators: *(i)* whether the scientific synergy is formed, *(ii)* whether linkages and feedbacks are developed. They believe that all kind of technopoles at least should articulate three key elements for success: *(i)* generation of –or access to- technological information, *(ii)* availability of high-skilled labor force, *(iii)* availability of venture capital (Castells and Hall, 1994, p237). Another comprehensive work is the one by Monck et al. (1988). Their work is solely on the growth and development of science parks in the United Kingdom (UK). Besides providing a theoretical framework, the study is a survey of science park firms. The methodology used resembles the one that is employed in this study. Interviews were made with firms currently located in a science park and later these were matched with firms similar in character but which were located outside a science park. The findings of Monck et al (1988) state that science parks are important tools for universities to set links with the commercial world. Lastly, perhaps the first work in Turkey is the one by Babacan (1995). Babacan (1995) made an attempt to judge whether science parks are appropriate tools for economic

development and made some early remarks about policy modeling based on science parks in Turkey.

The major contributions on the literature on incubators are very recent. Smilor and Gill (1986) is perhaps one of the earliest and most comprehensive study amongst all. The study was established on the assumption that the nature of economic development is changing due to increasing entrepreneurial activity and increasing competition and the concept of incubator respond well to these changes. The earlier studies have a common duty of establishing a solid literature since evaluation was not very possible because the concept of incubator was very new. Also the deficiency on evaluation was partially due to the lack of historical data (Mian, 1996a). However most of the incubator related knowledge does not have a solid theoretical base of its own and is anecdotal in nature (Mian, 1996a). Mian (1994a and 1994b, cited in Mian 1996a) has contributed greatly on the concept of university technology business incubators which he defines as a modern enterprise development tool employed by some entrepreneurial universities to support NTBFs. He investigates in detail which university related services and facilities provided by the incubator add major values to the client firms and find that laboratories and equipment, university image and student employees are important in this sense. Other researchers made numerous contributions to the subject matter and a brief but comprehensive literature review on university technology business incubators can be found in Mian (1996a).

The appearance of studies evaluating the effectiveness of science parks and especially incubators is only very recent. Colombo and Delmastro (2002) and Löfsten and Lindelöf (2002a, 2002b, 2003) employed more or less the similar methodology to assess the value-added contributions of being in a science park or an incubator.

Colombo and Delmastro (2002) initiated a study in Italy by surveying on-incubator firms and later matching these firms with the off-incubator counterparts. As expected he found that on-incubator firms not only display higher growth rates but also perform well in technological matters as opposed to the firms that are located outside an incubator. One important finding of the study is that on-incubator firms have better records in setting collaborative arrangements and cooperation with universities. This result is also supported by Löfsten and Lindelöf (2002a). However their most important finding is that innovative

activity is only marginally different between on- and off-incubator firms. This is interesting in the sense that Felsenstein (1994, cited in Löfsten and Lindelöf, 2002a) argues that science parks serve for "seedbeds" for innovation, however it seems that there is still room for development in this function.

Löfsten and Lindelöf (2002a, 2002b, 2003) conducts a survey in Sweden using the same methodology by comparing the results of on-science park firms with the firms located outside a science park. They employ three performance criteria: employment growth, sales growth and profitability and reached similar findings conforming with the literature that is on-science park NTBFs perform better on employment and sales growth. However the same is not true for profitability. It is also stated that on-science park firms have higher R&D intensities. A significant contribution favoring science parks is that initiatives to promote NTBFs on science parks, yields a higher rate of job creation relative to other polices that support NTBFs (Löfsten and Lindelöf, 2002a). On the marketing side they found that NTBFs have much wider market distribution (Löfsten and Lindelöf, 2003). The results also favor science parks in providing networking opportunities to NTBFs.

Phillips (2002) handled her study in a different way. She has differentiated technology business incubators (TBI) from other types of incubators by employing two criteria: *(i)* whether the primary supporter of the incubator is a university; *(ii)* whether "transfer of technology" or "commercialization of research" are amongst the primary objectives of the incubator. It was found that TBIs generally performed as well as other incubators. However Phillips (2002) have also stated that the level of technology transfer was lower than expected.

A final point is that profiles of founders of NTBFs are important determinants of firm behavior and success (Colombo and Delmastro, 2002; Löfsten and Lindelöf, 2002b, 2003). It is generally found that founders of NTBFs located in a science park or an incubator, tend to have higher academic qualifications and as expected hold degrees in engineering, science and technology fields. An important point stressed by all studies is that the percentage of entrepreneurs being previously employed by a university is higher in firms that are located on science parks and incubators.

On the grounds of these findings it can be asserted that in general, incubators and science parks are useful tools in transfer of knowledge and they contribute to the creation, survival and success of the NTBFs

CHAPTER III

DEFINITONS, METHODOLOGY AND MAIN HYPOTHESES

This chapter mainly deals with the methodology employed in this study. First of all, the main concepts (incubator, NTBF, SME etc.) are defined. The next section explains how the data is collected. The chapter closes with the discussion of main hypotheses to be tested.

3.1 Definitions

The, International Association of Science Parks (IASP) defines a *science park* as:

> "… an organization managed by specialized professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions.
>
> To enable these goals to be met, a *Science Park*;
>
> - Stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies and markets;
> - Facilitates the creation and growth of innovation-based companies through incubation and spin-off processes;
> - Provides other value-added services together with high quality space and facilities."

Association of University Research Parks (AURP) defines a *university research park* as:

> "A property-based venture, which has:
>
> - Existing or planned land and buildings designed primarily for private and public research and development facilities, high technology and science based companies, and support services.
> - A contractual and/or formal ownership or operational relationship with one or more universities or other institutions of higher education, and science research.

- A role in promoting research and development by the university in partnership with industry, assisting in the growth of new ventures, and promoting economic development.
- A role in aiding the transfer of technology and business skills between the university and industry tenants."

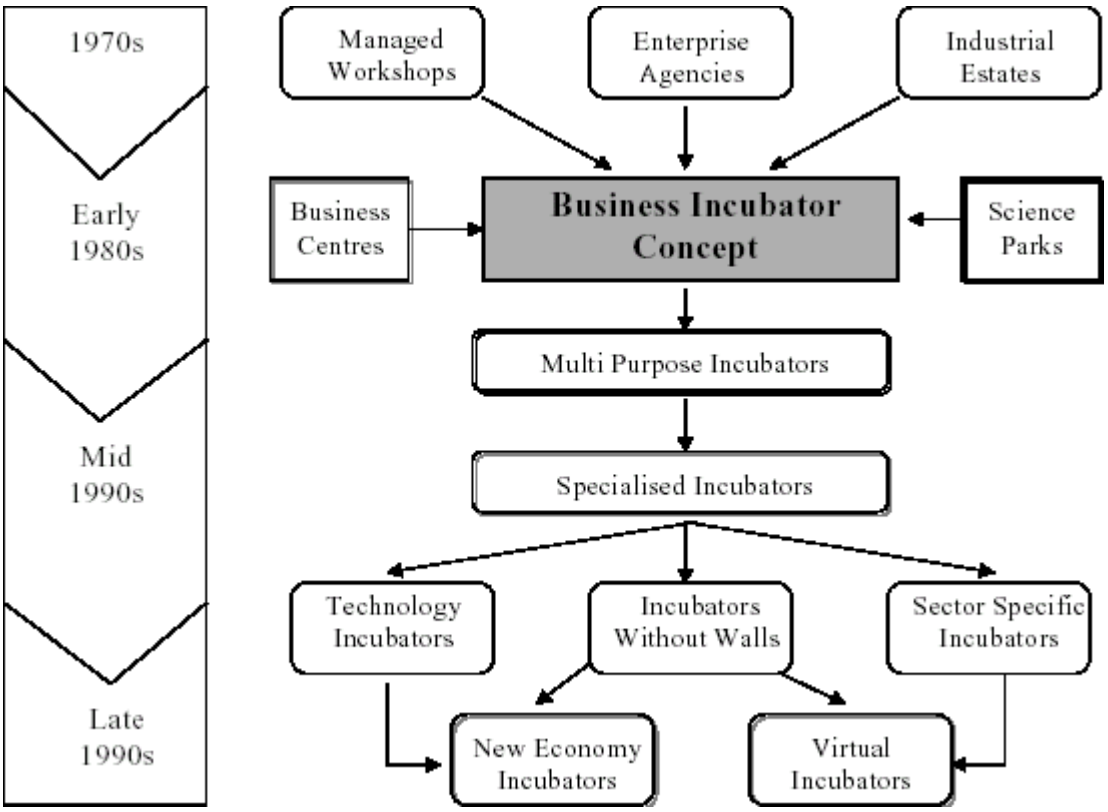
Lastly, National Business Incubation Association (NBIA) gives the definition of *business incubation* as:

"… a dynamic process of business enterprise development which:

- Nurture young firms, help them to survive and grow during the start-up period when they are most vulnerable;
- Provide hands-on management assistance, access to financing and orchestrated exposure to critical business or technical support services;
- Offer entrepreneurial firms shared office services, access to equipment, flexible leases and expandable space — all under one roof."

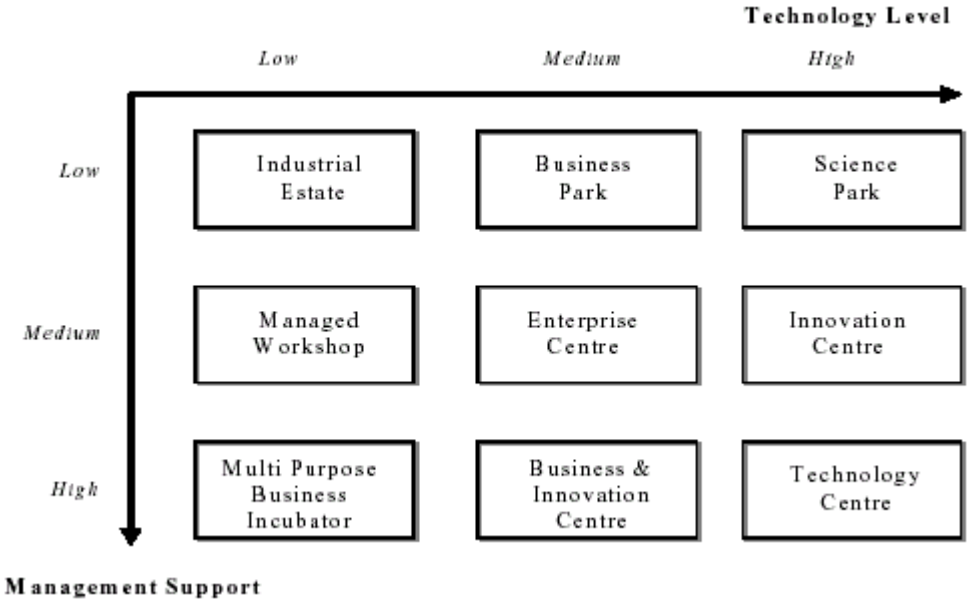
Figure 3.1 provides a well-defined incubator model (European Commission, 2002). The term business incubator in its broadest definition embraces a variety of different structures such as TBIs and Sector Specific Incubators. The primary goal of a "traditional" incubator is to facilitate economic development by promoting entrepreneurship, innovation, employment opportunities and growth. Especially after the 1990s incubators are generally established for differentiated special purposes. At this point we should devote our attention to *Technology Business Incubation* since TEKMERs in Turkey share common characteristics with TBIs. TBIs are not very different from other incubators. A primary objective of transfer of technology and commercialization of research is enough to identify a TBI. Main objectives can be summarized as:

- To facilitate new high-tech firm creation and development
- To improve technology transfer between higher education institutions and industry
- To facilitate transfer of scientific research into commercial applications
- To facilitate new opportunities for the university graduates both in terms of entrepreneurship and employment
- To benefit from agglomeration economies



Source: European Commission,(2002:3)

Figure 3.1: Evolution of Business Incubator Model



Source: European Commission (2002:6)

Figure 3.2: Comparison of Various Definitions of SME Promotion Structures

Figure 2 presents the relationship between different SME promotion structures. Although the concept of *Business Incubator* is positioned towards the right-hand corner, specialized incubators can easily be positioned to any place in the matrix. It is appropriate to position TEKMER in Turkey somewhere in between medium and high technology level, and medium and high management support.

Throughout this study two concepts are frequently used: New Technology Based Firms (NTBFs) and Small and Medium Sized Enterprises (SMEs). It is widely accepted that small firms are important in creating income and employment. Firms that employ 1 to 50 employees is identified as *small enterprises* and firms that employ 51 to 150 employees is defined as *medium-sized enterprises* according to KOSGEB. Little (1979, cited in Löfsten and Lindelöf, 2002a) argues that NTBFs share some common characteristic:

- It must be a business based on a potential invention or one having substantial technological risks over and above those of a normal business.
- It must have been established by a group of individuals – not as a subsidiary of an established company.
- It must have been established for the purpose of exploiting an invention or technological innovation.

