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ADE s.a.
Rue de Clairvaux, 40
B-1348 Louvain-la-Neuve
Belgium
Tél.: +32 10 45 45 10
Tél.: +32 10 45 40 99
E-mail: ade@ade.be
Web : www.ade.be

Compiled by: Sirin Elci
Technology Development Foundation of Turkey

Study coordinated by ADE

In association with SSEES AND LOGOTECH

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Introduction and acknowledgements

This report presents an analysis of innovation policy in Turkey prepared under the study on “Innovation Policy in Seven Candidate Countries: The Challenges”, carried out for Bulgaria, Latvia, Lithuania, Malta Romania, Slovakia and Turkey. It covers developments since 1996 and is based on officially approved statistics and publications. Where no official reports, evaluation studies etc. exist Government, or Government sponsored, studies, statistical or opinion surveys, evaluation reports or decisions; studies, reports, etc. funded by international funding agencies and academic studies; articles or reports by think-tanks, employers organisations were used.

The study was carried out in three stages at the end of which an interim report was prepared in January, May and September 2002.

While preparing the interim and final reports, in addition to carrying out a documentary analysis, face-to-face or phone interviews were conducted with policy-makers, business representatives, entrepreneurs and representatives of innovation support organisations. In addition, during August and September 2002, an opinion survey was carried out among 50 knowledgeable companies and private sector stakeholders to collect opinion on the influence of the legal and economic environment on business innovation; to seek the views of the private sectors actors on current policy developments and specific measures in favour of innovation, and to ascertain views with respect to networks and diffusion mechanisms in the innovation system. On 25 October 2002, an innovation policy workshop was organised with representatives of innovating companies, chambers, industrial federations, policy-makers and innovation support organisations. The purpose of the workshop was to provide a forum for debate on the initial conclusions of the national level analysis and on the result of the opinion survey.

This report is divided into three chapters. The first chapter presents information on the innovation policy framework of Turkey: trends economic and financial market reform, industrial trends, inward investment, industrial R&D; main developments in innovation policy; actors of innovation policy community; initiatives taken to monitor and collect data on innovation; and legal and administrative environment for innovation. Findings on the analysis of teaching and training initiatives in favour of innovation and on policies to foster the uptake of information and communication technologies are described in the second chapter. Chapter three analyses business innovation interfaces and support measures, looking at in detail the research community-industry co-operation, support for start-ups and new technology based firms and business networks for innovation.

This report was made possible thanks to the cooperation and support of the Turkish experts who participated in the multinational panel meetings; policy-makers, business representatives, entrepreneurs and representatives of innovation support organisations interviewed and who responded to the opinion survey; and participants in the innovation policy workshop. Their cooperation and support is gratefully acknowledged. Special thanks are due to the core team (ADE, SSEES and LOGOTECH) for their support and guidance during the course of the study.

This report was concluded in December 2002 and therefore only events or documents occurring up to this date are covered.

Section 1 - The Innovation Policy Framework

1.1 Economic transition, accession and innovation policy

A financial crisis in November 2000 was transformed into an economic crisis in February 2001. Both crisis, with increases in interest rates and inflation, and fluctuations in exchange rates, created serious problems for the industrial and service sectors.

Turkey experienced a positive trend in the annual rate of growth from 1996 to 1998 with on average 6.4%, however in 1999, the growth rate contracted by 6.1% due to policies aimed at reducing inflation and declining production because of the earthquake which took place in August of the same year. As a result of the three-year disinflation and structural adjustment programme started end 1999, that was supported by a stand-by agreement with the International Monetary Fund (IMF), inflation fell significantly in 2000 (from 84.9% in 1996 to 32.7 % in 2000). Meanwhile the interest rates sharply decreased below expected levels, production and domestic demand started to increase, GDP by expenditures grew by 7.1 % and as a result an annual growth rate of 6.1 % was achieved. However, since instability in the form of a financial crisis in November 2000 has been transformed into an economic crisis in February 2001, a new programme for restructuring the economy and achieving lasting stability had to be designed in April 2001. Although with the new programme annual growth rates of -3.0% and 5.0% were foreseen for years 2001 and 2002 respectively, they were reduced to -8.5% and 4.0% following the September 11 events. The inflation rates for 2001 and 2002 were targeted as 65% and 35% respectively¹.

In 2001, annual growth rate and year-end inflation were -7.4% and 68.5% respectively. The economic programme has been implemented successfully with a prospect that targets for 2002 will be met by the end of the year. Growths in GDP and GNP have been 8.2% and 8.8% year on year in the second quarter of 2002. For the first six months of 2002 taken together, GDP rose by 5.2% and GNP by 4.7% year on year. Increases in exports and stocks have been the main components of growth in 2002. With the annual rate of consumer price inflation down to 33 % in October, the year-end rate is expected to come in close to 30 %, below the Government's target of 35 % for 2002².

¹ IMF Letter of Intent dated November 20, 2001 for the 10th Review (http://www.treasury.gov.tr/Standby/mektup/mektup10/eng/niyet_mektubu10_eng.htm).

² The Economist Intelligence Unit, Country Report-Turkey, November 2002 (<http://www.eiu.com>).

In August 2002, the High Planning Council approved the economic programme of Turkey for 2002-2005³. The programme covers economic targets for meeting the EU accession criteria. An average growth rate of 5.2 % and an inflation rate of 8 % are targeted by the programme. It is aimed to reach a sustainable growth rate and the EU average in the ratio of public debt stock to GNP, and to strengthen the free market economy. It is foreseen that an increase in the growth rate will be mainly achieved by increasing investments and exports. Expected increase in investments and exports are calculated at 14.2% and 6.6% respectively.

Due to the recent macroeconomic programme, Turkey has gone through a large number of structural reforms. The aim of these reforms is defined as increasing the efficiency of growth and production factors in the country in order to meet the requirements of both globalisation and growth based on human capital and technology. Legislative measures taken in that respect are categorized as: a) financial sector restructuring, b) increasing transparency in the State and strengthening of public finances, c) enhancing of competition and efficiency in the economy, d) strengthening of social solidarity. Actions being taken to adopt the EU 'acquis' contribute to these efforts to a large extent.

As macroeconomic conditions play an important role in creation of a favourable environment for innovation, high long-term inflation in Turkey has been a significant disincentive.

As macroeconomic conditions play an important role in creation of a favourable environment for innovation, high long-term inflation in Turkey has been a significant disincentive in this respect. Both crises, with increases in interest rates and inflation, and fluctuations in exchange rates, created serious problems for the industrial and service sectors especially in 2001. Nevertheless, in 2002, industry and trade have been leading the economic recovery. Industry, which accounts for about one-third of GDP, expanded by 12.2% year on year in the second quarter of 2002 while trade increased by 10.1% in the same period. The value added in industry and services increased by 7.7% and 4.3% in the first half of 2002 compared to a decline by 7.5% and 7.6% respectively in 2001.

As underlined in the working paper for this study ("*Innovation Capabilities of the Seven EU Candidate Countries*", Volume 2.8), opportunities and incentives for innovation are highly dependent on the already achieved levels of development and productivity. Compared to the current 15 EU Member States (EU15), Turkey is less developed with Gross Domestic Product (GDP) per capita of 29 % of the EU average, if purchasing power standards (PPS) are taken into account for 2000. In terms of labour productivity, Turkey is in a second-placed group of countries with labour productivity in manufacturing and in the total economy standing

³ Pre-accession Economic Programme
(<http://www.ekutup.dpt.gov.tr/ab/kep/pep2002.pdf>).

between 40-60 % and 40-80 % of EU level respectively (Slovakia, Turkey, Slovenia, Hungary, Czech Republic, Greece and Portugal).

In terms of financial markets, in spite of its low-income level, the share of stock market capitalisation is quite high in Turkey (60.7 % of GDP in 1999). From the perspective of internationalisation of economy, Turkey's trade integration, which is 16.2 %, is less than EU economies (in the EU15 ranging from 25.5 % (Greece) to 129.6 % (Ireland)). Between 1995 and 1999, Turkey has transformed its structure of export from raw material to manufacturing based products. On the other hand, the share of high-technology exports as a percentage of manufactured exports (4.3 %) is significantly lower than that of EU15. Another indicator for internationalisation of economy in Turkey, Foreign Direct Investments (FDI) stock as a percentage of GDP, is very much lower (4.4 %) than would be expected given its trade integration level. This figure is the lowest both in EU15 and Candidate Countries⁴.

The Turkish Government has taken measures to remove constraints in product and process quality, industrial property regime, level of technology development and linkages between research and development (R&D) institutions and the industry since the beginning of 1990s.

Although the macroeconomic environment has not always been conducive to investment in innovation, the Turkish Government has taken measures to remove constraints in product and process quality, industrial property regime, level of technology development and linkages between research and development (R&D) institutions and the industry since the beginning of 1990s. The first milestone was the multi-annual programme called the Technology Development Project (TDP) that was financed by the Under-Secretariat of Treasury through the resources of the World Bank. TDP was implemented between 1991-1998 and its budget amounted to €108 million all of which was utilised for facilitating R&D activities of business sector. Another multi-annual programme financed in the same way as a continuation of TDP, is the Industrial Technology Project (ITP), being implemented between 1999-2003 with a total loan amount of €162 million, which also aims to facilitate industrial R&D. Besides these two programmes, business R&D has been funded by the Government since 1995 through two different implementing agencies (details of these programmes and agencies are given in Table 2). The various programmes and support schemes have been evaluated systematically since 1999.

The Government's first industrial technology and innovation strategy was articulated in the policy document, "Turkish Science and Technology Policy: 1993-2003" that formed an integral part of 7th Five-Year Development Plan covering the period of 1996-2000. In the context of Turkey's integration with the European Union and acceptance of General Agreement of Tariffs and Trade (GATT), the need for enhancing competitive advantage of

⁴ Innovation capabilities of the seven EU candidate countries. Working paper by UCL-SSEES (Volume 2.8).

These developments have started to create some level of awareness on innovation in the industrial sector but the results of the efforts have been limited and it has not been possible to reach all targets set by the Development Plan.

industrial enterprises through productivity improvements and technological innovation has increased. To this end, Turkey's science and technology strategy has been shaped to achieve a better integration of the science and technology infrastructure with industrial needs, to increase private sector investment in R&D, and to develop stronger linkages between industry, universities, and research institutions. These developments have started to create some level of awareness on innovation in the industrial sector but the results of the efforts have been limited and it has not been possible to reach all targets set by the Development Plan.

1.1.1 Structural Reforms in Enterprise Sector

Privatisation has been one of the essential elements of the economic programme with the aim of full integration into world markets, ensuring free market conditions, and increasing the efficiency and competitiveness of the economy within the framework of the Customs Union and with a view to EU membership. Through privatisation, it is also aimed to confine the role of the State in the economy to supervision and regulation by minimising its activities in producing goods and services, and to establish international standards in the Turkish economy.