3.2 The Questionnaire and the Data

As it is stated earlier the main purpose of this study is to evaluate whether the TEKMERs of KOSGEB in Turkey are successful in supporting NTBFs. In order to assess this, a questionnaire is employed and conducted to two different samples of firms, on-incubator and off-incubator. In some cases the questions were asked in different manners and in some cases less detailed versions are used. The on-incubator questionnaire consists of 6 parts and 28 questions (Appendix A). The questionnaire comprises questions about:

- Basic firm information – company's main business activity, date of establishment, legal status;
- Economic performance- such as employee structure and sales revenue;
- Technological performance- innovation indicators such as type of R&D conducted and patent information;
- Evaluation of the services provided by TEKMERs;

- Importance of interaction with universities and other agents;
- The profile of founders.

Questionnaires were conducted in 7 TEKMER to form the on-incubator sample. Later these firms were matched with their off-incubator counterparts. A sample with a similar sector, size and location characteristics was selected to form the off-incubator group. The response rates of each sample are provided in Table 3.1. Because of the difficulties in gathering detailed information from the firms –it seems that some firms do not believe in these kind of studies- the survey was conducted through face-to-face interviews. Face-to-face interviews are an important part of the study for several reasons. First of all, it should have been very hard to do this research by mailing the questionnaires and then waiting for the replies because the response rate would have been very low. Second, the firms are unwilling to share information that they consider "sensitive" (especially sales revenue and employment figures). Lastly, and the most importantly, the interviews not only produced data but also provided exchange of valuable informal information. The outspoken firm owners and employees gave important information on firm behavior and on the evaluation of the policies on SMEs.

Table 3.1: On- and Off- Incubator Samples and the Response Rates

Name	Location	Number of Firms Contacted	Number of Answered Questionnaires	Response Rate
On – Incubator Sample		*63*	*48*	*76.1*
Ankara University TEKMER	Ankara	5	4	80.0
METU TEKMER	Ankara	21	18	85.7
Bosphorus University TEKMER	İstanbul	9	8	88.9
ITU TEKMER	İstanbul	21	14	66.7
Yıldız Technical Univesity TEKMER	İstanbul	5	3	60.0
Gebze Institute of Technology TEKMER	İzmit	2	1	50.0
Off - Incubator Sample		*81*	*41*	*50.6*
	Ankara	26	19	73.1
	İstanbul	55	22	40.0

Note: Nearly in all TEKMERs the number of firms contacted is the same as the number firms operating in the TEKMER. However in Gebze Institute of Technology TEKMER there were 10 firms but we manage to contact only 2 of them.

I had also some difficulties during the data collection process and these can be summarized as follows:

- I was not able to gather information from all TEKMERs since some are very young and some do not have available buildings and infrastructure. The study is limited to firms that are physically located in a TEKMER.
- Some firms are very young or just have located in the TEKMER. Interviews were conducted with these firms unfortunately some information is not available.
- Some firms were unwilling to provide information on some firm specific variables (especially questions on sales revenue).

The second part of the survey is based on a matched sample of off-incubator firms. The questionnaire that the off-incubator firms answered is slightly different. The questions related with the services of TEKMER are excluded and some other questions are included (Appendix B). Three indicators are used to form the off-incubator sample: geographical location of the firm, main business activity (sector) of the firm and number of employees. During the matching process we did not have any problems concerning the first two criteria, but have difficulties to conform to the size criterion. I first planned to conduct a similar questionnaire in *Organized Industrial Estates* in Ankara and Istanbul. It would be interesting to compare the two samples from different establishments – TEKMERs and *Organized Industrial Estates* - that share a couple of common characteristics. However I couldn't manage to do this because there were not so many high-technology firms located in organized industrial estates. (12 firms in the off-incubator sample are located in an organized industrial estate). Several databases and methods are used to form the off-incubator sample. Unfortunately there are no comprehensive databases to form the population of firms. The TOBB database (the database of the Union of Chambers and Commodity Exchanges of Turkey) and KOBINET are not updated and this produced extra difficulty. The computer and software firms are obtained mainly from the TTGV database. Another difficulty was spotting micro firms. In this case the so-called *snowball* method is used. Firm owners were asked to name other micro firms, which the questionnaires can be applied.

There are two caveats of the method we employ in this study. First, observed differences between on- and off-incubator firms could reflect the motivations of the firms as well as the benefits of a science park or an incubator (Löfsten and Lindelöf, 2002a). This is also known as *the unobserved heterogeneity problem.* Second, firms, which perform well, are more willing to exchange information so that the samples might not represent the population truly (Colombo and Delmastro, 2002). We devote considerable attention to form the samples; unfortunately it is very hard to say that our sample is not affected from such biases. However we managed to get high response rates from the on-incubator firms so we are quite confident that the on-incubator sample can be regarded as a representative of the population.

To provide statistical evidence we have employed two different tests: independent sample t-test and chi-square test of independence. To evaluate the differences between two samples concerning continuos variables we performed independent sample t-tests. For the discrete variables we have used chi-square test of independence. In the cases we have performed chi-square tests the null hypothesis states that the variable in question is independent of location, i.e., there is no difference between on- or off-incubator firms. If the null hypothesis is rejected then it means that the difference between categories is statistically significant and the *"variable in question"* is not independent of location, i.e., being in on- or off-incubator category does affect the *"variable in question"*.

3.3 Basic Hypotheses

This study evaluates the benefits that are attached to TEKMERs. We test several hypotheses to assess these benefits.

The very first aim of an incubator is the creation of new high-technology firms. It is believed that through the services provided incubators enable strong start-up character. Löfsten and Lindelöf (2003) argue that science parks give the academics an opportunity to start a business and commercialize their research. Monck et.al. (1988) go even further by stating that without science parks most of the academic-owned businesses would not have been established. So the following hypothesis is proposed:

HYPOTHESIS 1: TEKMER facilitate new high-technology firm creation.

Another important aim behind incubation is that incubators fosters economic and technological performance of the NTBFs. Incubators are generally established with the expectation of their positive role on R&D, innovation and product renewal. So it is generally expected that the on-incubator firms will record higher levels of product innovation than independent NTBFs (Löfsten and Lindelöf, 2003). Another vital function of incubators is to enable innovations to be translated into aggregate productivity and employment growth through the process of technology diffusion. Productivity and employment growth can well be associated with positive economic performance. Therefore the following propositions are put forward in cooperation:

HYPOTHESIS 2: TEKMER foster the economic performance of new high-technology firms.

HYPOTHESIS 3: TEKMER foster the technological performance of new high-technology firms.

As I have stated earlier SMEs are important in creating income and employment however face some serious problems that hinder their growth and success. Ceglie, Clara and Dini (1999) argue that through networking, SMEs can address the disadvantages that they encounter and improve their competitive position. Incubators are important tools that enable their tenant firms to interact with other agents in the economy, especially with the university and other firms in their very early development stage. So the claim is as follows:

HYPOTHESIS 4: TEKMER enable firms to benefit from agglomeration economics. On-incubator firms attach more importance to interaction with both other firms and university.

TEKMER mean new opportunities for university graduates both in the sense that they provide employment and foster entrepreneurship. Even it is stated that student employees are important value-added components (Mian, 1996a). Besides providing employment, they provide stories of success of the previous graduates hence serve as a model for young entrepreneurs. I conclude by making the following assertions:

HYPOTHESIS 5: TEKMER facilitate new opportunities for university graduates in terms of employment and entrepreneurship

It is mentioned that the data also includes some information on the founders. There is a general belief that the firm founders that locate their business are more qualified both in terms of education and prior working experience (Colombo and Delmastro, 2002). So the following assertion can be evaluated:

HYPOTHESIS 6: On-Incubator firm founders are more qualified both in terms of educational background and prior working experience.

CHAPTER IV

PROFILES OF FIRMS AND FOUNDERS AND EVALUATION OF TECHNOLOGY DEVELOPMENT CENTERS

This chapter provides a detailed assessment of the characteristics of the on-incubator and off-incubator firms. The first section deals with the tests of the hypothesis introduced in chapter 3. It covers a comparison of the characteristics of founders of on-incubator and off-incubator firms as well. The evaluation of the services provided by the TEKMERs is given in section 4.2.

4.1 Characteristics of Firms and Founders

On-incubator firms are mostly high-tech firms and a categorization of the main business area show that computer and software, electronics and medical sectors are dominant (see Table 4.1). The firms that belong to medical sector include the ones that have electronics component. Although there are a few firms that belong to other sectors such as automotive, energy and chemical industry in the on-incubator sample, the off-incubator sample composes of three main sectors: computer and software, electronics and medical. There are 48 firms in the on-incubator sample and 41 firms in the off-incubator sample. Almost all firms in both samples are individual companies. In the on-incubator sample the majority of the firms are limited liability companies, whereas in the off-incubator sample 51% of the firms are limited liability companies and 39% of the firms are joint stock companies. The observations are from the two biggest cities of Turkey, Istanbul and Ankara and there is not any difference between on- and off-incubator samples regarding geographical location (see Table 4.2). On-incubator firms are on average smaller than off-incubator firms, which may be an expected result in the sense that the main objective of an incubator is nurturing newly established firms are. Moreover on-incubator firms somewhat younger than their off-incubator counterparts.

Table 4.1: Main Business Area and No of Employees of On- and Off-Incubator Firms

		On-Incubator					Off-Incubator			
		Sectors					Sectors			
		Computer / Software	Electronics	Medical	Other	Total	Computer / Software	Electronics	Medical	Total
No of Employees	1-4	8	6	3	5	22	2	8	1	11
	5-9	10	3	1	1	15	8	1		9
	10-24	5	1	1		7	9		2	11
	25-49	1	1		1	3	6		1	7
	50-99	1				1	2	1		3
Total		25	11	5	7	**48**	27	10	4	**41**

Table 4.2: Main Business Area and Geographical Location of Firms

	On - Incubator		Off - Incubator	
Mean Age	4.75		6.37	
	Frequency	%	Frequency	%
Main Business Area				
Computer / Software	25	52	27	66
Electronics	11	23	10	24
Medical	5	10	4	10
Other	7	15		
Total	48	100	41	100
Geographical Location				
Ankara	22	46	19	46
İstanbul	26	54	22	54
Total	48	100	41	100

The first hypothesis that the TEKMERs facilitate new high-technology firm creation can be supported in at least four ways. First of all the data reflects that TEKMERs display strong start-up character. There are 23 start-up firms in the on-incubator sample, which constitutes about 48% of all firms. However one can easily extend this by adding the 7 firms that are established outside the incubator but moved into a TEKMER within a year, which makes a total of 63% of all firms. Second, the questionnaire included a question on the behavior of the on-incubator firms if they had not located their business in a TEKMER.

12.5% of the firms have stated that the company might still exist but it would have been struggling to survive and would have been inefficient. 2 firms have stated that the company might have not existed and interestingly 3 firms stated that the founders would have moved to another country. The results display that at least 23% of the firms might have not been established if they were not located in a TEKMER. When only start-ups are taken into consideration, this rate goes up to 28%. Third, 20% of the firms stated that the infrastructure and available office spaces provided by the TEKMERs are amongst the most important reasons behind locating their business in a TEKMER. Moreover, 27% of the firms attached first degree of importance to this. It seems that TEKMERs provide important facilities especially for the start-ups. Studies by Mian (1996a, 1996b) report similar finding that is the rent breaks – cheaper office spaces- is an important value-added for many firms. Finally, the firms are asked to evaluate the supports and facilities of the TEKMERs. The following table displays the results of two different sub-samples. 54% of the firms that did not take any kinds of financial support[2] stated that the facilities provided by the TEKMERs were critically important to firm development.

Table 4.3: Evaluation of the facilities provided by the TEKMERs.

	A		B	
	Freq.	%	Freq.	%
Very important - Critical to firm development	14	53.8	10	55.6
Important	11	42.3	7	38.9
Not important	1	3.8	1	5.6
Total	26	100.0	18	100.0

A: On-incubator firms that have not taken any kind of financial supports
B: On-incubator firms that have not taken any kind of financial supports and that are start-ups or located their business in a TEKMER within a year

The second assertion is that TEKMERs foster the economic performance of new high-tech firms. Economic performance can be measured by two variables: changes in sales revenue and changes in employment. We had great difficulty in obtaining these figures due the reasons mentioned in the preceding chapter. Especially obtaining sales revenue figures was extremely hard. Since it was difficult to get information on sales values, the interviewees were asked whether the sales revenue increased, stayed constant or

[2] Such a constraint is imposed because the firms that are not supported financially are the ones that highly use other facilities such as infrastructure and office spaces and I suppose that it is these firms that have benefited the most.

decreased.[3] The lack of full sample data in sales revenue and employment figures was mostly because of this difficulty and it was partially due to newly established firms.[4]

Table 4.4 presents the data on employment change between 2000 and 2002. Our findings indicate that there is an important discrepancy between the on-incubator and off-incubator firms. Majority of the on-incubator firms has stated an *increase* or *no change* in sales revenue. On the contrary 32% of the off-incubator firms declared a decrease in their sales revenue between 2000 and 2002. This discrepancy takes a different form when only university graduates are taken in to consideration. The ratio of firms that stated an increase in employment of graduates widens between on-incubator and off-incubator sample in favor of on-incubator sample. Another aim of both incubators and science parks is to foster local employment. We have asked whether the firms rely on local or national labor market. As expected on-incubator firms heavily rely on local labor market (Table 4.5), more on the graduates from the university, where the firm is located in. Even the student employees are essential for quite an important number of on-incubator firms.

Table 4.4: Change in Employment in On- and Off-Incubator Firms, 2000-2002

	On - Incubator		Off – Incubator	
	Frequency	%	Frequency	%
Total Employment				
Increased	17	39.5	13	34.2
No change	20	46.5	13	34.2
Decreased	6	14.0	12	31.6
Total	43	100	38	100
University Graduates *				
Increased	18	41.9	11	28.9
No change	23	53.5	16	42.2
Decreased	2	4.7	11	28.9
Total	43	100	38	100

Note: For 17 firms in the on-incubator sample change in employment represents the difference between 2001 and 2002.

* Significant at the 5% level. $\chi^2 = 8.902$ and p-value = 0.012 (2 sided).

[3] Sales revenue values are generally provided in TL so they were converted into dollar terms. Change in sales revenue and employment represents the difference between 2000 and 2002 in both samples. However in the on-incubator sample in cases when the establishment year is after 2000 it is defined as the difference between 2001 and 2002.

[4] Perhaps a newly established firm cannot provide the full figures for succeeding years therefore we cannot obtain changes in sales revenue and employment figures.

Table 4.5: Role of Local and National Labor Markets

	On - Incubator		Off - Incubator	
	Frequency	%	Frequency	%
Source of labor **				
Local	41	85.4	23	57.5
National	7	14.6	17	42.5
N	48	100	40	100

** Significant at the 1% level. $\chi^2 = 8.573$ and p-value = 0.003 (2 sided).

Nearly 60% of the firms have revealed sales revenue figures. There is a great difference between on-incubator and off-incubator firms concerning sales revenue: 66% of the on incubator firms have stated that their sales revenue have increased; whereas this ratio is much more lower in the off-incubator sample. Our findings show that on-incubator firms display better records both in terms of sales revenue and employment. But we should note a possible bias in the data: although it is not statistically significant the on-incubator sample includes smaller and younger firms and younger firms tend to grow faster than older firms. Therefore, age differences may explain a part of growth differential. However the impact of TEKMERs on firms concerning economic growth still seems to be strong. Löfsten and Lindelöf (2002b) have also found that NTBFs in the off-park sample have a significantly lower growth of employment and lower growth of sales turnover. Colombo and Delmastro (2002) and Westhead and Storey (1994, cited in Colombo and Delmastro, 2002) report similar results.

Table 4.6: Change in Sales Revenue in On- and Off-Incubator Firms, 2000-2002

	On - Incubator		Off - Incubator	
	Frequency	%	Frequency	%
Sales Revenue **				
Increased	18	62.1	5	19.2
No change	1	3.4	5	23.1
Decreased	10	34.5	15	57.7
N	29	100	25	100

Note: For 6 firms in the on-incubator sample change in sales represents the difference between 2001 and 2002.

** Significant at the 1% level. $\chi^2 = 10.777$ and p-value = 0.005 (2 sided). 2 cells (33.3 %) have expected count less than 5.

Another criterion that can be used to compare on- and off-incubator firms is innovation. It is suggested that TEKMERs foster technological performance of new high-tech firms. Several indicators can be used to evaluate this hypothesis. Table 4.7 reports the data related to innovation. The data reflects a difference between on- and off-incubator

firms regarding ownership of patents, trademarks, industrial designs and utility models. Our findings show that in the case of ownership of trademarks off-incubator firms have better record than their on-incubator counterparts. Nearly 40% of the off-incubator firms have its own trademark, whereas this ratio is about only 15% in the on-incubator category. The difference is statistically significant at the 5 percent level of significance. However it might be misleading to conclude from this data. First, the base concerning intellectual property rights is newly established in Turkey and the firms definitely do not believe in protection under patents, trademarks etc. Another factor is the time and money cost of making an application. Many firms during the interviews stated that it took months to conclude an application and in some cases the firms find the procedure complicated which causes loss of time. The questionnaire also comprised a question to gather information on whether the firms have introduced a new product or a process innovation in the past three years. Though this information is rather informal, it could still be used as an indicator. 32% of the off-incubator firms have declared that the product they produced is at least partially new for the world, however this is slightly lower in the on-incubator category. The situation is not very different in terms of firms that have stated that the product developed is new for Turkey, that is to say the percentage

Table 4.7: Indicators on Innovation and Technology in On- and Off-Incubator Firms

	On - Incubator		Off - Incubator	
	Frequency	%	Frequency	%
Type of R&D conducted				
Applied	23	47.9	23	56.1
Experimental Development	4	8.3	1	2.4
Both	21	43.8	15	36.6
No R&D	0	0	2	4.9
Ownership of patent, trademarks etc. *				
Patent	6	12.5	4	9.8
Trademark	7	14.6	16	39.0
Industrial Design	0	0	2	4.9
Utility Models	0	0	0	0
Firms introduced a new product or service				
New for the firm	7	14.6	0	0
New for Turkey	20	41.7	23	56.1
New for the World	12	25.0	13	31.7
Not introduced new product or service	9	18.8	5	12.2
Total	48	100.0	41	100.0

* Significant at the 5 % level. χ^2 = 10.175 and p-value = 0.017 (2 sided). 3 cells (37.5 %) have expected count less than 5.

being higher on the off-incubator category. 15% of the on-incubator firms have stated that what they produce is new to the firm, which might be an expected result in the sense that on-incubator firms are rather younger, and what they produce may be a known technology in the industry but they have just made it on their own. This indicator show that there is not an important difference between on-incubator and off-incubator firms concerning new product development. Both Colombo and Delmastro (2002) and Westhead and Storey (1994, cited in Colombo and Delmastro, 2002) state similar result that there is no statistical difference between on- and off-incubator samples as to the number of patents and copyrights.

Apart from these the employment figures in R&D can also be regarded as an indicator for technological performance. Table 4.8 shows that on-incubator firms have better performance than their off-incubator counterparts regarding employment in R&D related activities. However the results cannot be confirmed statistically. The number of firms indicating a rise in R&D personnel in the on-incubator group is larger than the off-incubator sample. About 26% of the firms in the off-incubator sample indicated a decrease in R&D personnel, whereas this is only 7% in the on-incubator sample. Information on personnel holding PhDs is also included in Table 4.8. The data shows that the pointer is still in favor of the on-incubator category. Nearly 29% of the on-incubator firms have stated an increase in employment with a PhD degree, whereas this is only 13% in the off-incubator group. Monck et al. (1988) and Löfsten and Lindelöf (2002b) present such findings, however Colombo and Delmastro (2002) find no evidence to support this. The ratio of R&D personnel to total personnel is also presented below but can be misleading because it disregards the absolute changes.[5] Lastly, the data indicate that on-incubator firms employ relatively more R&D employees than the off-incubator firms on average. The difference in the average of the ratio of R&D personnel to total personnel is statistically significant at 5 percent level (for 2002). On-incubator firms seem to have a better record in terms of indicators related with employment of R&D personnel. The finding regarding the higher ratio of R&D staff to total staff in on-incubator firms is supported by Monck et al.

[5] The figures can be misleading: suppose a firm employs 4 people, 2 of them as R&D personnel. Assume three years later the firm employs 20 people (9 of them as R&D personnel). The ratio of R&D staff to total staff certainly decreases in three years however in absolute terms one can say that the firm has performed good since both total staff and R&D staff has increased considerably.

(1988) and Lindelöf and Löfsten (2002b), however Westhead (1997, cited in Colombo and Delmastro, 2002) can not confirm this.

Table 4.8: Change in Employment in R&D Personnel and PhDs in On- and Off-Incubator Firms, 2000-2002

	On - Incubator		Off - Incubator	
	Frequency	%	Frequency	%
Employment (R&D personnel)				
Increased	16	37.2	10	26.3
No change	24	55.8	18	47.4
Decreased	3	7.0	10	26.3
Total	43	100.0	38	100.0
Employment (PhD)				
Increased	4	28.6	2	13.3
No change	10	71.4	12	80.0
Decreased	0	0	1	6.7
Total	14	100.0	15	100.0

	On - Incubator		Off - Incubator	
	When first located in TEKMER	2002	2000	2002
R&D Staff / Total Staff (averages in %)	69.7	61.5	53.9	50.4

Note: For 17 firms in the on-incubator sample change in employment represents the difference between 2001 and 2002.

One of the most vital impact of TEKMERs on tenant company is the opportunities arise from networking with other business and university. It is asserted that TEKMER enable firms to benefit from business networking and on-incubator firms tend to attach more importance to interaction with both other firms and university. Prior studies are based on asking the formal links that firms have with other business and university. However we do not employ such a procedure because there are only a few firms having formal or contractual relationship with a university or another firm. But this hypothesis is tested by asking the firms the *importance they attach* to networking and interaction. Firms are asked to attach an importance level, 1 being the highest degree of importance and 5 being the lowest degree of importance, to interaction with other firms and university. The averages are presented in Table 4.9 and the details are provided in Tables 4.10 to 4.13.

Table 4.9: Degree of Importance Attached to Networking and Interaction by On-and Off-Incubator Firms (averages)

	On-Incubator	Off-Incubator
Interaction with other businesses		
R&D collaboration	2.375	2.475
Commercial relations	1.854	1.700
Social interaction	2.646	1.925
Interaction with universities		
R&D collaboration	2.104	2.513
Analysis, testing and evaluation of company's products	2.854	2.829
Collaboration on Projects (Other than R&D)	2.333	2.659
Employee education and training	2.542	3.171
Recruitment of staff	2.479	2.513
Contact with universities		
Contact with academic personnel	1.896	2.341
Using the available infrastructure at the university	1.708	2.927

Note: 1 being the highest degree of importance and 5 being the lowest degree of importance. The figures represent the averages. These figures can be misleading since arithmetic mean of ranks are calculated. For more details see Table 4.11 to 4.13.

Our findings report a couple of interesting features. First, both on- and off-incubator firms rank R&D collaboration and commercial relations with other businesses more or less at the same level. Interestingly social interaction is not so much important for on-incubator firms as opposed to off-incubator firms. However we have also asked on-incubator firms to rank the importance on interaction with on-incubator firms. It is expected that the interaction within incubator firms should be ranked more important. However surprisingly averages within on-incubator firms are higher than the averages between categories. Researchers are not in a consensus in this issue (meaning it is less important). Mian (1996a) states that business networking is important and that the services provided by the incubator regarding business networking are found to be the ones that firms mostly receive benefit from. However Löfsten and Lindelöf (2003) suggest that there is not a significant added value of networking with similar business. During the interviews it is observed that the main reason for low level of business networking is actually lack of confidence. Firms do not trust in other firms because they are afraid of other firms to plagiarize their own projects. Moreover they are also uncomfortable about transfer of employees to other firms. The on-incubator firms are small in size and many owners revealed that employees have perfect information on everything and transfer of an employee to another competitor means simply transfer of the firm's own project.

On-incubator firms attach marginally more importance to every type of interaction with universities as opposed to their off-incubator counterparts. However except interaction with universities on employee education and training the difference between the categories is not statistically significant. This might be an expected result since TEKMERs are all located on a university campus and it should be easier for firms to contact with universities on employee education and training. Similar results are also found by Mian (1996b). The firms are also asked to rank the importance for contact with universities, which is separated in to two forms: contact with academic personnel and using the available infrastructure of the university. Our findings denote a difference between the on- and off-incubator firms and this difference is statistically significant. On-incubator firms tend to attach more importance to contact with academic personnel and use of the infrastructure of the university. Geographical proximity can be an explanatory factor to this. Moreover, younger and smaller on-incubator firms are perhaps in more need of tools and equipment as well as advice from the academics. In the same manner Löfsten and Lindelöf (2003) state that the proportion of NTBFs on science parks with links with universities is comparatively high, however most of the links were in the way of informal contacts just as our findings reports.