Since the start of the privatisation activities in 1985, 166 companies have been privatised with no governmental shares existing in 149 of them. As of August 2002, there are 39 state economic enterprises (SEEs) 18 of which are covered by the privatisation programme. In 2001, several laws like Telecom Law were put into force which also accelerated the privatisation process. In spite of these efforts, there have been problems encountered in privatisation processes of some major state-owned companies both due to the changing market conditions and delays in legislative changes. After the September 11 events the weakened market conditions have forced the Government to postpone the offerings of major SEEs to 2002 such as TUPRAS (oil refinery) and POAS (petroleum distribution) and Turkish Airlines. Legislative delays also caused postponement of privatisation in some major state-owned companies like SEKER (sugar factories). By the end of 2001, privatisation receipts had reached approximately €3.2 Billion. In 2002, in line with the laws on liberalising the power and gas markets approved in February and April 2001, the new energy agency, the Energy Market Regulation Agency⁵, took up its full responsibilities for the licensing and regulation of participants in the electricity market on and took charge of the gas market. Privatisation of some SEEs (such as POAS) and preparations for the privatisation of others (such as Turk Telecom) proceed according to the road maps in 2002. However, the election campaign in the 2nd half of 2002

⁵ <http://www.epdk.gov.tr/english/default.asp>

slowed the pace of process in some SEEs, such as TEKEL (the tobacco and alcohol company). The target on cumulative cash privatisation proceeds for 2002 is € 700 million⁶.

Privatisation activities are supported by the Privatisation Social Support Project financed jointly by the Turkish Government and the World Bank in order to provide the employees of the privatised companies with job loss compensation and job deployment⁷. The project finances training and technical assistance for entrepreneurship as well and a programme is being implemented together with Small and Medium Industry Development Organisation (KOSGEB) for this purpose.

With regards to competition policy, in 2002, the Competition Authority has adopted a number of secondary legislations to implement Law No. 4054 that was adopted in 1994 to address three categories of issues regarding competition policy: a) agreements, decisions, and concerted practises which hinder, distort or restrict competition among enterprises; b) the abuse of a dominant position by enterprises; and c) mergers and acquisitions which distort the competitive structure of the market. Preparatory work for adoption of communiqués on de-minimis and R&D is being continued. In addition, draft law on Monitoring and Surveillance of State Aid has been prepared to establish an independent body responsible for monitoring and supervising state aid and taking the necessary measures to prevent the distortion of competition.

1.1.2 Structural Reforms in Finance Sector

In Turkey, the banking sector accounts for three-fourth of the financial sector assets; the rest is composed of non-bank financial institutions, which are mostly subsidiaries of banks. Total assets of the banking sector were 76.9% of GNP in 2000. The banking legislation and regulations were designed in accordance with the principles of the Bank of International Settlement (BIS) and EU directives. The number of banks has been reduced considerably since 2001, from 62 in 1999 to 43 in June 2002.

The new banking law came into force in 1999 and an independent institution called Banking Regulation and Supervision Agency⁸ was established in 2000. The banking sector has gone through major changes since the economic crisis in 2001 due to macroeconomic instability, high public sector deficit, systemic distortions created by the state banks, and inadequate risk assessment and management systems. The cost of restoring the banking sector was estimated around €45 Billion, 20% of Turkey's

⁶ IMF Letter of Intent dated July 30, 2002

(http://www.hazine.gov.tr/Standby/3gg_nm_eng.pdf).

⁷ Details are available at <http://www.oib.gov.tr> (Privatisation Administration).

⁸ http://www.bddk.org.tr/english/mainpage/index_eng.htm

GDP. The Banking Sector Reconstruction Programme was started on 15 May 2001 with the aim to financially restructure and rehabilitate the state banks; rapid resolution of the banks under the administration of the Savings Deposit Insurance Fund (SDIF); and to take measures to facilitate the strengthening of the private banking system. The banking law of 1999 was revised according to the requirements that arose after the crisis and the new law was put into force on 29 May 2001. In line with the changes in EU norms and international central banking practices, a new Central Banking Law was enacted in May 2001 to strengthen the Central Bank's operational independence. Developments in the sector after the crisis aim at balancing Turkish banking sector that is highly segmented, with a group of efficient and profitable banks at the core and other smaller banks at the margin.

Since the banking sector is the dominant financial sector in Turkey, problems encountered led to great difficulties in industry that depend on bank credits and guarantees for their operations.

Since the banking sector is the dominant financial sector in Turkey, problems encountered led to great difficulties in industry that depend on bank credits and guarantees for their operations. Since the crises, access to finance has been a major problem especially for small and medium-sized enterprises (SMEs).

On the other hand, in 2002, due to the reform programme and economic recovery, banks restarted to design and implement special loan programmes for SMEs with favourable conditions. In addition, a voluntary market-based framework, also known as the "Istanbul Approach", for dealing case-by-case with multicreditor exposures to large (with more than 100 employees) and small-size companies have been introduced. Under the Istanbul Approach, as of October 2002, banks agreed to reschedule the debts of 28 companies, which ran into trouble during the 2001 crisis. Applications from another 141 firms have been accepted⁹. Through the banking sector restructuring programme, risk management and auditing systems were established, merging of eight banks was achieved, and measures for financial recovery of the banks taken. Privatisation processes of three major state banks were started and efforts to make them profitable have continued as part of the preparations for their sale.

During the last decade, Turkish banking sector has made considerable advances in terms of technological infrastructure with a sharp increase in the number of ATMs, Internet branches, use of Electronic Funds Transfer and SWIFT systems, smart card applications etc. Those developments helped increase innovation activities in the supplier firms active mainly in information and communication technologies (ICT) sector.

⁹ Details are available in Banking Sector Restructuring Program-Progress Report V-Banking Regulation and Supervision Agency (http://www.bddk.org.tr/english/publicationsandreports/bsrreports/BSRP_Progress_112002.doc).

More than 80 % of production and 95 % of gross fixed the investment is realised by private sector.

1.1.3 Industrial Trends

Turkish industry is mainly composed of private sector companies and dominated by SMEs (companies with up to 250 employees). More than 80% of production and 95% of gross fixed investment is realized by private sector. The share of SMEs is 99.5% in total number of establishments, 65% in total employment, 26.5% in investments, 35% in added value, and 10% in exports.

Starting from 1980s, “industrialization based on exports” instead of “industrialization based on substitution of imports” has been the primary objective in Turkish industrial policy. To support this objective, radical changes have been made in the monetary, fiscal, foreign trade and foreign currency exchange rate policies. Production aimed at foreign markets led to increase in capacity utilization, increasing scale of production and new investments. As a result, the share of manufacturing sector in exports has increased from 36% to 91% between 1980-2000. This figure is 92% for 2001 and 94 % in for the first nine months of 2002. The share of industry in GNP has continued to increase from 1996 (24.7%) to 2001 (26%) although it decreased to 22.6% in 1998 due to the Russian crisis and 23% in 1999 due to the earthquake, which affected the largely industrialized region (Marmara Region) of Turkey. The share of industry in GNP is 25.4% for the first nine month of 2002.

Turkish industry has been recovering from the severe economic crises of 2000 and 2001, and it grew by 3% year on year in the first quarter of 2002 (manufacturing industry grew by 2.6%), which was -7.5% for 2001. The recovery in economic activity is reflected in industrial output figures, which increased 8.5% in the monthly index in the first nine months of 2002 compared with the same period in 2001. Manufacturing output, which accounts for almost 90% of all industrial output, was up by 8.3%. Industrial production growth in 2002 was estimated at 8.5% as opposed to -7.3% in 2001. Manufacturing industry is the second fastest growing sub-sector with 2.6% growth in the first quarter of 2002 followed by commerce, which grew by 3.9% in the same period. The growth rates for 1999, 2000 and 2001 were -5.7 (due to the earthquake), 6.4 and -8.1% (due to the financial crises) respectively.

The economic crises in November 2000 and February 2001 have been driving forces for Turkish manufacturing industry to open to foreign markets. Most of the already exporting companies have struggled to increase their export shares and/or to find new countries to export their products while those who never exported have started exporting for the first time. A survey carried out by the Istanbul Chamber of Industry in August 2002 indicated that 90% of large companies, 80% of medium size companies and 60% of small companies exported their products in the first half of 2002 due to narrowed local market. As a result, the number of

The number of companies who become aware of the requirements for global competition has been increasing and this causes an increase in the number of innovating companies.

companies exporting their products increased from 65% in 2001 to 74.2% in the first half of 2002. Therefore, the number of companies who become aware of the requirements for global competition has been increasing and this causes an increase in the number of innovating companies¹⁰.

Since the beginning of 1990s, major driving forces for development of Turkish Industry have been the acceptance of GATT and the Customs Union Agreement with the European Union (EU) that went into effect in 1996. While the Customs Union Agreement offered Turkey a unique opportunity to accelerate its development through freer and better access to markets, it has also made Turkish industrial firms more vulnerable to international competition. Therefore, a number of measures to increase the competitive advantage of Turkish Industry have been taken. Legal and institutional arrangements regarding intellectual and industrial property rights (IPR), consumer protection, competition, accreditation and prevention of unfair competition in imports were introduced and investment incentives were adapted to the requirements of the EU and GATT. As a result, more emphasis on metrology, standards, testing and quality (MSTQ) has been given by strengthening the infrastructures of Turkish Standards Institute¹¹ and National Metrology Institute¹² and Turkish Patent Institute¹³, Turkish Competition Authority¹⁴ and Turkish Accreditation Agency¹⁵ have been established.

The Turkish Patent Institute (TPE) was established in 1994 as a financially and administratively autonomous body, that reports to the Ministry of Industry. Under the provisions of the legislation related to IPR, the responsibilities of the Turkish Patent Institute include to provide documentary and printing services for industrialists and researchers, to inform national and international individuals and enterprises about industrial property rights, to cooperate with enterprises on technological research and development issues both nationally and internationally, to establish documentation centres and to make available such information to the public, and to represent Turkey on international platforms on IPR. Concerning intellectual, industrial and commercial property rights, Turkey took a very significant step with the legislation enacted before the Customs Union by taking into consideration the Treaty establishing the WTO and the TRIPS Agreement. Within this framework Turkey ratified various

¹⁰ This is evident with the increase in the project proposals to the implementing agencies of Government R&D and innovation support, TTGV and TUBITAK-TIDEB. Project applications to TTGV were 46% more in the first half of 2002 than in the same period of 2001, and 16% more in 2001 than 2000. Applications to TUBITAK-TIDEB were 28% more in 2001 than 2000 and such an increase is being expected by the end of 2002.

¹¹ <http://www.tse.org.tr/tsedefault.htm>

¹² <http://www.ume.tubitak.gov.tr/engmain.htm>

¹³ <http://www.turkpatent.gov.tr/english/index.asp>

¹⁴ <http://www.rekabet.gov.tr/indexeng.html>

¹⁵ <http://www.turkak.org.tr/eng/eng.htm>

international agreements. More information on TPE and IPR issues are given in Section 1.5.