Three things draw attention in Tables 4.10 to 4.13. First, the percentages of off-incubator firms that attach first degree of importance to networking with similar business are significantly higher than the on-incubator in all three categories of interaction. The opposite is expected, but possible explanations are already put forward. The difference between the two samples is only statistically significant in the case of "social interaction" (Table 4.10). Second, on-Incubator firms are also asked to indicate the importance attached to interaction with incubator firms. The data imply that commercial relations are not very important within incubator firms (Table 4.11). Lastly, we employed a similar analysis by combining the first two levels of importance and labeling as "important", and combining the remaining 3 and labeling as "not important". The difference between on- and off-incubator firms regarding importance they attach to R&D collaboration with universities is more explicit in this case (66.6% of the on-incubator firms state that R&D collaboration

Table 4.10: Degree of Importance Attached to Interaction and Networking with Other Firms by On- and Off-Incubator Firms

	R&D collaboration				Commercial relations				Social interaction **			
	On - Incubator		Off - Incubator		On - Incubator		Off - Incubator		On - Incubator		Off - Incubator	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
First degree importance	14	29.2	17	42.5	28	58.3	28	70.0	14	29.2	21	52.5
Second degree importance	15	31.3	7	17.5	7	14.6	2	5.0	11	22.9	3	7.5
Third degree importance	10	20.8	4	10.0	8	16.7	6	15.0	8	16.7	14	35
Fourth degree importance	5	10.4	4	10.0	2	4.2	2	5.0	8	16.7	2	5
Not important at all	4	8.3	8	20.0	3	6.3	2	5.0	7	14.6	0	0
Total	48	100.0	40	100.0	48	100.0	40	100.0	48	100.0	40	100.0

** Significant at the 1% level. $\chi^2 = 17.626$ and p-value = 0.001 (2 sided). 3 cells (30 %) have expected count less than 5.

Table 4.11: Degree of Importance Attached to Interaction and Networking (TEKMER firms with TEKMER firms)

	R&D collaboration		Commercial relations		Social interaction	
	Freq.	%	Freq.	%	Freq.	%
First degree importance	19	39.6	10	20.8	28	58.3
Second degree importance	7	14.6	9	18.8	7	14.6
Third degree importance	12	25.0	8	16.7	8	16.7
Fourth degree importance	6	12.5	6	12.5	2	4.2
Not important at all	4	8.3	15	31.3	3	6.3
Total	48	100.0	48	100.0	48	100.0

Table 4.12: Degree of Importance Attached to Interaction with Universities by On- and Off-Incubator Firms

	R&D collaboration				Analysis, testing and evaluation of company's products				Collaboration on Projects (Other than R&D)			
	On - Incubator		Off - Incubator		On - Incubator		Off - Incubator		On - Incubator		Off - Incubator	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
First degree importance	22	45.8	15	36.6	11	22.9	11	26.8	15	31.3	13	31.7
Second degree importance	10	20.8	5	12.2	8	16.7	6	14.6	15	31.3	6	14.6
Third degree importance	9	18.8	12	29.3	13	27.1	11	26.8	10	20.8	11	26.8
Fourth degree importance	3	6.3	3	7.3	9	18.8	5	12.2	3	6.3	4	9.8
Not important at all	4	8.3	6	14.6	7	14.6	8	19.5	5	10.4	7	17.1
Total	48	100.0	41	100.0	48	100.0	41	100.0	48	100.0	41	100.0

Table 4.12: Degree of Importance Attached to Interaction with Universities by On- and Off – Incubator Firms (Continued)

	Employee education and training *				Recruitment of staff			
	On - Incubator		Off - Incubator		On - Incubator		Off - Incubator	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
First degree importance	12	25.0	8	19.5	16	33.3	15	36.6
Second degree importance	12	25.0	3	7.3	8	16.7	4	9.8
Third degree importance	15	31.3	14	34.1	14	29.2	14	34.1
Fourth degree importance	4	8.3	6	14.6	5	10.4	2	4.9
Not important at all	5	10.4	10	24.4	5	10.4	6	14.6
Total	48	100.0	41	100.0	48	100.0	41	100.0

* When the first two levels of importance are combined and labeled as "important" and the remaining 3 are combined and labeled as "not important", chi-square test of independence is significant at the 5% level. $\chi^2 = 4.975$ and p-value = 0.026 (2 sided).

with universities is *important,* whereas this ratio is 48.8% in the of-incubator sample). Our findings reveal that there is not an important difference between on- and off-incubator categories concerning the importance attached to interaction with similar business, however on-incubator firms display better records regarding links with universities, although most of them are in the form of informal contacts.

Table 4.13: Degree of Importance Attached to Contact with Universities by On- and Off-Incubator Firms

	Contact with academic personnel ** a				Using the available infrastructure at the university ** b			
	On - Incubator		Off - Incubator		On - Incubator		Off - Incubator	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
First degree importance	22	45.8	14	34.1	28	58.3	10	24.4
Second degree importance	15	31.3	6	14.6	11	22.9	2	4.9
Third degree importance	6	12.5	15	36.6	5	10.4	18	43.9
Fourth degree importance	4	8.3	5	12.2	3	6.3	3	7.3
Not important at all	1	2.1	1	2.4	1	2.1	8	19.5
Total	48	100.0	41	100.0	48	100.0	41	100.0

** a When the first two level of importance are combined and labeled as "important" and the remaining 3 are combined and labeled as "not important", significant at the 1% level. $\chi^2 = 7.692$ and p-value = 0.006 (2 sided).

** b Significant at the 1% level. $\chi^2 = 27.167$ and p-value = 0.000 (2 sided). 4 cells (40 %) have expected count less than 5. When the first two level of importance are combined and labeled as "important" and the remaining 3 are combined and labeled as "not important", significant at the 1% level. $\chi^2 = 24.421$ and p-value = 0.000 (2 sided).

Another hypothesis is that TEKMERs facilitate new opportunities for university graduates both in terms of employment and entrepreneurship. As pointed out before when employing university graduates regional resources are important for on-incubator firms. Many firms rely on student employees as well. Other from that almost all firms employs student trainees. Mian (1996a and 1996b) indicates that "student employees" is one of the chief value-added contributions of a university incubator. 36 firms (75%) have stated that there is at least 1 employee (including founders) graduated from the university, where the firm is located in. Amongst all the university graduates, 36% is graduated from the university that the firm is located in. The firms in the TEKMERs serve also as a model for young entrepreneurs. From the 48 on-incubator firms 29 (60%) of them have at least one founder graduated from the university that the firm is located in. With reference to my qualitative observations, students –especially the ones from the technical departments- do really care about the employment opportunities in TEKMERs and science parks and many of them are also aware of other opportunities both in firms located in these institutions.

It is believed that on-incubator firms are better attached to information networks and have better opportunities to access to financial support. The questionnaire involves several questions that can be used as indicators to evaluate this assertion. The first set of questions is related with the financial supports that are available through three different institutions: TUBITAK-TIDEB (TUBITAK- Technology Monitoring and Evaluation Board), TTGV and KOSGEB. The second set of questions is related with the EU Sixth Framework Program.

At this point it will be appropriate to make a brief summary about the R&D support programs in Turkey. Both TIDEB and TTGV support a definite proportion of the R&D incentives for similar aims. They provide financial assistance for the research that aims to create a new product or to improve the competitive power of existing products. The supports are up to 50-60% of the total project expenses and include expenditures on personnel, tools, materials, software, consultancy and even expenditures for registration of a patent, industrial design etc. The important difference is that, the support of TTGV has to be repaid within a time interval but without an interest, however the support of TIDEB is in the form of grant. KOSGEB has also incentives on supporting R&D on the project basis. This is partially done through the TEKMERs. The firms outside the incubator building can also apply for the KOSGEB support as well as the firms that locate their business in a TEKMER. The support can either be in the form of a grant or should be repaid. The support is for a diversified set of activities but the maximum amount of the support is $42.000 currently however the firms themselves should cover 15% of the amount.

To assess whether on-incubator firms have better opportunities to access to financial support relative to their off-incubator counterparts, we have asked several questions in accordance. Table 4.14 displays all the information. The data indicates that almost all firms in both categories have information on the available supports. Around 40% of the firms in both categories have at least one supported project. However the origin of support shows a discrepancy between the two categories. It is inclined towards TIDEB and TTGV in the off-incubator sample, and towards KOSGEB in the on-incubator sample. There are two possible explanations for this. First of all TEKMERs are centers of KOSGEB so it may be easier for on-incubator firms to access to supports of KOSGEB. Second, the supports of TIDEB and TTGV are generally for bigger firms and for bigger projects and our data

provide evidence that off-incubator firms are bigger than on-incubator firms. Unfortunately, especially the on-incubator firms indicated several difficulties in reaching financial assistance on R&D projects from any source. Nearly all firms stated the application process is rather complicated and time consuming. Firms do not have special personnel to deal with the application and it is hard for a firm employee (generally an engineer) to handle both R&D and administrative tasks. For example during the interviews many interviewees stated that it sometimes takes months to conclude an application because of bureaucracy and the opportunity cost –*time lost*- might even be bigger. Moreover the project may not be found eligible for support. Another factor is that the money cost of the application can even be too much for a micro firm to handle.[6] There is strong evidence that the supports provided by the institutions are critically important to company development for the on-incubator firms but only important (not critical) for more than 50% of the off-incubator firms. Indeed the supports are more important for on-incubator firms that are smaller in size and younger in age

Table 4.14: Evaluation of Supports of KOSGEB, TIDEB and TTGV

	On - Incubator		Off – Incubator	
	Frequency	%	Frequency	%
Has information about supports?				
Yes	47	97.9	39	95.1
Taken supports?				
Yes	21	43.8	17	41.5
Total	48	100.0	41	100.0
Origin of Support *				
TIDEB	9	42.8	11	64.7
TTGV	2	20.0	8	47.0
KOSGEB	14	66.6	1	5.9
Total	21	129.4 [a]	17	117.6 [a]
Importance of supports				
Very important-critical	14	66.7	4	36.4
Important	6	28.6	6	54.5
Not Important	1	4.8	1	9.1
Total	21	100.0	11	100.0

* Significant at the 5% level. $\chi^2 = 10.986$ and p-value = 0.012 (2 sided). 4 cells (50 %) have expected count less than 5.
[a] *Firms have multiple responses*

[6] For a detailed evaluation see Taymaz (2001)

than their off-incubator counterparts. To sum up, there is no difference between on- and off-incubator firms regarding access to financial support, but undoubtedly the supports are more important for the on-incubator firms. Colombo and Delmastro (2002) found a contradictory result that the on-incubator firms have more easier access to state funds.

Our second point of reference is whether the firms are aware of the opportunities that arise from the EU Sixth Framework Program. The information is summarized in Table 4.15. Our data reveals that on-incubator firms have better information on the program but their small size hinders the opportunities. Accordingly, owners generally find their firms rather small and inexperienced to take part in such projects. On-incubator firms employ generally 3-4 people including the actively working founders and they have no special personnel to take care of an application and it is a fact that the application process to EU Sixth Framework Program is rather complicated and time consuming. Since firms are rather negative on the success of their proposal they don't want to spend time on it. Only 2 on-incubator firms that have information on the program send a project proposal, as

Table 4.15: Do firms Have Information About EU Sixth Framework Program?

	On - Incubator		Off - Incubator	
	Frequency	%	Frequency	%
Has information on EU 6. Framework				
Yes	32	66.7	22	53.7
Send project proposal? **				
Yes	2	4.2	9	22.0
N	48		41	
Plan to send project proposal?				
Yes	21	70.0	10	76.9
N	30		13	
Area of Interest				
Genomic and biotechnology	6	20.7	1	7.7
Information science technology	15	51.7	11	84.6
Nano-technology, multifunctional materials, new production processes	3	10.3		
Aeronautics and space	2	6.9		
Food quality and safety	2	6.9	1	7.7
Sustainable energy systems and surface transport	1	3.5		
Knowledge based society, citizenship, new forms of governance				
N	30	100.0	13	100.0

** Significant at the 1% level. $\chi^2 = 9.655$ and p-value = 0.002 (2 sided). 1 cell (25 %) has expected count less than 5.

opposed to 9 firms in the off-incubator sample. Nevertheless, many firms plan to send a project proposal in the future. The areas that firms participate or plan to participate are diversified in the on-incubator sample, but are clustered into one category in the off-incubator case. The attention is on information technology in general. However in EU countries that have easier access to EU funds the results differ. Colombo and Delmastro (2002) for Italy reports that the number of firms involved in EU R&D projects in the on-incubator sample is significantly higher than the off-incubator sample.