The Law on The Protection of Competition was enacted in December 1994 in order to avoid agreements, decisions and practices which prevent, restrict or distort competition and abuse of dominant position by those enterprises which are dominant in the market. The Competition Authority was established on 1997 as an independent body (information on competition policy is given above in “Structural Reforms in Enterprise Sector”). Turkish Accreditation Agency has been established in 1999 as an administrative and financial autonomy in order to accredit organisations to conduct laboratory, certification and inspection services.

1.1.4 Industrial Research and Development (R&D)

R&D activities conducted by Turkish Industry and therefore share of R&D expenditures in GDP by the industrial sector is quite low compared with developed countries.

The number of companies conducting R&D has increased by nearly 58 % between 1996-2000.

R&D activities conducted by Turkish industry and therefore share of R&D expenditures in GDP by the industrial sector is quite low compared with developed countries. While the research and technological development investment in the EU is 1.9%, it is 0.64% in Turkey as of 2000. On the other hand, there is a gradual increase in total Gross Domestic Expenditure on R&D (GERD) as a percentage of GDP since 1996, from 0.45% to 0.64% in 2000. In terms of purchasing power parity (PPP) GERD increased by 57% from 1996 to 2000. Moreover, share of the industry in total R&D expenditures is also quite low (33.4%¹⁶) compared with that of the EU (64.5%) although the number of companies conducting R&D has increased by nearly 58% between 1996-2000¹⁷. Total number of R&D personnel (full time equivalent) that was 21,983 in 1996 (20.1% was employed in business enterprise sector) increased to 27 thousand in 2000 (22.3% in business enterprise sector). The reasons for the increase in industrial R&D activities and R&D personnel can be explained by: a) relations with the EU and especially the rapidly changing market conditions under the influence of globalisation forced the companies invest in R&D and innovation. b) state support programmes for R&D projects of the industry helped the companies invest in R&D. Those programmes not only provide financial support but also raise awareness on industrial R&D and innovation through supplementary activities. Therefore, the number of companies conducting R&D with or without financial support has increased.

¹⁶ The R&D statistics of the industry indicate in-house R&D spending.

¹⁷ <http://www.dic.gov.tr/english/SONIST/ARGE/180902/180902.html>

A tax postponement incentive for industrial R&D has been applied since 1986.

In Turkey, R&D activities carried out by the industry have started to be financed by the Government in 1991 through World Bank sources. A tax postponement incentive for industrial R&D has been applied since 1986. The decree for providing State support for R&D activities of industry became effective in 1995 as a result of adaptation of State incentives in accordance with the requirements of the GATT. This decree is designed as “non-actionable subsidy” as per the provisions of Uruguay Round Final Act. Financial support for this purpose is provided through the Under-Secretariat of Foreign Trade (UFT)¹⁸. The legislation on “State Support for R&D Investments”, providing loan support for procurement of equipment for R&D activities by industrial companies, came into force in 2000. Another important legislative development has been the Technology Development Zones (Technology Parks) Law, which came into force in 2001. The law stimulates establishment of technoparks by universities or research centres with a view to encourage industrial R&D by increasing university/research centre-business interactions on R&D, facilitating mobilisation of academic staff and providing tax incentives exclusively for R&D activities of tenant companies. More detailed information on the schemes and legislations mentioned here is given in Section 1.5.

1.1.5 Inward Investment

The rate of inward investment has always been low compared with the high potential of Turkey mostly because of heavy bureaucratic procedures.

The rate of inward investment has always been low compared with the high potential of Turkey mostly because of heavy bureaucratic procedures, and political and economic uncertainties. In recent years, the FDI to GDP ratio has been below 0.5 %. In the 1990-2001 period, cumulative FDI to Turkey only reached 13.3 billion dollars, representing a share of less than 1% of the world total¹⁹. Share of manufacturing sector in total FDI is around 50 %²⁰. One of the major initiatives for inward investment was the constitutional amendment of 1999; which provided for a resolution procedure for disputes involving foreign parties through International Arbitration; a related law that determines the application principles was enacted in June 2001. The Government started to take intensive actions to improve the conditions for attracting FDI by the beginning of 2001 with the assistance of Foreign Investment Advisory Service (FIAS) of International Finance Corporation (IFC).

In 2002, there have been further major developments to improve the business environment (for domestic and foreign investments) under the Reform Programme for Improvement of Investment Climate. Nine technical committees have been established under the reform programme to carry out necessary studies for

¹⁸ <http://www.dtm.gov.tr/menueng.htm>

¹⁹ Pre-accession Economic Programme, Turkey, August 2002 (<http://www.ekutup.dpt.gov.tr/ab/kep/pep2002.pdf>)

²⁰ <http://www.hazine.gov.tr/english/YBSWEB/fdifigures.htm>

improving the investment environment. Those committees are responsible for employment, sectoral authorisations, establishment of companies, investment location, taxes and subsidies, customs and standards, IPR, legislation on FDI and investment promotion. Meantime, the Coordination Council for the Improvement of the Investment Climate holds regular meetings to assess private investors' needs and monitor the progress made by the nine technical committees.

In this context, an action plan to improve the investment environment for both domestic and foreign investments was approved by the Council of Ministers in January 2002. A new draft Law on Foreign Direct Investment in line with the findings of the FIAS study is being prepared and will be submitted to the Parliament. The results of these developments are expected to influence technological capabilities of domestic companies positively and lead way to innovation.

Increasing the level of FDI is seen as one of the solutions to prevent brain drain in Turkey²¹ as qualified human resources and researchers, which are the most important capital for innovation, prefer to leave the country both because of macroeconomic conditions and less developed R&D base. Therefore, mechanisms to increase the level of FDI and of innovative activities of such companies are important in this respect as well as encouraging establishment of start-ups and spin-offs. Moreover, special measures should be taken to increase innovation activities of foreign enterprises and interaction and cooperation of them with domestic enterprises.

Key findings

- Between 1996-2001, the macroeconomic situation in Turkey was severely affected by the Russian crisis (1998), the earthquake (1999) and two domestic crises (late 2000 and early 2001). These developments negatively influenced innovation performance of business. In 2002, economic recovery has started which began to have a positive impact on innovation and R&D in the business sector.
- The economic crises in 2000 and 2001 have been driving forces for Turkish industry to attack foreign markets, which increased the number of companies who become aware of the requirements for global competition and innovation.
- The large number of structural reforms underway; to be able to implement the macroeconomic stability programmes and to adopt the EU 'Acquis'; are great challenges for Turkey to achieve sustainable economic growth and to create an environment conducive to innovation.
- The Government has taken action to improve technological innovation capability of industry since 1990s, and acceptance of GATT and the Customs Union Agreement between the European Union (EU) and Turkey that went into effect in 1996 have been the most important driving forces in that respect.

²¹ See Annex-3, Output Paper of Innovation Policy Workshop.

1.2 Main developments in innovation policy

The innovation policy of Turkey is embedded in its Science and Technology Policy Documents. Five-Yearly Development Plans provide the budgetary allocations to innovation policy.

The innovation policy of Turkey is embedded in its science and technology policy documents²²; while the Five-Yearly Development Plans provide the necessary budgetary allocation for innovation policy. One of the most important steps in this respect is establishment of the Scientific and Research Council of Turkey (TUBITAK)²³ in 1963 as a result of the First Five-Year Development Plan (1963-1967) in order to prepare and coordinate implementation of Turkish Science and Technology Policy. In the Annual Programmes of the Second Five-Year Development Plan (1968-1972) and in the Third Five-Year Development Plan (1973-1977) topics on technological development and technology transfer have been included. The Fourth Five-Year Development Plan (1979-1983) refers to “technology policies” and emphasizes the need for “integrating technology policies with industry, employment and investment policies, and enhancing certain industrial sectors in a way that they develop their own technologies”.

The main objective of the science and technology policy has been defined as “establishment of the National Innovation System”.

In 1983, the Government issued the first policy document “Turkish Science Policy, 1983-2003” that mainly focused on increasing R&D activities in the country and defining priority technology areas. The other important milestone in connection with the policy document in question is the establishment of the Supreme Council of Science and Technology (BTYK) in 1983, which is chaired by the Prime Minister. It is composed of the highest level representatives of related ministries and public administrations. Meantime, TUBITAK was assigned as the secretariat to the BTYK. The second policy document “Turkish Science and Technology Policy: 1993-2003” was prepared by TUBITAK and approved by the BTYK in February 1993. Another important policy document is the project on “Impetus in Science and Technology” (1995), which was embedded in the Seventh Five-Year Development Plan (1996-2000), as one of the “Fundamental Structural Transformation Projects”. Referring to the above-mentioned documents, the main objective of the science and technology policy is defined as “establishment of the National Innovation System that would enable systematic operation of the whole institutions and mechanisms required to carry out scientific and technological research and development activities and to transform the results of those activities into economic and social benefit”.

In August 1997, the BTYK approved the “Policy Agenda on Science and Technology for the Years 1996-1998” that covers immediate arrangements and preparations for establishment of the National Innovation System as the main theme of the National Science and Technology Policy. The August 1997 decisions of the

²² <http://www.tubitak.gov.tr/btpd/arsiv.html>

²³ <http://www.tubitak.gov.tr/english/>

BTYK centred around “innovation” stressing necessary actions to be taken for “research on regional innovation systems; raising awareness on innovation; dissemination of techniques on technology management, innovation management, quality management and certification, and stimulation of innovation activities” and “providing support for innovation activities of SMEs”.

Other decisions such as increasing the number of venture capital funds, putting the law of technology development regions into force or supporting patent expenditures were also taken to serve the same purpose. The policy agenda and the decisions formed an integral part of the updated Science and Technology Policy Document of Turkey (1997) which elaborated on the necessity of the National Innovation System and the role of the Government on innovation related matters. The Science and Technology Policy Document of Turkey was amended in 1999 based on developments and results of the meeting of the BTYK in 1998 that reviewed progress and made the necessary amendments to the former decisions.

During the preparation studies of Eight Five-Year Development Plan, the “Specialization Committee on Science and Technology” prepared an important document that consists of proposals for implementation of innovation policies.

The decisions of the BTYK released after its meetings in 1999, 2000 and 2001 again protect the theme of an innovation policy and strategy. Recent efforts on the science and technology policies of Turkey for the 2003-2023 period started with the *Vision 2023 Project* in the beginning of 2002 under the coordination of TUBITAK and following the decision of the BTYK. The project mainly covers implementation of the national technology foresight study through 11 panels in different socio-economic activity areas, and Delphi surveys on public, private sector and NGOs. The Vision 2023 Project includes three more sub-projects, which are “National Technology Inventory”, “Turkish Researches Inventory” and “National R&D Infrastructure”. These sub-projects aim at collecting and analysing information on the technological levels of industrial sectors, technology acquisition sources and methods and inventory of researches. Details of the Vision 2023 Project are given in Box 1. The Eighth Five-Year Development Plan (2001-2005) focuses on the need for technological innovation and the actions to be taken on the subject in line with the policy documents approved by the BTYK. During the preparation studies of Eighth Five-Year Development Plan, the “Specialization Committee on Science and Technology” formed by representatives of related public bodies, umbrella organizations and business enterprises prepared an important document that consists of proposals for implementation of innovation policies. Sectoral specialization committees on information technologies, biotechnology, electronics industry, etc. prepared reports in the same manner. All of those reports formed the building blocks of the innovation related topics in the Development Plan.