All the above evaluations should best be completed with a profile of founders and a brief comparison between on and off-incubator founders in terms of age, educational background and prior working experience. Our data do not report important differences between on-and off-incubator founders. First, we cannot reject the hypothesis that the mean age between two samples is equal. 50% of the on-incubator founders started their business before 30, and this is not very different in the off-incubator sample, which accounts to 45%. There are minor differences in educational background between two samples. On-incubator sample is slightly more educated. The proportion of both PhDs and masters is higher in the on-incubator sample as opposed to off-incubator counterparts. However once again this cannot be confirmed statistically. This is interesting in the sense that similar findings for other countries suggest that there are significant differences in terms of education between on- and off-incubator firms. See Colombo and Delmastro (2002) and Löfsten and Lindelöf (2002b) as an example. It should be noted that the founders that have an education level lower than university, are mostly graduated from a technical high school or a vocational school. Second, in terms of a departmental breakdown of education there are some differences between the two samples. The ratio of founders that hold an undergraduate degree from science departments such as mathematics and chemistry are significantly more than founders in the off-incubator sample. Interestingly about 22% of the founders in the off-incubator sample hold a social science degree, against only 4% in the on-incubator sample. Another feature that may display discrepancy between the two categories of founders is the founder's prior working experience. As it is mentioned earlier, TEKMERs enable new opportunities for both students and academic personnel. So at least it may be expected that the proportion of founders that have prior academic career is higher

Table 4.16: Founder Profile: On-Incubator versus Off-Incubator Firms

	On - Incubator		Off - Incubator	
Descriptive Statistics of Age [a]				
Mean	33.1		32.4	
Median	30.5		31	
Min	19		18	
Max	64		50	
	On - Incubator		Off - Incubator	
	Frequency	%	Frequency	%
Education level				
PhD	16	20.5	10	16.4
Masters	25	32.1	16	26.2
Undergraduate	35	44.9	29	47.5
High School	2	2.6	4	6.6
Lower than high school	0	0	2	3.3
Total	78	100.0	61	100.0
Area of Undergraduate Degree [**]				
Engineering	58	77.6	39	70.9
Science	15	18.4	3	5.5
Social science	3	3.9	12	21.8
Other	0	0	1	1.8
Total	76	100.0	55	100
Prior Working Experience				
First experience	9	11.7	2	3.3
Owns a business	7	9.1	14	23.0
Private firm	51	66.2	36	59.0
Government	5	6.5	4	6.6
Academic	5	6.5	5	8.2
Total	77	100.0	61	100.0

[**] Significant at the 1% level. χ^2 = 15.144 and p-value = 0.002 (2 sided). 2 cells (25 %) have expected count less than 5.
[a] *Age of founders when starting the business.*

in the on-incubator group as opposed to the off-incubator sample. Colombo and Delmastro (2002) for instance states such result. Though not statistically significant it is interesting to see just the opposite. Another interesting finding is that 12% of the on-incubator founders had no prior working experience before founding the firm, while this is only 3% in the off-incubator sample. In conjunction with this only 9% of the on-incubator founders owned a business previously, whereas this goes up to 23% in the off-incubator category. So we have evidence that off-incubator founders have better records in terms of management capacity than their on-incubator counterparts. A detailed evaluation shows that there are 27 founders (%75) in the off-incubator sample that have prior working experience in the area of

business that his or her company currently operates in (amongst 36 founders who have previously worked in a private firm). This goes up to 47 founders (%92) in the on-incubator sample (amongst 51 founders who have previously worked in a private firm). This difference is also confirmed statistically but only at the 10%. This finding supports other research that contends that spin-offs are the dominant source of start-ups. (Sung, Gibson and Kang, 2002; Colombo and Delmastro, 2002)[7]. During the interviews it is observed that one of the main deficiency of the on-incubator founders is their lack of experience on handling the management of the firm. Many have troubles in getting used to the harsh competitive conditions of the business world. By providing the necessary substructure and by transferring the experience TEKMERs can well be remedy to this deficiency.

The questionnaire also comprises a question concerning the funding of the business at foundation. Table 4.17 indicates that there is not a difference between the categories regarding the source of capital. Most of the founders in both on- and off-incubator samples stated that the main source of funding was own accumulation. Storey (1982, cited in Löfsten and Lindelöf, 2003) reports a similar finding. Founders were also asked whether their capital was sufficient at foundation. Interestingly, nearly half of the on-incubator founders have stated that their capital was sufficient, and the ratio is even higher in the off-incubator case reaching up to 67%. This is also find to be statistically significant. An important factor that may

Table 4.17: Source of Funding in On- and Off-Incubator Firms

	On - Incubator		Off - Incubator	
	Frequency	%	Frequency	%
How did you raised your capital?				
Own accumulation	67	77.0	52	77.6
Bank credit	4	4.6		
Friends and relatives	12	13.8	8	11.9
Other	4	4.6	7	10.5
N	87		67	
Was your capital enough? *				
Yes	34	44.2	36	66.7
No	43	55.8	18	33.3
N	77		54	

Note: Some founders have multiple responses
* Significant at the 5 % level. χ^2 = 6.464 and p-value = 0.011 (2 sided).

[7] There is a set of definitions for spin-off. In this study the following definition is employed. Spin-offs are new firms created by the former personnel of an existing firm.

cause a bias here is that many software firm founders stated that a software company could easily be established with little capital –only with a computer in most cases. Our findings points out another important deficiency that is the underdeveloped capital market and risk capital in Turkey. Of course improvement on this issue is well above the aims of TEKMERs individually but it should well be a policy of KOSGEB or even the government.

4.2 Overall Evaluation of TEKMER

In this section we will conclude the chapter by making some remarks on overall TEKMER performance. We also include a brief general evaluation of the services and facilities provided by the TEKMERs

In the first place the on-incubator firms are asked to indicate the source of information about TEKMER. Table 4.18 presents the results. Our data indicate that universities are an important source in transferring information about TEKMERs. Many interviewees do not state a definite source. Information was rather from informal ways like contact with friends or contact with KOSGEB personnel or KOSGEB itself. It is also observed that informal rather than formal contacts are important in sharing information not only about TEKMERs but also on any other related subject. The exchange of information between firms is in two forms. First, contact with other firms –for example for commercial reasons- is an important source of exchange of information. Second, the associations and societies that the firms form seem to be another important way. For example during the interviews many firm owners stated that for quite a long time a debate is going on concerning the negative and positive effects of science parks and incubators through an e-mail group that many SMEs are registered.

Table 4.18: Source of Information on TEKMERs

	% of firms
Universities	34.9
Other (KOSGEB, friends etc.)	22.2
Firms located in TEKMERs	19.0
Other Firms	14.3
Promotion programs	6.3
Internet	3.2

In addition firms stated three reasons in sequence for locating their business in a TEKMER. The firms are also asked to rank the realizations (whether they are satisfied from the services provided) and the sufficiency levels (whether the facility is sufficient or not) for the three reasons that they select. The results are presented in Table 4.19. Four reasons found to be the most important of all: opportunity to interact with university, available infrastructure and office space, favorable location and image and government support in all kinds. Only, less than 10% of the firms stated that the reason for locating the business in TEKMERs is to network with similar business and actually none of them stated as the first reason. This is interesting in the sense that one of the main purposes of an incubator is to facilitate interaction and networking between firms. Westhead and Batstone (1998) find similarly that the importance attached to "proximity to firms in similar industrial sector / using the same technology" is rather low in a study for UK. The data shows that the administrative and technical supports are not important at all. It is evident that on-incubator firms are satisfied of the location and image of TEKMERs, and they as well rank the sufficiency level highest of all. See Westhead and Batstone (1998) and Mian (1996a) for similar findings. Firms are also quite satisfied with the office spaces and infrastructure provided. However they ranked the sufficiency levels slightly lower. One point deserves attention. For the last four reasons the sufficiency levels are smaller than the satisfaction levels indicating that the facilities are in fact sufficient but the firms have disabilities or the firms are unwilling to use these services. For example, in the case of opportunity to network with similar businesses sufficiency and realization levels display an important discrepancy in favor of sufficiency level. It has already been mentioned that the firms though there is a favorable environment are unwilling to cooperate with similar business or even with universities. Previously lack of confidence to other firms is put forward as an explanation. This could well be enlarged to comprise macroeconomic stability and even cultural background – cooperation in any sense is weak in Turkey. In the case of government support nearly all firms agree that though the resources are limited there are good initiatives that support SMEs. However reaching those resources are not easy for SMEs especially for micro firms. Possible explanation for this has already been provided.

Table 4.19: Reasons Behind Locating the Firm in a TEKMER

			Realization level		Sufficiency level	
Reasons	% of Firms	Percent of firms that stated first choice	Average	% of firms that attach first two level	Average	% of firms that attach first two level
Opportunity to interact with university	22.5	22.9	2.48	31.3	2.45	31.3
Available infrastructure and office space	19.7	27.1	2.11	37.5	2.30	33.3
Favorable location and image	19.0	18.8	1.96	41.7	1.85	39.6
Government Support in all kinds	15.5	25.0	2.64	20.8	2.36	25.0
Opportunity to network with similar business	9.2	-	2.92	10.4	2.46	16.7
Technical support made available by TEKMERs	8.5	6.3	2.55	12.5	2.27	14.6
Administrative support made available by TEKMERs	5.6	-	2.50	8.3	2.13	10.4
Total	48	100.0				

Realization level: 1 to 5, being 1: Totally satisfied, 3: Average satisfaction, 5: Not at all
Sufficiency level: 1 to 5, being 1: Very good, 3: Average, 5: Not at all

Consequently firms are asked to make an overall evaluation of the TEKMERs. Table 4.20 presents evidence on the importance of TEKMERs. Only 1 firm has declared that the impact of TEKMERs is not important. Nearly 60% of the firms have stated that the facilities and opportunities made available by the TEKMERs were critical to firm survival and development. In a study by Mian (1996a) likewise, majority of the respondents believed that the services provided by the incubator were adding value to their firm. To sum up TEKMERs are quiet successful in providing the needs of the firms and assist them (especially start-ups) for further development in an unstable macroeconomic environment.

Table 4.20: Overall evaluation of TEKMERs

	Frequency	%
Very important - Critical to firm development	28	58.3
Important	19	39.6
Not important	1	2.1
Total	48	100.0

As a final step to find out the general characteristics of the on-incubator firms that have attached critical importance to TEKMERs facilities, we have divided the on-incubator sample into two and carry out a similar analysis. The 28 firms that have attached critical importance to TEKMERs facilities are compared with remaining 20 firms in the on-incubator sample. In the first place 70% of the firms that have attached critical importance to TEKMERs facilities are start-ups. Furthermore half of these firms have taken a direct R&D support from one of the three sources and nearly all stated that the R&D support was also critical in the development of the firm. It is also evident that these firms display better records in terms of economic and technological performance as opposed to the remaining 20 firms in the on-incubator sample. 75% of these firms have stated an increase in sales revenue, whereas this is only 53% in the remaining sample. 30% of these firms own a patent or a trademark as opposed to 15% of the remaining 20-firm sample. In conjunction with this 41% of these firms as well stated that they have produced a product or a service, which they label as *new to the world* in the past three years. This ratio is only 17% in the remaining 20-firm sample. An unexpected result is that firms that do not find the facilities provided by the TEKMERs critical, attach more importance to R&D collaboration with other firms. However in the case of links with universities our data indicates that the firms that have attached critical importance to TEKMERs facilities have better relations with universities tough this is generally in the form of informal contacts. Another important

discrepancy is that the firms that have attached critical importance to TEKMERs facilities have stated that one of the main sources of capital when establishing the firm was supports from relatives and friends and other sources, and only 25% of these firms have stated that their capital was sufficient. However 95% of the firms in remaining 20-firm sample stated that the main source of finance was own accumulation and furthermore 65% of them found it to be sufficient. These final results once again support the main argument that the TEKMERs in Turkey are important in providing assistance for micro firms (especially for start-ups) and help them to survive in their vulnerable stages. Table 4.21 concludes this chapter by presenting the main findings of this study and weaknesses of TEKMERs in Turkey.

Table 4.21: Main Findings of the Study and Weaknesses of the Incubators in Turkey

Main Findings	
Economic performance	On-incubator firms seem to display better records both in terms of employment growth – local employment especially- and sales revenue growth.
Technological performance	There is no statistical difference between on- and off-incubator firms regarding ownership of patents and new product development. However on-incubator firms seem to have a better record in terms of indicators related with employment of R&D personnel.
Interaction with similar business	Importance attached to interaction with similar business does not differ between the on- and off-incubator categories.
Interaction with universities	On-incubator firms display better records regarding links with universities, although most of them are in the form of informal contacts.
Information networks & financial supports	The hypothesis that on-incubator firms are better attached to information networks and have better opportunities to access financial support is also not clear. Support mechanisms seems to be sufficient for a developing country, however unwillingness and disabilities of firms, complexity of application procedure and deficiencies of the implementation process hinders the full impact of the financial support mechanisms.
Opportunities for graduates	TEKMER serve as a model for young entrepreneurs. The findings show that an important part of the labor force of on-incubator firms are graduates and student employees from the university that the firm is located in.
Firm founders	Although it is not confirmed statistically on-incubator firm founders appear to be slightly better educated. More than 95% of the on-incubator firm founders are either engineer or hold a science a degree, which is significantly more than the off-incubator counterparts. It is also found that the on-incubator firm founders are less experienced in terms of managing a firm.
Overall Evaluation	TEKMERs in Turkey have quite an important role in supporting start-ups in their vulnerable stages and help them to survive. Approximately 60% of the firms found the services provided critical to firm development.

Table 4.21: Main Findings of the Study and Weaknesses of the Incubators in Turkey (continued)

Main Weaknesses	
Lack of marketing initiatives	The policies aiming to increase the innovativeness and creation of new products and processes should best be supported by policies that aim to improve marketing opportunities - both national and international- as well as policies that aim to create domestic demand.
Business networking and interaction	The long-term benefits of an incubator are more important and attached mainly on the success of business networking and interaction initiatives that have impact on the behavior and capability of its tenants.
Lack of risk capital initiatives	Risk capital mechanisms are vital for the success of the incubation process, however it should be kept in mind that macroeconomic stability is prerequisite for this.
Business support functions	The success of an incubator rests on the quality of the services provided rather than the quantity. There should be improvements in the quality of the services provided and business support functions.

CHAPTER V

CONCLUDING REMARKS

An overall assessment shows that TEKMERs have played quite an important role in supporting start-ups in their vulnerable stages and help them to survive. Successful firms in TEKMER as well serve as a model for young entrepreneurs. There are significant differences between on- and off-incubator firms regarding economic performance, highly in favor of on-incubator firms. On-incubator firms display better records both in terms of employment growth –local employment especially- and output growth. However there is not any significant difference in technological performance. The hypotheses put forward concerning business networking in incubators appear to be flawed. Unfortunately only 10% of the on-incubator firms stated that the reason for locating the business in a TEKMER is to network with similar business and none of them attached first degree of importance to this factor. Low level of business networking and interaction is one of the main weaknesses of TEKMERs. The long-term benefits of an incubator highly depend on the impact of incubator on the behavior and capability of its tenants. Business networking is an important tool in this respect. Unfortunately, improvements in business networking in TEKMER could be slow because firms do not consider networking as an essential strategy. However TEKMER should not only strengthen business networking initiatives for tenant companies but should also divert attention to connect TEKMERs to other institutions. Incubators should not be stand alone entities but rather work along side other organizations and schemes to promote broader strategies (European Commission, 2002).

The hypothesis that on-incubator firms are better attached to information networks and have better opportunities to access financial support is also not clear. Most of the firms have information on R&D that they consider beneficial for a developing country, but they do not benefit from this initiatives because they are either unable or unwilling to receive

support. Especially micro firms – firms employing less than 10 employees- have great difficulty in obtaining financial support. The application process is complex and time consuming, and firms do not employ special personnel to take care of such issues. Cost in money terms also turns to be important for micro firms. Some firms believe that the opportunity cost of an application is even higher then the expected benefits of getting the support. TEKMERs can make this process easier by offering extensive help in the application procedure, which is welcome by most of the firms.

Another important finding of the study is that the main source of funding at the start-up is own resources of entrepreneurs. Venture capital markets are certainly not developed in Turkey and there should be some attempts for improvement. This is important in the sense that, venture capital and spin-off process are vital for success of long-run benefits of incubators and science parks. However one should keep in mind that macroeconomic stability is a prerequisite for developing a well-functioning venture capital market. Another important weakness that is stated by most of the firms is the lack of marketing initiatives in TEKMERs. The policies aiming to increase the innovativeness and creation of new products and processes should best be supported by policies that aim to improve marketing opportunities. High technology market is international and the opportunities for high-technology based products are not geographically constrained (Löfsten and Lindelöf, 2003).

In addition, tax-exemptions provided to tenant companies might cause imperfections. Many firms find that tax exemptions provided to on-incubator firms brought distortion to market and even hinder competition. This causes problems because there is an excess demand for office spaces in TEKMERs. It is interesting to observe that some newly established technology based firms are prepared to locate the business in a TEKMER in order to take advantage of tax exemptions. Many firms find that being outside certainly harms the competitive position of the firm. This is interesting in the sense that it might discourage new firm creation in certain sectors since a firm located outside in the start-up phase certainly will not be able to compete with the on-incubator firms.

A criterion that deserves particular mention is “additionality” – the change due to the policy compared to what would have happened in its absence (European Commission, 2002). This is very difficult to observe, so that is why many researchers have different

views on the subject matter. Our findings provide evidence that TEKMERs in Turkey encourage new-firm creation and provide important facilities to support start-ups in their vulnerable stages. Turkey has long lasting problems in coherent and embracing policy making. Many difficulties arise because of the lack of interaction and cooperation between the government, the policy-making institutions and the parties subject to that particular law. Improvements can be made by formulating incubator policy in such a way that it is complementary to policies in product, financial and labor markets, and education and training.

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APPENDIX A

ON-INCUBATOR QUESTIONNAIRE

INTRODUCTION

Last decade has witnessed a growing attention on the interaction between technical change, innovation and economic growth, which led to the rise of technology policies. Tools such as, science parks, research parks and incubators have become quite important for shaping science and technology policy in this sense.

The main purpose of this project is to evaluate whether the Technology Development Centers (TEKMERs) in Turkey, which are incubator like institutions established by the Small and Medium Size Industry Development Organization (KOSGEB) of Turkey are successful in new firm creation and boosting the performance of the new technology-based firms (NTBFs) both in terms of economic and technological aspects. In this sense the study aims to compare and contrast the on-incubator firms with the off-incubator control group. This questionnaire comprises questions about basic firm information; economic indicators such as employee structure and sales revenue; technological and innovation indicators such as type of R&D conducted and patent information; significance of the supports of TEKMERs and type of interaction with universities. This questionnaire also aims to gather information about the founders.

The success of this study solely rests on the valuable information that is to be provided by the firms. The information made available is to be kept confidential and will not be shared with third parties.

1. NAME OF THE COMPANY: ……

1.3 Address: ……

……

City: ……

2.3 Contact name details;

Name: ……..

Position: ……...

Address: ……...

…… …...

Telephone: ……...……

E-mail: ……...…...……

1.3 Name of the Technology Development Center (TEKMER) where the company is located:

……...

2. GENERAL INFORMATION OF THE COMPANY

2.1 Year of establishment of the company: ☐

When was the company located in the TEKMER? : ☐

2.2 Capital structure of the company (%);

☐ Public

☐ Private ☐ Individual company

Subsidiary of Name of the parent company:.....

☐ another company City:.....

☐ Foreign ownership Country of Origin:.....

2.3 Legal status of the company:

☐ Proprietorship ☐ Simple Partnership ☐ General Partnership

☐ Limited Partnership ☐ Limited Liability Company ☐ Joint-Stock Company

☐ Cooperative ☐ Other

2.4 Does the company have any other branches elsewhere? ☐ Yes ☐ No

If yes, in which city / cities? : .....

2.5 What is the main business activity of the company?

.....

2.6 What are the company's target markets?

☐ Local markets ☐ Nation wide markets

☐ International markets Specific countries:.....

3 COMPANY DETAILS: ECONOMIC INFORMATION

3.1

	The year in which the company is located in a TEKMER	2000	2002
How many people do the company employ at the TEKMER location?	☐	☐	☐
How many people do the company employ in total?	☐	☐	☐
How many university graduates do the company employ?	☐	☐	☐
How many R&D personnel do the company employ ?	☐	☐	☐
How many PhD's do the company employ ?	☐	☐	☐

3.2 Where does most of the company's staff come from?

☐ Local resources ☐ Nation wide resources

How many graduates does the company employ from the university in which it is located? ☐

3.3 Company's

	The year in which the company is located in a TEKMER	2000	2002
Sales revenue (TL)	☐	☐	☐
Export share in sales revenue(%)	☐	☐	☐

4 COMPANY DETAILS: TECHNOLOGICAL INFORMATION

4.1 Does your company hold any patents, trademarks, industrial designs or utility models?

☐ Yes ☐ No

If yes provide the details:

	Turkish Patent Institute	Foreign patent Institute	IPC codes
Patent	☐	☐	.....
Trademarks	☐	☐	….....
Industrial designs	☐	☐	.....
Utility models	☐	☐	.....

If no, does your company plan to make an application in three years time ?

☐ Yes ☐ No

If yes, which of them? ☐ Patent ☐ Industrial design

☐ Trademarks ☐ Utility models

4.2 Does your company invest on R&D ? ☐ Yes ☐ No

If yes, in which area(s) are they directed mostly?

☐ Basic research

☐ Applied research

☐ Experimental research

4.3 What specific technologies does your company produce?

.....

Does your company support employees (in terms of money and time) on training and educational activities?

☐ Yes ☐ No

If yes, approximately how many days a year? ☐

4.4 Do you have information about TÜBİTAK-TİDEB, TTGV, and KOSGEB supports?

☐ Yes ☐ No

If yes, has your company taken supports? ☐ Yes ☐ No

If yes please provide the details?

	How many projects?	Total value of the project ($)
TÜBİTAK-TİDEB	☐	☐
TTGV	☐	☐
KOSGEB	☐	☐

How important has the support provided been to the development of your company?

☐ Very important – without the support, the company would not have been successful.

☐ Important – the support provided was not critical to company development.

☐ Not important – the company would have done the same without the supports.

If not taken supports please provide the reason: ……

4.5 Has your company developed a new product / service or process in the past three years?

☐ Yes ☐ No

		Product / Service	Process
If yes,	New for the firm	☐	☐
	New for Turkey	☐	☐
	New for the world	☐	☐

If yes approximately what proportion of total sales revenue is gathered through the sales of the new product / service? ☐

If yes, has your company exported the new product / service? ☐ Yes ☐ No

4.6 Does your company have information about EU 6. Framework Program?

☐ Yes ☐ No

If yes, Has your company send a project proposal? ☐ Yes ☐ No

Does your company plan to send a project proposal? ☐ Yes ☐ No

Please specify the area(s).

☐ Life sciences, genomics and biotechnology

☐ Information Science Technology

☐ Nano –technology, multifunctional materials and new production processes

☐ Aeronautics and Space

☐ Food quality and safety

☐ Sustainable energy systems and sustainable surface transport

☐ Knowledge based society, citizenship, and new forms of governance

4.7 How many expositions have you been to in the last two years?

Number of national expositions participated ☐

Number of international expositions participated ☐

Number of national expositions participated (with a stand) ☐

Number of international expositions participated (with a stand) ☐

5 TECHNOLOGY DEVELOPMENT CENTRE SERVICES

5.1 Where did your company get information about the TEKMERs?

☐ Press ☐ Internet ☐ Other Companies

☐ Promotion programs ☐ Official Newspaper ☐ Other

☐ Universities ☐ Companies located inside a TEKMER

5.2 Why did your company located its business in a TEKMER? (Please provide the most important three reasons in order)
(Realization level: 1 to 5, being 1: Totally, 3: Satisfied, 5: Not at all)
(Sufficiency level: 1 to 5, being 1: Very good, 3: Average, 5: Not at all)

	Reasons	Realization	Sufficiency
TEKMER location and image	☐	☐	☐
Government support and grants available through KOSGEB	☐	☐	☐
Availability of infrastructure	☐	☐	☐
Technical support services provided by the TEKMER	☐	☐	☐
Administrative support services provided by the TEKMER	☐	☐	☐
Opportunity to network with similar business	☐	☐	☐
Opportunity to cooperate with universities	☐	☐	☐
Other reasons.....	☐	☐	☐

5.3 What importance does your company attach to networking with firms inside the TEKMERs and other similar business outside?