Box 1 - Vision 2023 Project: Science & Technology Policy of Turkey or 2003-2023

Turkey has a long tradition of science and technology policy-making back to 1960s. By mid-90s, innovation policy has been placed at the heart of science and technology policy documents. However, although existing policy documents cover very important policy actions, and significant institutional and legislative measures have been taken in line with those actions to establish the national innovation system, their main goal, establishing a fully functioning national innovation system, has not been followed up entirely. The reasons for this have been identified by the policy makers as not having a shared vision and having deficiencies in commitment by all stakeholders (politicians, public and private sector, universities, etc.). By the beginning of 2002, the VISION 2023 project has been started in line with the decision of the Supreme Council of Science and Technology. The objective of the project has been set as formulation of new national science and technology policies and setting priority areas for the next couple of decades in order to create a prosperous society and economy based on innovation by 2023, the 100th Anniversary of the Turkish Republic.

To provide participation and commitment, a Steering Committee have been established with participation of high level representatives of 65 public and private organisations and universities. At the Committee, 27 public organisations, 29 non-governmental organisations (NGOs) and nine academic institutions are represented under the coordination of TUBITAK. The main functions of the Steering Committee have been determined as taking strategic decisions on the project and providing commitment by related stakeholders.

Four sub-projects have been defined under the VISION 2023: National Technology Foresight Project, Technological Capabilities Project, Researcher's Inventory Project and National R&D Infrastructure Project.

Technology Foresight Project has been decided as the backbone of the VISION 2023. In April 2002, the Steering Committee agreed on 11 areas where foresight panels were formed; namely Education and Human Resources, Environment and Sustainable Development, Information and Communication, Energy and Natural Resources, Health and Pharmaceuticals, Defence, Aeronautics and Space Industries, Agriculture and Food, Machinery and Materials, Transportation and Tourism, Textile and Chemistry, Construction and Infrastructure. Panels established by participants from public sector, business sector, NGOs and universities, have started to work actively. Along with the panels' studies, a two-round Delphi survey will be executed by the project office in co-ordination with the panels. A UK based organisation, PREST, has cooperated on methodological issues.

Technological Capabilities Project has been designed to determine the technological capability levels of industrial companies, technology acquisition methods and sources, and technology acquisition costs. A survey with face-to-face interviews at the industrial companies will be conducted under the project and TUBITAK, Technology Development Foundation of Turkey (ITGV) and State Institute of Statistics (SIS) are cooperating for this purpose. Researcher's Inventory Project aims at gathering information on scientific research areas and institutions of Turkish researchers in Turkey and abroad, and preparation of a "National Scientists Catalogue". National R&D Infrastructure Project has been designed to prepare an inventory of Turkish research institutions (public, private and academic) and to assess research activities and potential of those institutions.

The end results of all four sub-projects will be used to design the new science and technology policy of Turkey that would be shaped by participation of all stakeholders and will be owned and implemented by them to the largest extent possible.

The list of main policy documents and consultative papers since 1996 is given in Table 1. In addition to the documents listed below, a number of policy proposals for specific sectors have been prepared both by TUBITAK and the Science, Technology and Industry Policy Discussions Platform²⁴ formed by Technology Development Foundation of Turkey (ITGV)²⁵, TUBITAK and Turkish Academy of Science (TUBA)²⁶.

Table 1 - Main policy documents and consultative papers since 1996

Title of document	Organisation responsible	Legal status	Comments
Seventh Five-Year Development Plan (1996-2000) July 18 th , 1995.	State Planning Organization (SPO) ²⁷	Preparation and implementation are defined by the Law and each plan is approved by the Turkish Grand National Assembly.	Partly implemented; results of implementation was evaluated in the Eight Five-Year Development Plan (2001-2005).
Science and Technology Policy Document of Turkey, August 25 th , 1997.	TUBITAK is responsible for design; BTYK is responsible for recommending it to the Government	BTYK decision	Can be referred as the comprehensive Innovation Policy document of Turkey
Decisions of the BTYK and Policy Agenda on Science and Technology for the Years 1996-1998, August 25 th , 1997.	BTYK is responsible for follow-up and coordination	BTYK decision	Partly implemented because of financial constraints
Evaluation and Decisions by the BTYK on the Progress, June 2 nd , 1998.	BTYK is responsible for follow-up and coordination	BTYK decision	Progress on the decisions of August 25 th , 1997 was evaluated, revisions were made and new decisions were added.
Science and Technology Policy Document of Turkey, January 1999.	TUBITAK is responsible for design; BTYK is responsible for recommending it to the Government	BTYK decision	Amended version of 1997 Policy Document
Evaluation and Decisions by the BTYK on the Progress, December 20 th , 1999.	BTYK is responsible for follow-up and coordination	BTYK decision	Progress on the decisions of June 2 nd , 1998 was evaluated, revisions were made and new decisions were added.
Report of Specialization Committee on	SPO	BTYK document	The report reflects the views and proposals of all parties of innovation system and

²⁴ <http://www.tubitak.gov.tr/btpd/arsiv.html>

²⁵ http://www.ttgv.org.tr/tur/tur_anamenu.html

²⁶ <http://www.tuba.gov.tr>

²⁷ <http://www.dpt.gov.tr/dptweb/ingin.html>

Title of document	Organisation responsible	Legal status	Comments
Science and Technology, 2000.			was partially included in the Eight Five-Year Development Plan.
Eight Five-Year Development Plan (2001-2005) June 27 th , 2000.	SPO	Preparation and implementation are defined by Law and each plan is approved by the Turkish Grand National Assembly	
Evaluation and Decisions by the BTYK on the Progress, December 13 th , 2000.	BTYK is responsible for follow-up and coordination	BTYK decision	Progress on previous decisions was evaluated, revisions were made and new decisions were added.
Evaluation and Decisions by the BTYK on the Progress, December 24 th , 2001.	BTYK is responsible for follow-up and coordination	BTYK decision	Progress on previous decisions was evaluated, revisions were made and new decisions were added.

During the period 1996-2002, both:

- A wider policy community (Government itself through the BTYK, State organizations such as Under-Secretariat of Treasury (UT), SPO, TUBITAK, not-for-profit foundations such as TTGV, industrial chambers, academic community and industry); and
- External drivers such as market demand and competition brought about by the effects of globalisation and free trade in Europe have been the major influences on the development of science and technology policy which in fact defines the innovation policy of Turkey.

In particular, the latter influence boosted the involvement of the business community in science and technology policy issues as it started to become aware of the importance of innovation in gaining competitive advantage.

In the policy documents of Turkey, the scope of its innovation policy is well articulated. The main objective is establishing a national innovation system with all elements as a network. For this reason, the recent policies on the subject are very nearly coherent with the objectives set out in the 2000 Commission Communication²⁸. The actions that must be taken in order to improve the regulatory framework comprise of a number of legal measures such as the laws and regulations for intellectual and

²⁸ COM(2000)567, 20/9/2000
(<http://www.cordis.lu/innovation-smes/communication2000/home.html>).

There are no direct specific measures to encourage establishment and growth of innovative start-ups.

industrial property rights, accreditation, management of brainpower, stimulation of university-industry cooperation and establishment of technology development regions. On the other hand, although having a weak enterprise policy that does not encourage entrepreneurship well enough there are no specific legal measures to increase the quality of the enterprise policy. It covers actions for creation and growth of innovative enterprises by means of financial supports, venture capital finance, tax incentives, training and consultancy with special emphasize to SMEs. However, there are no direct measures to encourage establishment and growth of innovative start-ups. Regarding improvement of key interfaces in the innovation system, the policy consists of actions for research on regional innovation systems, establishment of university-industry joint research centres, preparation of the master plan of national information infrastructure, establishment of national academic network, and restructuring public R&D institutes. In order to create a society open to innovation, there are actions for establishment of science and technology centres, increasing the number of and spreading Internet cafés, spreading the e-commerce network in the country, revising the purchasing policy regulations of the public administration and preventing brain drain.

As a result of the opinion survey and the debate in the innovation policy workshop held under this study, the need for giving higher priority by the Government to promoting an innovative society was emphasised. In addition, it was underlined that involvement of all stakeholders in policy making process and establishing effective coordination and cooperation mechanisms among the institutions that implement policy actions would increase the level of commitment. Recent efforts in that respect by the Vision 2023 Project are very important. Another important requirement arising from the survey and debate is the need to support the development of innovation policy at local and regional levels (For more details, see Annex 3-Output Paper of Innovation Policy Workshop).

The major programmes that directly support R&D projects of the industry are the ones carried out by TTGV, as soft loan with long repayment period, and by TUBITAK-TIDEB, as grants.

Table 2 summarizes major Government funded programmes and initiatives in the favour of innovation. Those programmes and initiatives are designed and are being revised in accordance with the innovation policies. The major programmes that directly support R&D projects of the industry are the ones carried out by TTGV, as soft loan with long repayment period, and by TUBITAK-TIDEB, as grants. Both programmes co-finance the expenditures of R&D projects carried out by industrial companies. 73 % of the companies with projects supported by TTGV are SMEs while the share of SMEs is 70 % in TUBITAK-TIDEB's portfolio of companies. TTGV was established in 1991 as a not-for-profit independent organisation to act as the implementing agency for the funds provided from the UT through the World Bank resources for financially supporting R&D projects of the

business sector. TTGV takes the credit risk and does not get financial support from the Government for its operating expenses. As the resources allocated for that purpose were scarce and were World Bank loans to the Government, TTGV established a revolving fund that is being recycled for the same purpose, i.e. to support R&D and innovation activities of the business sector. In that respect sustainability of TTGV has been recognized as an important issue and therefore the funds provided for the business sector have been in the form of soft loan with long repayment periods. The funds for TUBITAK-TIDEB's R&D finance programme -and another programme executed by TTGV for financing R&D projects of the industry in the same manner- are financed through the UFT from the state budget.

The unstable macroeconomic environment of the country negatively affects effective and efficient implementation of both programmes because of the budgetary constraints. This is also confirmed by the results of the opinion survey where interviewees underline that the level of Government funding for R&D undertaken within, or for private enterprises, is not adequate. On the other hand, public funding to support international co-operation of enterprises in the field of R&D and innovation has been possible through EUREKA. Also, in 2002, Turkey has become for the first time full associate member in the 6th Framework Programme of the EU.

The evaluation results of the programmes implemented indicated that almost 80 % of the companies applied to the programmes to get financial support for implementation of their R&D projects.

The evaluation results of the programmes implemented by these two organisations indicated that almost 80 % of the companies applied to the programmes to get financial support for implementation of their R&D projects. On the other hand “prestige” brought about by “being eligible for support”, systematisation and institutionalisation of R&D management, and verification of the quality of an R&D project were indicated as the most important factors for applying for support for all of the companies. Creating means for university/research centre and industry interactions has also been shown as a significant factor by the applicant firms. Details on funding available by TTGV and TUBITAK-TIDEB are given in the following table.