(Importance level: 1 to 5, being 1: Very important, 3: Average importance, 5: Not important)

	With firms inside a TEKMER	With firms located elsewhere
R&D collaboration	☐	☐
Commercial relations	☐	☐
Social Interaction	☐	☐

5.4 What importance does your company attach to collaboration with universities?

(Importance level: 1 to 5, being 1: Very important, 3: Average importance, 5: Not important)

☐ R&D collaboration

☐ Analysis, testing and evaluation of company's products

☐ Collaboration on projects (other than R&D)

☐ Employee education and training

☐ Recruitment of staff

☐ Full time job ☐ Trainee

5.5 What importance does your company attach to links with university?

(Importance level: 1 to 5, being 1: Very important, 3: Average importance, 5: Not important)

☐ Links with university academic personnel

☐ Using the infrastructure available at the universities

5.6 How important has the support provided by the TEKMER been to the development of your company?

☐ Very important – without the support, the company would not have been successful.

☐ Important – the support provided was not critical to company development.

☐ Not important – the company would have done the same without the supports.

5.7 How will your company behave if it were not located in the TEKMER?

.....

.....

5.8 When does your company plan to leave the TEKMER? ☐

Where will be the new location? ☐ Same city ☐ Elsewhere

Reasons for departure

☐ The tenancy term will expire.

☐ Company needs more space.

☐ Company found a better place to locate its business

☐ The support provided by the TEKMER was not sufficient

☐ Other reasons.....

6 INFORMATION ON FOUNDERS

Founder's;

6.1 Year of birth: .....

6.2 Education level

☐ High school

☐ University graduate or higher

	Undergraduate	MS or MA	PhD
Name of the University:	.....	.....	.....
Department:	.....	.....	.....

Subject of thesis if available: .....

6.3 Prior experience?

☐ First job ☐ Owned a business earlier ☐ Worked for another company earlier

Sector: ..... Sector: .....

6.4 Do you have a partner?

☐ Yes ☐ No

6.5 How did you raised your capital when starting the business?

☐ Own accumulation ☐ Bank Credit ☐ Friends / relatives ☐ Other .....

6.6 Was your capital sufficient when starting business?

☐ Yes ☐ No

PARTNER 2

6.1 Year of birth: .....

6.2 Education level

☐ High school

☐ University graduate or higher

	Undergraduate	MS or MA	PhD
Name of the University:	.....	.....	.....
Department:	.....	.....	.....

Subject of thesis if available: .....

6.3 Prior experience?

☐ First job ☐ Owned a business earlier ☐ Worked for another company earlier

Sector: ..... Sector: .....

6.4 Do you have a partner?

☐ Yes ☐ No

6.5 How did you raised your capital when starting the business?

☐ Own accumulation ☐ Bank Credit ☐ Friends / relatives ☐ Other .....

6.6 Was your capital sufficient when starting business?

☐ Yes ☐ No

PARTNER 3

6.1 Year of birth: .....

6.2 Education level

☐ High school

☐ University graduate or higher

	Undergraduate	MS or MA	PhD
Name of the University:	.....	.....	.....
Department:	.....	.....	.....

Subject of thesis if available: .....

6.3 Prior experience?

☐ First job ☐ Owned a business earlier ☐ Worked for another company earlier

Sector: ..... Sector: .....

6.4 Do you have a partner?

☐ Yes ☐ No

6.5 How did you raised your capital when starting the business?

☐ Own accumulation ☐ Bank Credit ☐ Friends / relatives ☐ Other .....

6.6 Was your capital sufficient when starting business?

☐ Yes ☐ No

APPENDIX B

OFF-INCUBATOR QUESTIONNAIRE

INTRODUCTION

Last decade has witnessed a growing attention on the interaction between technical change, innovation and economic growth, which led to the rise of technology policies. Tools such as, science parks, research parks and incubators have become quite important for shaping science and technology policy in this sense.

The main purpose of this project is to evaluate whether the Technology Development Centers (TEKMERs) in Turkey, which are incubator like institutions established by the Small and Medium Size Industry Development Organization (KOSGEB) of Turkey are successful in new firm creation and boosting the performance of the new technology-based firms (NTBFs) both in terms of economic and technological aspects. In this sense the study aims to compare and contrast the on-incubator firms with the off-incubator control group. This questionnaire comprises questions about basic firm information; economic indicators such as employee structure and sales revenue; technological and innovation indicators such as type of R&D conducted and patent information; significance of the interaction with universities. This questionnaire also aims to gather information about the founders.

The success of this study solely rests on the valuable information that is to be provided by the firms. The information made available is to be kept confidential and will not be shared with third parties.

1. NAME OF THE COMPANY: ……

1.1 Address: ……

……

City: ……

1.2 Contact name details;

Name: ……..

Position: ……...

Address: ……...

…… …...

Telephone: ……...……

E-mail: ……..…...……

2. GENERAL INFORMATION OF THE COMPANY

2.1 Year of establishment of the company: ☐

2.2 Capital structure of the company (%);

☐ Public

☐ Private ☐ Individual company

Subsidiary of Name of the parent company:.....

☐ another company City:.....

☐ Foreign ownership Country of Origin:.....

2.3 Legal status of the company:

☐ Proprietorship ☐ Simple Partnership ☐ General Partnership

☐ Limited Partnership ☐ Limited Liability Company ☐ Joint-Stock Company

☐ Cooperative ☐ Other

2.4 Does the company have any other branches elsewhere? ☐ Yes ☐ No

If yes, in which city / cities? : .....

2.5 What is the main business activity of the company?

.....

.....

2.6 What are the company's target markets?

☐ Local markets ☐ Nation wide markets

☐ International markets Specific countries:.....

3. COMPANY DETAILS: ECONOMIC INFORMATION

3.1

	2000	2002
How many people do the company employ in total?	☐	☐
How many university graduates do the company employ?	☐	☐
How many R&D personnel do the company employ ?	☐	☐
How many PhD's do the company employ ?	☐	☐

3.2 Where does most of the company's staff come from?

☐ Local resources ☐ Nation wide resources

3.3 Company's

	2000	2002
Sales revenue (TL)	☐	☐
Export share in sales revenue(%)	☐	☐

4. COMPANY DETAILS: TECHNOLOGICAL INFORMATION

4.1 Does your company hold any patents, trademarks, industrial designs or utility models?

☐ Yes ☐ No

If yes provide the details:

	Turkish Patent Institute	Foreign patent Institute	IPC codes
Patent	☐	☐	.....
Trademarks	☐	☐	….....
Industrial designs	☐	☐	.....
Utility models	☐	☐	.....

If no, does your company plan to make an application in three years time ?

☐ Yes ☐ No

If yes, which of them? ☐ Patent ☐ Industrial design ☐ Trademarks ☐ Utility models

4.2 Does your company invest on R&D ? ☐ Yes ☐ No

If yes, in which area(s) are they directed mostly?

☐ Basic research

☐ Applied research

☐ Experimental research

4.3 What specific technologies does your company produce?

.....

4.4 Does your company support employees (in terms of money and time) on training and educational activities?

☐ Yes ☐ No

If yes, approximately how many days a year? ☐

4.5 Do you have information about TÜBİTAK-TİDEB, TTGV, and KOSGEB supports?

☐ Yes ☐ No

If yes, has your company taken supports? ☐ Yes ☐ No

If yes please provide the details?

	How many projects?	Total value of the project ($)
TÜBİTAK-TİDEB	☐	☐
TTGV	☐	☐
KOSGEB	☐	☐

How important has the support provided been to the development of your company?

☐ Very important – without the support, the company would not have been successful.

☐ Important – the support provided was not critical to company development.

☐ Not important – the company would have done the same without the supports.

If not taken supports please provide the reason: ……

4.6 Has your company developed a new product / service or process in the past three years?

☐ Yes ☐ No

		Product / Service	Process
If yes,	New for the firm	☐	☐
	New for Turkey	☐	☐
	New for the world	☐	☐

If yes approximately what proportion of total sales revenue is gathered through the sales of the new product / service ? ☐

If yes, has your company exported the new product / service? ☐ Yes ☐ No

4.7 Does your company have information about EU 6. Framework Program?

☐ Yes ☐ No

If yes, Has your company send a project proposal? ☐ Yes ☐ No

Does your company plan to send a project proposal? ☐ Yes ☐ No

Please specify the area(s).

- ☐ Life sciences, genomics and biotechnology
- ☐ Information Science Technology
- ☐ Nano –technology, multifunctional materials and new production processes
- ☐ Aeronautics and Space
- ☐ Food quality and safety
- ☐ Sustainable energy systems and sustainable surface transport
- ☐ Knowledge based society, citizenship, and new forms of governance

4.8 How many expositions have you been to in the last two years?

Number of national expositions participated ☐

Number of international expositions participated ☐

Number of national expositions participated (with a stand) ☐

Number of international expositions participated (with a stand) ☐

5 IMPORTANCE OF COOPERATION AND COLLABORATION

5.1 What importance does your company attach to networking with other similar business?

(Importance level: 1 to 5, being 1: Very important, 3: Average importance, 5: Not important)

R&D collaboration ☐

Commercial relations ☐

Social Interaction ☐

5.2 What importance does your company attach on collaboration with universities?

(Importance level: 1 to 5, being 1: Very important, 3: Average importance, 5: Not important)

- ☐ R&D collaboration
- ☐ Analysis, testing and evaluation of company's products
- ☐ Collaboration on projects (other than R&D)
- ☐ Employee education and training
- ☐ Recruitment of staff
  - ☐ Full time job ☐ Trainee

5.3 What importance does your company attach on links with university?

(Importance level: 1 to 5, being 1: Very important, 3: Average importance, 5: Not important)

- ☐ Links with university academic personnel
- ☐ Using the infrastructure available at the universities

5.4 Do you have information about science parks and incubators (TEKMERs)

☐ Yes ☐ No

If yes what was the source of the information?…….…

If your company has information about TEKMER what was the reason(s) for not locating your company inside a TEKMER or a science park? Do you plan to move to a TEKMER or a science park? ……..……..

6 INFORMATION ON FOUNDERS
Founder′s;

6.1 Year of birth: .....

6.2 Education level

☐ High school

☐ University graduate or higher

	Undergraduate	MS or MA	PhD
Name of the University:	.....	.....	.....
Department:	.....	.....	.....

Subject of thesis if available: .....

6.3 Prior experience?

☐ First job ☐ Owned a business earlier ☐ Worked for another company earlier

Sector: ..... Sector: .....

6.4 Do you have a partner?

☐ Yes ☐ No

6.5 How did you raised your capital when starting the business?

☐ Own accumulation ☐ Bank Credit ☐ Friends / relatives ☐ Other .....

6.6 Was your capital sufficient when starting business?

☐ Yes ☐ No

PARTNER 2

6.1 Year of birth: .....

6.2 Education level

☐ High school

☐ University graduate or higher

	Undergraduate	MS or MA	PhD
Name of the University:	.....	.....	.....
Department:	.....	.....	.....

Subject of thesis if available: .....

6.3 Prior experience?

☐ First job ☐ Owned a business earlier ☐ Worked for another company earlier

Sector: ..... Sector: .....

6.4 Do you have a partner?

☐ Yes ☐ No

6.5 How did you raised your capital when starting the business?

☐ Own accumulation ☐ Bank Credit ☐ Friends / relatives ☐ Other .....

6.6 Was your capital sufficient when starting business?

☐ Yes ☐ No

PARTNER 3

6.1 Year of birth: .....

6.2 Education level

☐ High school

☐ University graduate or higher

	Undergraduate	MS or MA	PhD
Name of the University:	.....	.....	.....
Department:	.....	.....	.....

Subject of thesis if available: .....

6.3 Prior experience?

☐ First job ☐ Owned a business earlier ☐ Worked for another company earlier

Sector: ..... Sector: .....

6.4 Do you have a partner?

☐ Yes ☐ No

6.5 How did you raised your capital when starting the business?

☐ Own accumulation ☐ Bank Credit ☐ Friends / relatives ☐ Other .....