Table 2 - Major Government funded programmes and initiatives in favour of innovation

Title	Government body responsible	Objectives of programme	Funding available
Technology Development Project Support	UT provided the funds from the resources of the World Bank to Technology Development Foundation of Turkey (TTGV) as one of the implementing agencies of the Technology Development Project (TDP) (1991-1998) and the Industrial Technology Project (ITP) (1999-2003).	Providing financial support for technology development projects of industrial companies.	Soft loan up to 50% of project budget (not more than €2 M); rest should be financed by company (Total amount of funds is €32.4 M in TDP and €43 M in ITP €12 M of which nearly is provided from TTGV's resources).
Strategic Project Support	UT provided the funds from the resources of the World Bank to TTGV as one of the implementing agencies of the TDP (1991-1998).	Supporting strategic studies on competitiveness of Turkish industry.	Grant financing up to €100,000 (Total amount of funds is €1.3 M).
Support for Industrial Technology Service Centres	UT provided the funds from the resources of the World Bank to TTGV as one of the implementing agencies of the TDP (1991-1998).	Supporting establishment of technology service centres with industry for common use of specific industrial sectors.	Soft loan up to 50% of project budget (not more than €2 M); rest should be financed by the founders of the centre (Total amount of funds is €6.3 M).
Technology Development Project	UT provided the funds from the resources of the World Bank to Turkish Standards Institute (TSE) and National Metrology Institute (UME) as implementing agencies of the TDP (1991-1998).	Strengthening Turkey's Metrology, Standards, Testing and Quality (MSTQ) infrastructure by assisting the TSE in strengthening competencies in the areas of standards preparation, product certification, and testing including development of a Quality Campus to help the industrial community in that area gain greater access to these services, and strengthening the infrastructure of metrology services to industry through the UME.	Total amount of funds by the UT was €56 million. There are measures for providing matching funds by TSE and UME.
State Support for R&D	Under-Secretariat of Foreign Trade (UFT) provides funds to TTGV as one of the implementing agencies.	Supporting R&D projects of industrial companies.	Soft loan up to 50% of project budget; rest should be financed by company (Total amount is determined by annual budget).
State Support for R&D	UFT provides funds to Technology Forecasting and Assessment Directorate (TIDEB)	Supporting R&D projects of industrial companies.	Grant financing up 60% of the project budget; rest should be financed by the

Title	Government body responsible	Objectives of programme	Funding available
	of TUBITAK as one of the implementing agencies ²⁹ .		industrial company itself (Total amount is determined by annual budget. Total amount disbursed for the companies from the date of establishment of TUBITAK-TIDEB to December 2002 is €97 million).
Tax Postponement for R&D Expenses	Ministry of Finance-General Directorate of Revenues ³⁰ (also cooperates with TUBITAK-TIDEB).	Postponement of 20 % of yearly corporate tax (should not exceed total annual R&D expenses) for a period of three years without interest.	
Technology Support Services	UT provides funds from the resources of the World Bank to TTGV as one of the implementing agencies of the ITP (1999-2003).	Supporting training and consultancy needs of SMEs.	Grant financing up to 50-75% of project budget; rest should be financed by SME (Total amount available is €3M).
Technoparks and Technology Centres	UT provides funds from the resources of the World Bank to TTGV as one of the implementing agencies of the ITP (1999-2003).	Supporting establishment of technology parks and centres by sponsoring organizations.	Soft loan not exceeding 50% of project budget (Total amount available €10M).
Establishment of Venture Capital Funds	UT provides funds from the resources of the World Bank to TTGV as one of the implementing agencies of the ITP (1999-2003).	Supporting establishment of venture capital funds to invest in high-tech enterprises.	Capital investment in venture capital company up to 30 % of total investment (up to €4 M) (Total amount available €7M).
Strengthening of Metrology Services	UT provides funds from the resources of the World Bank to UME as one of the implementing agencies of the ITP (1999-2003).	Strengthening Turkey's metrology infrastructure in order to serve a larger section of Turkish industry and gain acceptance from European bodies.	Total amount of funds by the UT is €33 M. There are measures for providing matching funds by UME.
Restructuring of R&D Institutions	UT provides funds from the resources of the World Bank to Marmara Research Centre of TUBITAK (TUBITAK-MAM ³¹) as one of the implementing agencies of the ITP (1999-2003).	Supporting restructuring of TUBITAK-MAM to help it become more industry-oriented.	Total amount of funds by the UT is €33 M. There are measures for providing matching funds by TUBITAK-MAM.
Strengthening of Industrial Property Rights Services	UT provides funds from the resources of the World Bank to Turkish Patent Institute (TPE) as one of the implementing agencies	Harmonizing Turkey's IPR regime with WTO and EU standards.	Total amount of funds provided by the UT is €15 M. There are measures for providing

²⁹ <http://www.tideb.tubitak.gov.tr/dokumanlar/e-presentation/sld001.htm>.

³⁰ <http://www.gelirler.gov.tr/gelir2.nsf/MainEng>. OpenFrameset.

³¹ <http://www.mam.net.tr/english/index.html>.

Title	Government body responsible	Objectives of programme	Funding available
	of the ITP (1999-2003).		matching funds by TPE.
State R&D Investment Support	UT	Supporting procurement of R&D related equipments by industry.	Loan financing in accordance with the conditions defined by the Decree. (Interest bearing loan with long repayment period financing up to 50 % with a max. amount of approx. € 200,000).
Technology Development Supports for SMEs	Ministry of Industry and Trade through its Small and Medium Industry Development Organization (KOSGEB) ³² ;	Supporting prototype development by SMEs through R&D.	Following supports are provided only for development of a prototype through R&D: Place in its incubators, R&D equipment support (up to €25,000; 85 % is provided by KOSGEB, rest by SME), consultant support from universities to SMEs, participation in fairs; software and publication support (up to €2,000 by max. 70 %), support for promotion (up to €2,000 by max. 50 %), training support, support for patenting (Total amount is determined by the annual budget).
University-Industry Joint Research Centres Programme	TUBITAK through its TIDEB.	Establishing R&D centres jointly by universities and industry.	Around €100,000 per centre, up to 50 %, rest must be provided by industry (Total amount is determined by the annual budget).

³² <http://www.kosgeb.gov.tr/index2.htm>.

Of above programmes and initiatives, the ones carried out by TTGV, TUBITAK-TIDEB, TUBITAK-MAM, UME and TPE were evaluated independently for the period of 1990-1997. The evaluation activity for 1998-2000 period was started by the end of 2001. The main results of the evaluation indicated that a) the companies benefiting from the evaluated programmes have greater competitive power; b) there is a great need for awareness raising on technological innovation among industry; c) macroeconomic environment and the regulations on education, training and employment are not favourable enough for innovation; d) insufficient financial mechanisms to support firms during commercialisation stage of their R&D activities is a major problem. On the basis of the results of the evaluation, TTGV implemented an intensive promotion and marketing campaign in order to contribute to awareness raising activities. Other institutions carried out their promotion activities in 2002.

Key findings

- The innovation policy of Turkey is embedded in its Science and Technology Policy Documents.;
- The most important policy document to focus on Turkish innovation policy (the Science and Technology Policy of Turkey, 1997) covers immediate arrangements and preparations for establishment of the National Innovation System.
- Turkish Innovation Policy was shaped by a broad policy community including all related public and private bodies as a result of external drivers like globalisation and free trade with Europe.
- Since the main objective of the innovation policy is to establish a national innovation system with all elements as a network, it is largely coherent with the objectives set in the 2000 European Commission Communication on Innovation.
- On-going and systematic monitoring and evaluation activity for major Government funded innovation support schemes started in 1999.
- The Vision 2023 project that launched at the beginning of 2002 to design science and technology policy of Turkey for the next two decades is very important as it provides participation and commitment by all stakeholders.

1.3 The innovation policy community

The Scientific and Technical Research Council (TUBITAK), which reports to the Prime Ministry, is the responsible body for designing science and technology policy.

The Scientific and Technical Research Council (TUBITAK), which reports to the Prime Ministry, is the responsible body for designing science and technology policy, including innovation policy. The **Supreme Council on Science and Technology (BTYK)** decides on the policy designed and proposed by TUBITAK and approves the action plan for implementation of it.

The BTYK is chaired by the Prime Minister and formed by the Ministers of Foreign Affairs, Communication and Transportation, Energy and Natural Sources, Defence, Finance, Education, Health, Forestry, Agriculture and Rural Affairs, Industry and Trade, Environment; the President of the Higher Education Council; the Undersecretaries of the State Planning Organization, Treasury, and Foreign Trade; the President of the TUBITAK and one of his deputies; the President of the Nuclear Energy Council of Turkey; the General Director of the Broadcasting Corporation of Turkey; and the President of the Union of Chambers of Commerce and Industry of Turkey (TOBB). Presidents of other related governmental organizations, not-for-profit foundations, chambers and major technical universities are invited to the meetings. TUBITAK acts as the secretariat for the Council. During its annual meetings, the BTYK assigns the responsible bodies and coordinators for each policy measure.

The following Government led institutions and initiatives are also involved in innovation policy either by proposing policies in their areas of activity (such as KOSGEB on SMEs and TUBA on science) or implementing and following up implementation of the policies from Government side.

Parliamentary Commission for Industry, Trade, Energy, Natural Sources, Information and Technology is responsible for designing and proposing to the Grand National Assembly the laws and regulations also on innovation related matters.

Parliamentary Group for Information and Information Technologies is a working group established to contribute development of information technologies related issues in the country by proposing opinions and legislations on the subject in close cooperation with the Parliamentary Commission for Industry, Trade, Energy, Natural Sources, Information and Technology and in consultation with related public and private organizations.

Under-Secretariat of Treasury and Under-Secretariat of Foreign Trade is actively involved in shaping of policies in connection with the design of mechanisms to support innovation.

State Planning Organization (SPO) is responsible for preparation, coordination and follow-up of the Five-Yearly Development Plans, which also contain the actions for the innovation related issues for the period in question.

High Planning Council is the decision-making body and assistant to the Board of Ministers on implementation of the development plans. The High Planning Council is chaired by the Prime Minister and composed of the ministers appointed by the Prime Minister plus the Under-Secretary of SPO. The SPO acts as the secretariat to the Council.

Small and Medium Sized Industry Development Organization (KOSGEB) plans and proposes policies towards increasing competitive advantage of SMEs and development of entrepreneurship also through innovation.

Turkish Academy of Science (TUBA) is responsible for determining and proposing scientific priority areas, and proposing legislations to the Government on the issues related with scientists and researchers.

Table 3 below summarizes the Government agencies and other organisations responsible for implementing innovation policy in the country.

Table 3 - Government funded agencies

Organisation	Status	Main responsibilities	Elements of assessment
TTGV	Autonomous not-for-profit foundation	Managing research and technology development support, technology service centres, technoparks, technology support services and venture capital programmes.	Independent external evaluation
TUBITAK-TIDEB	Autonomous Public	Managing R&D support, and university-industry joint research centres programmes. Also assists to the Ministry of Finance in execution of tax postponement scheme and to the UT in R&D investment incentive.	Independent external evaluation
TUBITAK-MAM	Autonomous Public	Increasing level of competitiveness of industry by contractual research, testing, training, consultancy, analysis and certification in its research centre, and creating an environment for generation and growth of high-tech firms in its technopark, technology free zone and incubator.	Independent external evaluation

Organisation	Status	Main responsibilities	Elements of assessment
KOSGEB	Autonomous Public	Managing support programmes for SMEs, and providing environment for establishment of high-tech firms through its incubators (called technology development centres) in 11 different locations of Turkey.	Internal evaluation
UME	Autonomous Public	Increasing level of competitiveness of industry by means of measurement, training, consultancy, information dissemination and infrastructure support.	Independent external evaluation
TURKAK	Autonomous Public	Increasing level of competitiveness of industry by accrediting organisations to conduct services of laboratory, certification and inspection and ensuring that these organisations operate in accordance with national and international standards and that product, service, system, personnel and laboratory certificates are recognised in national and international area.	Monitoring and evaluation by the European Accreditation (EA)
TPE	Autonomous Public	Increasing level of competitiveness of industry by dealing with the issues related with intellectual and industrial property rights.	Independent external evaluation

TTGV is a not-for-profit organization established in 1991 with joint efforts of private and public sectors to support technological innovation activities of industry including on-lending of funds and taking credit risk.

TTGV is a not-for-profit organization established in 1991 with joint efforts of private and public sectors to support technological innovation activities of industry including on-lending of funds and taking credit risk. The programmes of TTGV are funded by the Government through the resources of the World Bank and UFT. It is also responsible for facilitating university-industry cooperation on innovation, acting as a catalyst in the establishment of technoparks, technology service centres, venture capital funds, providing technology support services to SMEs and increasing awareness on innovation. Being a member of the Association for Technology Implementation in Europe (TAFTE) since 1997, TTGV provides information exchange, benchmarking and establishment of best practices on innovation matters in the country.

TUBITAK-TIDEB was established in 1995 by the Government to provide grant support for R&D projects of industry.

TUBITAK-TIDEB is a department of TUBITAK that was established in 1995 by the Government to provide grant support for R&D projects of industry. It also implements the EUREKA programme; university-industry joint research centres programme and activities to increase awareness on innovation, and assists the Government on implementation of R&D tax postponement scheme and R&D investment incentives. Another unit of TUBITAK, the Marmara Research Centre (**MAM**), was

established in 1972 as the first R&D institution of TUBITAK especially to conduct contractual research for the industry on the fields of materials and chemistry, ICT, genetic engineering and biotechnology, energy systems and environment, food technology, and earth and marine sciences. TUBITAK-MAM also runs an incubator, a technology free zone and a technopark for high-tech enterprises.

KOSGEB was established by the Ministry of Industry in 1990 in order to increase the competitiveness of SMEs. It has branches all over the country. The main tasks through its network of institutes and departments include information dissemination, facilitating networking between SMEs, supporting entrepreneurship, providing laboratory services, consultancy and training, supporting modernization and technology development, market research and regional development. It also runs incubators for high-tech start-ups in different regions of the country together with technical universities.

Established as an institute of TUBITAK in 1992, **UME** provides measurements, training, consultancy, information dissemination, infrastructure support, device control software, equipment and prototype production services to the industry. UME was also responsible for accreditation related matters until establishment of **TURKAK** by law in 1999 which is now responsible for accrediting national and foreign organisations as well as increasing awareness on accreditation and quality, and facilitating information dissemination on the subject among industry.

In addition to above institutions, organisations listed in Table 4 funded either privately or publicly are active in delivering innovation support to businesses.

Table 4 - Main innovation support providers

Organisation	Main type of service provided	Commentary
Technology Service Centres of TTGV	Industrial R&D, measurement, testing, training and consultancy.	These centres are established as profit making private companies with the support of TTGV together with private entities. There are four centres active in biotechnology, advanced materials, software and electronics.
R&D institutes of TUBITAK	Industrial R&D, measurement, testing, training and consultancy.	Institutes of TUBITAK that are active in information technologies and electronics, defence industries, cryptology, agro-technology and genetic research also provide services to industry.
METU Technopolis	An environment (by means of infrastructure, consultancy, links with facilities of the university, animation events, etc.) is for high-tech firms.	Tenants are mainly active in information and communication technologies (ICT) sector; also hosts an incubator (METU-KOSGEB Technology Development

Organisation	Main type of service provided	Commentary
		Centre) and a software development centre to help start-up companies. There are 86 companies located as of November 2002.
GEBZE OSB Technopark	A recent technopark initiative started with Gebze Organised Industrial Zone, Sabanci University, Kocaeli University, Tefen Technopark of Israel, Kocaeli Chamber of Industry and Gebze Chamber of Commerce.	There are 2 companies located as of November 2002. The aim is to host 15-20 companies in the first year and 150-200 in 10 years time.
Ankara Cyberpark	Another recent initiative started by Bilkent University in Ankara to provide an environment for generation and growth ICT companies.	There are 12 companies located as of November 2002. Aims at hosting more than 400 companies and more than 10,000 qualified R&D staff in the 10 th year of establishment.
Public R&D institutes	Out of nearly 90 public research institutes, 12 are carrying out industrial R&D.	Institutes are mainly active in food, machinery, construction, chemistry sectors and carry out R&D, testing, training, consultancy, and information dissemination activities in their technological area.
Universities and technology institutes	Industrial R&D, testing, training, consultancy and information dissemination.	There are 77 universities in the country, three-fourth of which has technical faculties and research centres to carry out innovation related services to industry. 67% of the universities and 18 life-long learning centres provide management programmes and courses (details are given in Section 2.1).
Private incubators	Providing infrastructure and mentoring activities for high-tech start-ups.	Established by large Turkish and/or multinational firms such as Koc Holding, Ericsson and Siemens.
Venture capital companies	Providing financial support and consultancy to high-tech firms.	There are eight venture capital companies to support companies with high growth potential.
Public bodies and NGOs (a list is given Table 9 in Section 2.1)	Providing consultancy and training on innovation related matters.	There are remarkable number of activities carried out by public and non-governmental organisations and are designed in accordance with the needs of the industrial sector.
Consultancy firms	Providing consultancy and training on innovation related matters.	There are a few private firms providing consultancy and training on innovation but mainly located in Istanbul and not able to help companies countrywide.
South-Eastern Anatolia Project-Entrepreneur Development Centres (GAP-GIDEM) ³³ .	Providing information, consultancy and training to entrepreneurs in the region for starting up or developing their businesses.	There are GIDEMs in 5 cities to serve industrialization strategy of the region. GIDEMs were established on a cost-sharing basis between the Government and the United Nations Development Programme (UNDP).
Banks and credit guarantee fund.	Providing financial support for SMEs, entrepreneurs and exporters.	The "Halk Bankasi" is the major bank providing credits for SMEs and entrepreneurs. It is being restructured due

³³ <http://www.gap.gov.tr/English/gidem.html/>

Organisation	Main type of service provided	Commentary
		to privatisation process and financial support to SMEs is continuing despite slight decreases compared to previous years. The “Turk Eximbank” provides credits for exporters. The Credit Guarantee Fund (KfW) helps SMEs in their guarantees to credits and provides loans for them (“Small Enterprises Loan Programme” was started in late 2002 with the support of the EU). Some commercial banks (like Garanti, Disbank, etc.) launched specific loan programmes for SMEs in 2002.

Apart from above listed organizations, **The Union of Chambers of Commerce and Industry (TOBB)**³⁴ implements various activities for increasing the competitiveness of the business sector which also directly or indirectly covers innovation related issues. One of the latest projects started by the Union aims at improving the business environment for the SMEs. **Chambers of Industry** are established throughout the country to serve business interest, mainly provide and disseminate information, as well as providing training and consultancy services to their members. On the other hand, only a few of them are very active in innovation matters such as Istanbul Chamber of Industry (ISO)³⁵. The Quality and Technology Advisory Board (KATEK) of **ISO** helps design and formulation of innovation support activities. KATEK has two working groups; one works on innovation related activities at macro level and the other focuses on firm-level innovation activities.

Not-for-profit foundations like the ICT Foundation of Turkey (TBV)³⁶, Economic Development Foundation (IKV)³⁷, Aegean Region Economic Development Foundation (EGEV)³⁸ established by industrial, commercial and financial sectors carry out activities for providing and disseminating information; business partnership events on R&D, technology, commerce and finance, etc.

Turkish Industrialists’ and Businessmen’s Association (TUSIAD)³⁹, among other activities, deals with information dissemination and stimulation of the industry by means of awards on innovation related matters. TUSIAD organizes the Technology Award and Congress together with TTGV and TUBITAK, and

³⁴ <http://www.tobb.org.tr/index-english.html>

³⁵ <http://www.iso.org.tr/inghtml/ingsiteindex.html>

³⁶ <http://www.tbv.org.tr/english/>

³⁷ <http://www.ikv.org.tr/IKV-Eng/ikv-eng.html>

³⁸ <http://www.egev.org/>

³⁹ <http://www.tusiad.org.tr/eng/homepage.nsf/FRMain?OpenFrameSet>

the National Quality Award and Congress together with the Quality Association of Turkey (KalDer)⁴⁰ to promote innovation.

Private and semi-public centres and associations such as National Productivity Centre (MPM)⁴¹, Turkish Institute for Industrial Management (TUSSIDE) Association Of Automotive Parts And Components Manufacturers (TAYSAD)⁴², Technology Management Association⁴³, KalDer, the Informatics Association of Turkey (TBD)⁴⁴ also carry out activities to raise awareness and disseminate information on technology and innovation related matters.

With regards to the partnership and networking activities between different organisations involved in policy community, one of the most important actions can be defined as the working groups that are formed by the private and public institutions to implement the specific actions defined by the BTYK on innovation policy related issues (For example the Ministry of Communication and Transportation, Turk Telecom, TTGV, TUBITAK, the Association for Electronics Industrialists of Turkey (TESID) worked together and produced the Master Plan on National Information Infrastructure of Turkey in 1999). The Vision 2023 Project is being carried out in cooperation with public sector organisations, NGOs and business sector as explained in Box. 1 in Section 1.2. TUBA is implementing a foresight activity to determine the scientific areas to focus with participation of various stakeholders. The “specialization committees” established by the SPO with participation of all related public institutions, NGOs, business sector and academia for designing the science, technology and innovation related sections of the development plans are also important mechanisms to establish networks on the subject. These committees are formed by large group of experts a remarkable number of whom comes from business sector and the needs of business in relation with the innovation policy are carried to the policy arena.

The Vision 2023 Project is being carried out in cooperation with public sector organisations, NGOs and business sector.

Another activity to facilitate partnership and networking between different organizations is the Science, Technology and Industry Discussions Platform established by TTGV, TUBITAK and TUBA in 1992.