6.6 Was your capital sufficient when starting business?

☐ Yes ☐ No

APPENDIX C

COMPANY CONTACTS

Table A3-1: Names and Addresses of On-Incubator Firms That Have Responded to the Questionnaires

Location of TEKMER	*Location of University*	Name of the Company
Ankara	Middle East Technical University (METU)	SIMART Muh. Yaz. Otomasyon Sist. San. Tic. Ltd. Sti.
Ankara	METU	SIDATA Yazilim Hizmetleri Ltd. Sti.
Ankara	METU	SATEK Savunma Teknolojileri Ltd. Sti.
Ankara	METU	POLAR Muhendislik ve Danismanlik Ltd. Sti.
Ankara	METU	EYMIR Muhendislik Ltd. Sti.
Ankara	METU	EMESYS Endustriyel Medikal Elektronik Sistemler Yazilim Sanayi ve Ticaret Ltd. Sti.
Ankara	METU	EKON Kontrol Sistemleri Sanayi ve Ticaret. Ltd. Sti.
Ankara	METU	SIGMA Yaz. Muh. Sav. San. Tic. Ltd. Sti.
Ankara	METU	MEDISPO Medikal Teknik San. Tic. Ltd. Sti.
Ankara	METU	PGG Proje Gelistirme Grup San. Tic. Ltd. Sti.
Ankara	METU	FILKON Elektronik Ticaret ve Paz. Ltd. Sti.
Ankara	METU	LETRA Elektronik Yazilim San. Tic. Ltd. Sti.
Ankara	METU	VERISEL Elektronik ve Yazilim Ltd. Sti.
Ankara	METU	DIZGE Analitik Ltd. Sti.
Ankara	METU	TUMEL Muh. Ltd. Sti.
Ankara	METU	UDEA Elektronik San. Tic. Ltd. Sti.
Ankara	METU	INTERAK Bilgisayar Egit. Dan. Proje. Tic. Ltd. Sti.
Ankara	METU	APSIS Kontrol Sistemleri Ltd. Sti.
Ankara	Ankara University	KAYNAK Arastirma Egitim Pazarlama Telekom Org. San. ve Tic. A.S.
Ankara	Ankara University	MIKROLAB Dis. Tic. Ltd. Sti.
Ankara	Ankara University	ELEKTROLAND Endustriyel Elektronik ve Otomasyon Sanayii Tic. Ltd. Sti.
Ankara	Ankara University	BIOGENTEK Bioteknoloji Sis. San. Tic. Ltd. Sti.
Istanbul	Istanbul Technical University (ITU)	Ileri Teknoloji Malz. Arge A.S.

Table A3-1: Names and Addresses of On-Incubator Firms That Have Responded to the Questionnaires (continued)

Istanbul	ITU	TURKSER Teknoloji Sistemleri Ltd. Sti.
Istanbul	ITU	Ozer Egitim Teknolojileri
Istanbul	ITU	OTONOM Bilgi Teknolojileri San. Ve Tic. A.S.
Istanbul	ITU	PC Danismanlik Elektronik San ve Tic Ltd. Sti.
Istanbul	ITU	Parsera Bilgi Teknolojileri
Istanbul	ITU	KAYA Muhendislik Yapi Bilgisayar Sog. Ve Isitma Sistemleri San. Tic. Ltd. Sti.
Istanbul	ITU	TEKNOPARK Elektronik Bilisim Danismanlik Turizm San. Ve Tic. Ltd. Sti.
Istanbul	ITU	Best Bilgisayar ve Elektronik Sanayi Tic. Ltd. Sti.
Istanbul	ITU	Karakaslar Seramik Ltd. Sti.
Istanbul	ITU	ITU ETA Ileri ElektronikTeknolojileri Arastirma Gelistirme Vakfi
Istanbul	ITU	Portakal Ltd. Sti.
Istanbul	ITU	Akropol Bilgisayar Muh. Sanayi ve Ticaret Ltd. Sti.
Istanbul	ITU	Nux System Bilgi Tek. San ve Tic Ltd. Sti.
Istanbul	Bosphorus University	MAVITEK Elektrik Elektronik Medikal Yazilim Muh. San. Tic. Ltd. Sti.
Istanbul	Bosphorus University	INVENOA Yazilim Bilgisayar A.S.
Istanbul	Bosphorus University	MAKERSAN Makina Otomotiv San. Tic. Ltd. Sti.
Istanbul	Bosphorus University	GNS Internet Otomasyon Dan. Egit. Yaz. Hiz. San. Tic. Ltd. Sti.
Istanbul	Bosphorus University	VERTON Aritma Isitma Tesisat Muh. Kaucuk ve Plastik San. Tic. Ltd. Sti.
Istanbul	Bosphorus University	BIYOTEK Biyoteknoloji San. Dan. Muh. Bas. Yay. Ic ve Dis Tic.
Istanbul	Bosphorus University	INTEGRAL Bilgisayar Hizmetleri A.S.
Istanbul	Bosphorus University	Bilko Bilgisayar Otomasyon ve Kontrol A.S.
Istanbul	Yildiz Technical University (YTU)	Eline Elektronik Ticaret Internet Tanitim ve Yayincilik Ltd. Sti.
Istanbul	YTU	VIRA Bilgi ve Iletisim Teknolojileri San. Ve Tic. Ltd. Sti.
Istanbul	YTU	SAYI Isi Ekonomi Servisi
Kocaeli-Gebze	Gebze Institute of Technology	BIAS Elektronik Mekanik Bilgisayar Muhendislik Danismanlik San. Tic. Ltd. Sti.

Note: For details of other TEKMER companies see http://www.kosgeb.gov.tr/firmalar/Default.asp

Table A3-2: Names and Addresses of Off-Incubator Firms That Have Responded to the Questionnaires

City of Location	*Name of the Company*	**Adress of the Company**	*Telephone*
Ankara	MEDOR Medikal Ortepedi A.S.	13. Sokak No:31 OSTIM	90 312 385 3467
Ankara	STC Elektronik Ltd. Sti.	10 Sokak No: 28 OSTIM	90 312 385 6399
Ankara	ELMED Elektronik ve Medikal San. Tic. A.S.	42A Sokak No: 16 OSTIM	90 312 385 1358
Ankara	EMS Rontgen Elektronik Mekanik	30. Sokak No: 139 OSTIM	90 312 354 2430
Ankara	Anadolu Endustriyel Otomasyon	31/A Sokak No:25/100 OSTIM	
Ankara	Enerkon Elektrik Elektronik	30. Sokak No: 2/1-H 06370 OSTIM	90 312 385 1229
Ankara	Enelko Muhendislik Endustriyel Elektronik Kontrol	Alinteri Bulvari OSTIM Is Merkezleri A Blok No:31	90 312 385 5173
Ankara	TERMO-AK Otomasyon Servis	100. Yil Bulvari 41/A Sokak No: 35/P-6 OSTIM	90 312 385 1748
Ankara	CABA Makina Muh. Hiz. San. Tic. Ltd. Sti.	31/A Sokak No:25/34 OSTIM	90 312 385 0280
Ankara	MEGA EMI Elektrik Elektornik Insaat Ltd. Sti.	41-A Sokak No:60 OSTIM	90 312 354 6944
Ankara	Simsek Laborteknik Sag. Lab. Cih. Ltd	Merkez Sanayi Sitesi 537 Sok. No: 22-24 OSTIM	90 312 395 2484
Ankara	EMM Elektro Mekanik Montaj San. Tic. Ltd. Sti.	Ivedik Organize Sanayi S.S. Ozanadolu Koop. 19171 Ada 662. Sokak No:1	90 312 395 4588
Ankara	Kardiosis Cardiologic Diagnostic Systems Ltd. Sti.	ODTU Gumus Bloklar A Blok No:2 06531	90 312 210 1810
Ankara	Bilgi ve Teknoloji Grubu	Abidin Daver Sokak No: 26/2 Cankaya 06550	90 312 440 9668
Ankara	MANAS Elektronik Teknoloji A.S.	ODTU Gumus Bloklar A Blok No:14 06531	90 312 210 1547
Ankara	Bilisim San. Tic. Ltd. Sti.	Ankara Cyberpark Beytepe Koyu Yolu 5/A 06530 Bilkent	90 312 266 1144
Ankara	Stratek Stratejik Teknolojiler Ar-Ge Ltd. Sti.	ODTU Gumus Bloklar B Blok No:7 06531	90 312 210 1668

Table A3-2: Names and Addresses of Off-Incubator Firms That Have Responded to the Questionnaires (continued)

Ankara	Key Kalite Elektronik ve Yazilim San. Ve Tic. Ltd. Sti.	Ankara Cyberpark 5. Cadde No: 4/202 06530 Bilkent	90 312 266 4245
Ankara	Interlog Lojistik Sistemler Yazilim Donanim Ltd. Sti.	Cetin Eme Bulvari 6. Cadde No: 60/6 Asagi Ovecler 06460	90 312 478 0404
Istanbul	Ideal Teknoloji Bilisim Cozumleri A.S.	Alemdag Cad. Masaldan Is Merkezi E Blok Kat 4 Kisikli 81180	90 216 328 2570
Istanbul	Mor Yazilim Hizmetleri ve Bilgisayar Sistemleri Ltd. Sti.	Eski Uskudar Caddesi Cayiryolu Sokak Ay Plaza No: 2/4 Icerenkoy	90 216 573 5600
Istanbul	Banksoft Bilisim Bilgisayar Hizmetleri Ltd. Sti.	Bulgurlu Mah. Aydinoglu Sokak No: 29 Camlica 81190 Uskudar	90 216 521 1414
Istanbul	Bilden Bilgisayar	Ziverbey Kasap Ismail Sokak Sadikoglu 4 Is Merkezi No:13 Ofis No:41 Kadikoy	90 216 449 5250
Istanbul	AMP Yazilim Sanayi ve Ticaret Ltd. Sti.	Bahariye Caddesi no:49/6 81300 Kadikoy	90 216 346 8799
Istanbul	TEKNOBIL Muhendislik Bilgisayar Elektronik Taahhut San. Ve Tic. A.S.	Bulgurlu Mah. Sarigazi Caddesi, No: 25 81180 Kucukcamlica	90 216 461 60 00
Istanbul	DORUK Otomasyon ve Yazilim San. Tic. A.S.	Eren Sokak Yavuz Han No: 6/8 80700 Besiktas	90 212 327 4944
Istanbul	CPM Bilgisayar Yazilim ve Donanim Tic. A.S.	Abide-i Hurriyet Caddesi Izzetpasa Sokak Dagli Han No: 31/19 80260 Sisli	90 212 230 2040
Istanbul	Workcube e-is Sistemleri A.S.	Kasap Sokak No:16 Eser Is Merkezi A Blok Kat 6 80280 Esentepe	90 212 211 5388
Istanbul	Bizitek Bilgisayar Yazilim ve Internet Teknolojileri A.S.	Eski Buyukdere Caddesi Dilaver Sokak No: 4 80660 Otosanayi 4. Levent	90 212 317 6254
Istanbul	IMS Yazilim Danismanlik ve Tic. Ltd. Sti.	Talatpasa Caddesi Sair Celebi Sokak No: 1/5 34413 Gultepe	90 212 270 9650
Istanbul	BILSER Bilgisayar ve Yonetim Sistemleri A.S.	Kasap Sokak No:16/A Eser Is Merkezi 80280 Esentepe	90 212 211 5388
Istanbul	FET Bilgisayar Yazilim ve Danismanlik San. Tic. Ltd. Sti.	Mevlut Pehlivan Caddesi No:22 Kat 7 Gayrettepe	90 212 266 4250

Table A3-2: Names and Addresses of Off-Incubator Firms That Have Responded to the Questionnaires (continued)

Istanbul	Solon Bilgisayar Yazilim Hizmetleri A.S.	Abide-i Hurriyet Caddesi Yonca Apt. No: 282/9 80260 Sisli	90 212 232 4306
Istanbul	Mobilera Bilisim Iletisim Teknolojileri A.S.	Buyukdere Caddesi Yunus Emre Sokak Topcu Is Merkezi No:1 Kat: 4 80660 4. Levent	90 212 284 9104
Istanbul	ITD Iletisim Teknoloji Danismanlik Ticaret A.S.	Manolya Sokak No: 10 3.Levent 80620	90 212 281 4878
Istanbul	EST Enerji Sistem Teknolojileri Ltd. Sti.	Ferahevler, Sultankonan Sokak No:21 80880 Tarabya	90 212 299 2329
Istanbul	Gonca Grubu Yazilim ve Bilgisayar Sistemleri San. Ve Tic. Ltd. Sti.	Izzetpasa Mahallesi Yeni Yol Caddesi Balci Is Merkezi No:16/18 Mecidiyekoy	90 212 296 5816
Istanbul	MS Yazilim A.S.	Buyukdere Caddesi No:34/16 K:6 Mecidiyekoy	90 212 274 3414
Istanbul	SANOR Bilisim Teknolojileri San. Tic. A.S.	Perpa Ticaret Merkezi B Blok Kat:11 No:1706 80270 Okmeydani	90 212 222 4403
Istanbul	Gelecek A.S.	Osmanli Sokak Osmanli Is Hani No:24 Kat:4 Taksim	90 212 243 7530
Istanbul	INFOTRON	Prof. Dr. Fahrettin Kerim Gokay Cad. No: 27/3 34662 Altunizade	90 216 651 0955