Another activity to facilitate partnership and networking between different organizations is the Science, Technology and Industry Discussions Platform established by TTGV, TUBITAK and TUBA in 1992 to implement studies on science, technology and innovation related subjects with participation of public and business sector representatives. As a result of this initiative various studies on technological and industrial issues are being performed, and reports with policy and strategy proposals are produced to serve as inputs for policy developments. Moreover, cooperation protocols are signed between above listed organizations on innovation matters (such as the one between TTGV, TUBITAK

⁴⁰ <http://www.kalder.org/ingilizce/>

⁴¹ <http://www.mpm.org.tr/>

⁴² <http://www.taysad.org.tr/index.htm>

⁴³ <http://www.mam.gov.tr/~tyd/>

⁴⁴ <http://www.tbd.org.tr/icenglish.html>

and KOSGEB) and activities are organized jointly by different organizations (for example TUBITAK, TTGV and TUSIAD organizes the Technology Award and Technology Congress). KOSGEB has established networks on entrepreneurship development⁴⁵ and SMEs⁴⁶. There are networking initiatives started on the Internet by various stakeholders which can be referred as first experiments on the subject: For example, the virtual environment for facilitating university-industry collaboration created on the website of Istanbul Chamber of Industry and technology marketplace developed on the website of TTGV for matchmaking on technology and innovation.

Key findings

- The Supreme Council of Science and Technology (BTYK) decides on the science and technology policy covering innovation policy of Turkey, which is designed and proposed by the Scientific and Technical Research Council (TUBITAK).
- The BTYK also decides on the action plan for the policy. There is also a parliamentary commission, a working group and public bodies involve in the process of innovation policy-making.
- Government funded agencies which serve countrywide implements the innovation policy by means of financial support, training, consultancy, testing, accreditation, etc.
- Although not large in number, there are private or publicly funded organisations in various regions that provide innovation support to the business through technoparks, incubators, R&D centres, consultancy, training and information dissemination mechanisms.
- Partnership and networking actions between different stakeholders of innovation policy are taken through different means: by establishing working/project groups to implement policy actions set by the Government, by means of discussion platforms and on the websites of various organisations, etc.

1.4 Assessing innovation potential: data collection, surveys and indicators

The national R&D survey has been conducted in Turkey since 1990. The SIS started to implement the innovation survey in 1998 for the period of 1995-1997.

The national R&D survey has been conducted in Turkey since 1990 by the State Institute of Statistics (SIS)⁴⁷. The data on R&D is available until 2000. The R&D surveys are carried out in accordance with the OECD standards and classifications (Frascati Manual).

The SIS started to implement the innovation survey in 1998 for the period of 1995-1997. In implementation of the survey, the methodology of the Community Innovation Survey (CIS) II was followed, and stratified sampling method was used to determine the companies that were covered in the survey. The results of the innovation survey that was conducted both for manufacturing industry and for service sector were released in 1999. For the innovation survey of the manufacturing industry, firms with 10 or

⁴⁵ <http://www.girisimciliknetwork.gen.tr/>

⁴⁶ <http://www.kobinet.org.tr>

⁴⁷ <http://www.dic.gov.tr/English/index.html>

more employees were surveyed. All firms which have more than 100 employees; which carry out R&D activities, and which received R&D support from TTGV and TUBITAK-TIDEB were covered. As a result of the sampling, 4305 industrial firms were surveyed and 2100 of them replied the questionnaire. To obtain the results of the innovation survey, unresponsiveness analysis was done for the firms which did not reply the questionnaire. The result of the survey indicated that 24.6 % of the industrial companies in manufacturing sector implemented technological innovation activity between 1995-1997. For the innovation survey of the service sector, firms with 1 or more employees were surveyed. As a result of the sampling, 1151 firms were surveyed and 39 % of them replied the questionnaire. The result of the survey indicated that 48.2 % of the service firms conducted technological innovation activity in 1995-1997 period. The second innovation survey designed according to CIS III carried out in 2002 and is at the stage of data entry.

Another important activity to cover data and information on innovation related issues would be the studies to be carried out as sub-projects of the Vision 2023 Project (details are given in Box 1 in Section 1.2) in 2003. Besides the National Technology Foresight Project, the sub-projects of “Technological Capabilities”, “Turkish Researches Inventory” and “National R&D Infrastructure” will provide analysed information on the technological capabilities of industrial sectors, technology acquisition sources and methods, Turkish researches and R&D institutions.

As mentioned in Section 1.2, the study on evaluation of the Government funded innovation programmes implemented by TTGV, TUBITAK-TIDEB, TUBITAK-MAM, UME and TPE was conducted for the period of 1990-1997. The surveys which are conducted by the SIS and analysed under the evaluation study by an external expert include a) R&D surveys, b) Innovation survey, c) Industry surveys, d) Service usage surveys by the industry (services offered by five organizations mentioned above), e) Surveys specific to the firms benefited from TTGV’s and TUBITAK-TIDEB’s support. The results were presented in a report called “National Innovation System: Technological Change and Innovation Processes in Turkish Manufacturing Industry”, which was jointly published by TUBITAK, TTGV and SIS. The report also covers comparative science, technology and production data and analysis for Turkish manufacturing industry. The second stage of the evaluation surveys is being conducted together with the second innovation survey that will be completed by the beginning of 2003.

Apart from above data sources, there are some studies conducted by experts for different organisations or as academic research that contain data and information on science, technology and

innovation issues in Turkey⁴⁸. In addition, sectoral studies carried out by various organisations contain useful information on the subject. Some examples for these studies are: “New Product Development Capabilities of Turkish Electronic Industry (1998, TTGV)”, “Competitive Advantage and Future of the Turkish White Goods Sector (2001, SPO)”.

Data on patents, trademarks and industrial designs registered in Turkey are recorded by the TPE in accordance with the standards of the World Intellectual Property Organization (WIPO). MPM produces data on efficiency, productivity, employment and wages in manufacturing industry. There are data available at KalDer on the companies that have quality certificates and/or apply quality models (e.g. number of companies with ISO certificates and companies that apply European Foundation for Quality Management (EFQM) Excellence Model). Quality related data are recorded by TSE as well. KalDer also has other IMT related activities such as benchmarking and value analysis which are at the beginning stages.

Surveys related to information and communication technologies are conducted by the Information Technologies and Electronics Research Institute of TUBITAK (TUBITAK-BILTEN)⁴⁹. Data for 2000 on Information Technologies Penetration and Usage have been published in 2001 by the same institute. The SIS is also carrying out, in cooperation with TUBITAK-BILTEN, the preparation studies for the survey on penetration of ICT usage in business enterprises in connection with e-Europe+. Another data source on this subject is the Master Plan on National Information Infrastructure of Turkey that was completed in 1999.

Organisations that promote university/research centre-industry interactions (e.g. TTGV, TUBITAK-TIDEB, TUBITAK-MAM...) have data on the subject. Statistical information on FDIs and licence agreements in Turkey are provided by the General Directorate of Foreign Investments of the UT⁵⁰.

⁴⁸ The studies that are considered useful on the subject are: “Science and Technology Development in the Context of International Economic Integration-The Case of Turkey” (Romijn H, Turel O, 1997), “Technological Change and Efficiency in Turkish Manufacturing Industry (Taymaz E, Saatci G, 1997)”, “Small and Medium-Sized Industry in Turkey” (Taymaz E, 1997), “Technological Change and Employment in Turkish Manufacturing Industry (Taymaz E, 1998)”, “An Assessment of Innovation Management Performances of Turkish Industrial Companies (Elci S, 1999)” and “Productivity in Turkish Manufacturing Industry: A Comparative Analysis On The Basis Of Selected Provinces (Onder O, Lenger A, 2000)”.

⁴⁹ <http://www.bilten.metu.edu.tr/>

⁵⁰ <http://www.hazine.gov.tr/english/YBSWEB/index.htm>

Key findings

- State Institute of Statistics (SIS) has been conducting R&D survey since 1990 in accordance with the Frascati Manual of OECD. The first innovation survey was conducted for 1995-1997 period according to CIS II. The second survey according to CIS III is in progress.
- The report on evaluation of Government funded innovation support schemes analyses data obtained from R&D surveys, innovation survey, industry surveys, service usage surveys by the industry (services offered by the Government funded innovation support providers), surveys specific to the firms benefited from TTGV's and TUBITAK-TIDEB's support. All surveys were conducted by the SIS.
- There are also academic and sectoral studies carried out on innovation which can be referred as data sources as well as various other specific data sources on IPR, FDI etc.

1.5 Legal and administrative environment for innovation

The Decree on Venture Capital Investment Funds, which forms the basis for related legislation, is not favourable enough to set up venture capital companies.

The major legislative measures influencing the potential for business to engage in innovation are given in Table 5 below. In addition, there exist regulations indirectly influencing firms' innovation capacity. These include legislation on State support especially for SMEs to participate in international fairs, to organise international specializations fairs in the country, to carry out market research and to open offices abroad. Successful implementation of schemes that are based on the legislation in question largely depends on the macroeconomic factors. Deficits in the budgets of the agencies responsible for implementation of the schemes designed according to this legislation might cause problems in timely and sufficiently funding of the business sector in innovation related activities.

One of the problems reported by the experts and sponsors of the venture capital funds on the existing legislations is that the Decree on Venture Capital Investment Funds, which forms the basis for related legislation⁵¹, is not favourable enough to set up venture capital companies. The main problem is that venture capital companies can only be established as "joint stock companies". On the other hand, according to international best practices "venture capital funds", which are closed-end, are useful mechanisms for venture capital investments. If the venture capital legislation permits establishment of venture capital funds, then amendments in other related legislations are required as the funds can only be established by financial institutions, which is again a disadvantage considering the international best practices. In order for such companies to benefit from tax exemption, they have to be established in accordance with the Capital Markets Board (SPK) legislation. This requires the company itself to be opened to public in its early years with high rates. Details on the issue are also given in Section 3.2. Because of the difficulties arising from the

⁵¹ <http://www.spk.gov.tr>

regulations, only two venture capital companies were established in the country in accordance with the legislation by two major banks (Isrisk and Vakifrisk). The others prefer being established outside the country and make investments in Turkey and there are six companies operating in this way. Total amount of funds of these eight companies is around €250 million half of which prefer investing in seed and early stage and the rest in expansion and growth stages.

Table 5 - Legislative measures in favour of innovation

Title of legislative acts or regulations	Date of adoption and application	Specific measures in favour of innovation	Comments
Decree on Tax Postponement to Support R&D	3/4/1986	Regulates postponement of 20 % of yearly corporate tax (should not exceed total annual R&D expenses) for a period of three years without interest.	
Decree on State R&D Support	27/12/1994	Regulates the State Support to R&D projects of industry.	R&D expenditures are cost-shared by the Government.
Decree on State Support for Environmental Costs	27/12/1994	Regulates the State Support to SMEs for obtaining certificates to meet international quality standards on environment and health.	Certification expenditures are covered on cost-sharing basis.
Law on Intellectual and Industrial Property Rights	27/06/1995	Regulates protection of intellectual and industrial rights in line with international regulations.	
Decree on Venture Capital Investment Funds	6/11/1998	Regulates establishment and operations of venture capital companies including their management structure and fields of activity.	
Decree on State Support for Patent, Trade Marks and Industrial Design Registration	27/02/1998	Regulates the State Support for registration of industrial and IPR.	The expenditures for patenting, trade mark and industrial design registrations by the TPE are cost-shared.
Law on the Organisation and Functions of the Turkish Accreditation Agency	27/10/1999	Regulates activities of the Turkish Accreditation Agency for the purpose of accrediting national and foreign organisations to conduct services of laboratory, certification and inspection and ensuring that these organisations operate in accordance with specified national and international standards and that product, service, system, personnel and laboratory certificates are recognised at national and international level.	
Decree on State Support for the Investments of SMEs	21/12/2000	Regulates the State Support for investments of SMEs in line with the EU norms and international	

Title of legislative acts or regulations	Date of adoption and application	Specific measures in favour of innovation	Comments
		agreements to increase product and production quality, to meet standards, etc.	
Decree on State Support for Investments	21/12/2000	Regulates the State Support for high-tech investments in line with the EU norms and international agreements for removing regional imbalances (includes R&D investment incentives).	
Law on Technology Development Zones	26/6/2001	Regulates establishment of technology development regions in cooperation with universities and research centres to provide infrastructure required to facilitate technological innovation.	Tax exemptions only for R&D activities of companies located in technoparks are provided for certain periods. It also provides incentives for mobility of academic staff to work with private companies located in technoparks.

In Turkey, the first attempts to improve business environment started in 1987, and the Decree 353 and the Law no. 3572 were enacted in 1989 to simplify the procedures for starting and obtaining a license for operating a business. In connection with that Law, a Regulation on Licenses for Opening and Starting Businesses was issued to simplify and facilitate the process for obtaining licenses for opening all types businesses. In 1995, approval and authorisation procedures have been simplified by the Reform of the Commercial Code. Ministry of Industry and Trade (MIT)⁵² initiated a study to provide more efficient and effective services in its central, provincial and affiliated bodies and has received TS EN ISO 9002 Quality System Certificate in 1998. The quality system helped simplification of administrative procedures and the paper work asked by the Ministry was reduced by 40 % for the company starting up procedures at the MIT. In spite of these efforts there is still too much red tape and opening one-stop-shops for the starting up and operating a business would be a key improvement action⁵³. Also, bankruptcy and liquidation procedures are lengthy (around three years) which, according to Turkish authorities hampers risk-taking and therefore is a handicap for innovation. On the other hand in 2001 and 2002 there has been intensive studies carried out by related governmental bodies to eliminate such bureaucratic difficulties.

As mentioned in the “Inward Investment” part in Section 1.1, the Reform Programme for Improvement of Investment Climate has been carried out intensively in 2002 to improve business

⁵² <http://www.sanayi.gov.tr>

⁵³ EC CC Best (Candidate Countries-Business Environment Simplification Task Force) Report-Turkey.

environment for domestic and foreign investors. One of the nine technical committees, the Technical Committee for Company Establishments, finalized its studies in the second half of 2002 under the coordination of the MIT to simplify the procedures for starting up a business. As a result of these studies, *nineteen* stages to establish a company have been reduced to *four*. In addition, according to the improved procedures, processes required for establishing a company will be completed at a single place, Company Registration Offices. With the new adjustments in the company establishment procedures, it will be possible to establish a company in one day. Another important change in the new procedures is abolishing the permission granted by the MIT for establishing a company. Legislations to implement improvements have been prepared by the Committee and is planned to be sent to the Parliament by the end of 2002. It is targeted that new procedures will be applied by the beginning of 2003 after ratification by the Parliament of the amendments to the Commercial Code and other related laws. Meantime, steps are being taken for establishing a system to enable a company to be established on-line. However, there are significant infrastructural requirements to establish an IT system for this purpose.

Current procedure to be followed for establishing and operating a limited liability company is given in the following table. The minimum cost of registration is around 354 Euro. In addition, duration for registration of a joint-stock company is nearly 15 days while the minimum registration cost is approximately 427 Euro.

Table 6 - Administrative procedures required to establish and operate companies: The Case of Limited Liability Companies

Process	Duration (days)	Authorized Organisation
Control of the name and title of the company	1/2	MIT
Preparation and approval of articles of association (in 6 copies)	1	Notary Public
Permission on establishment of the company	1/2	MIT
Making payment to General Directorate of Consumer and Competition Protection	1/2	Central Bank
Registration of the company	1/2	Office of Trade Registration
Announcement of the company on Trade Registration Gazette	3	Office of Trade Registration
Preparation of Circular of Signature of the company manager	1/4	Notary Public
Application for tax account number	1/2	Tax Office
Approval of legal books	1/2	Notary Public
Completion of necessary documents and approvals for tax registration	6	Tax Office
Publication of the company documents like invoices, etc.	2	
Registration by the Chambers of	2 days at Chamber of	Local Chambers of Industry

Process	Duration (days)	Authorized Organisation
Industry and/or Commerce	Commerce 7 days at Chamber of Industry	and/or Commerce
Payment of stamp duty	1/4	Tax Office
Completion of Social Security Processes	1.5	Social Security Institutes

Activities of TPE have been evaluated independently. The result of the evaluation indicated that the views of the companies that received services from TPE are positive.

As mentioned in Section 1.1, the Turkish Patent Institute (TPE) was established in 1994 to deal with the issues of intellectual, industrial and commercial rights. Based on the information provided by the experts, cost and duration for administrative procedures for patenting by TPE is almost the same as the ones applied in EU countries. Besides its headquarters in Ankara, TPE has information and documentation units in three different regions of Turkey. There are 508 patent attorneys and 614 trademark attorneys registered by TPE who are located in every region in Turkey. TPE is in the process of establishing specialized courts that deal with IPR related issues. There is one court already established in Istanbul and another one is being established in Ankara. As stated in Section 1.2, activities of TPE have been evaluated independently. The result of the evaluation indicated that the views of the companies that received services from TPE are positive. There are incentives for financing patenting costs which are provided by TPE, KOSGEB and TTGV. With respect to the ownership issues, ownership of the employee inventions belongs to the firms according to the law.

The tax postponement incentive for R&D expenditures has been implemented since 1986. The main reason for low application to the scheme is that in general SMEs do not have separate R&D departments and are not accustomed to account R&D expenditures as separate items in their balance sheets.

The tax postponement incentive for R&D expenditures has been implemented since 1986. Under this scheme, 20% of yearly corporate tax that should not exceed total annual R&D expenses is postponed for a period of three years without interest to be paid in nominal amount. The number of companies which benefited from the scheme was 108 from 1997-2001, which is very low compared with the number of companies conducting R&D during that period. Interviews on the subject indicated that the main reason for low application to the scheme is that in general SMEs do not have separate R&D departments and are not accustomed to account R&D expenditures as separate items in their balance sheets. This is also evident from the fact that only 1.4% of the companies that benefited from the scheme between 1997-2001 were SMEs.

Another tax incentive for R&D and innovation activities is the one applied in technoparks. Exclusively R&D activities of the companies located in technoparks are exempted from corporate and income taxes for five years. In addition, income of the R&D staff working in the region is exempted from all taxes for a period of ten years from the establishment date. A law for this incentive was approved by the Parliament in 2001 and implementing regulations were issued in 2002; resulting in an increased demand both for establishment of technoparks by various sponsors and for locating to a technopark by NTBFs. After issuance of the law,

three more technoparks have been established (Gebze, OSB, Ankara Cyberpark and Izmir Technology Development Zone and 2 have been initiated (ITU Ari Technopark and Hacettepe Technology Development Zone) in addition to the two existing technoparks (TUBITAK-MAM Technopark and METU Technopolis).

In the opinion survey carried out under this study, interviewees were asked about their views on the legal and administrative environment for innovation. The interviewees are of the opinion that administrative procedures –bureaucratic burdens- and existing tax incentive for R&D does not sufficiently encourage innovation in Turkey. In addition, support and information to enterprises on the protection and exploitation of IPR have been found insufficient. The requirement for increasing awareness raising activities on IPR issues has been addressed. On the other hand, negative effect of legal and administrative procedures for creation of new technology based firms, and current legal framework on innovation was found to be relatively low. Not surprisingly, negative effect of macroeconomic environment (inflation, exchange rate, etc.) on innovation was declared to be very high. Insufficient level of venture capital finance and start-up funds for new technology based firms were emphasised as an important drawback by the interviewees.

Key findings

- In Turkey legislation directly and indirectly influencing the potential for business to innovate have been in effect since 1986 starting with the tax postponement for R&D activities.
- Improvements and revisions are needed on the legislation on venture capital to increase the investment in innovation.
- Although attempts to improve the business environment were started in 1987, there remain difficulties generally caused by red tape. One of the most important improvement actions needed is to open one-stop-shops for starting up and operating a business.
- Although the tax incentive for R&D activities has been applied since 1986 the number of companies applying is very low compared to the number conducting R&D. The most important reason is that SMEs that form more than 99% of Turkish Industry do not have separate R&D departments and do not keep accounts for R&D expenditures separately.
- Another important tax incentive for R&D activities of business sector was brought about by the law of technoparks approved in June 2001. Although the law has not yet been enacted, as the regulations are being prepared, a significant increase in demand for the technoparks by the NTBFs after approval of the law indicates that the R&D tax incentives will considerably contribute to enhance innovation performances of the industry.

Section 2 - Measures to improve the environment for innovation

2.1 Teaching and training initiatives in favour of an innovation and enterprise culture

In Turkey, the ratio of labour force of higher education graduates to total labour force has grown from 5.7% in 1995 to 7.3% to 1999 and the ratio of labour force consisting of graduates of high schools and equivalent to total labour force has grown from 12.6% to 13.2% over the same period. In the 8th Five-Year Development Plan issued in 1999, projections for the supply of higher educated manpower are estimated as 402,700 persons for the year 2000 and 506,500 for the year 2005. Supply and demand projections for skilled human resources (university graduates) in key sectors are given Table 7 below:

Table 7 - Supply and demand projections for skilled human resources in key sectors

Sector	Supply in 2000	Demand in 2000	Supply in 2005	Demand in 2005
ICT	39,000	40,000	52,300	60,000
Machinery	44,300	44,700	52,100	56,300
Construction	43,900	37,100	50,200	45,900
Agriculture and forestry	62,200	38,100	73,000	49,000
Chemistry	19,100	17,400	20,500	21,500

There is a need for balancing supply and demand of human resources across key sectors.

As is clear from the above table, there is a need for balancing supply and demand of human resources across key sectors. It is also necessary to increase the number and quality of the skilled human resources as also emphasized in the Development Plan. In addition investment in education in Turkey should be increased which is quite low (~3.2 % of GDP) compared to the EU15 except Belgium and Greece⁵⁴.

Brain drain is an important problem since both due to macroeconomic conditions and less developed R&D base, qualified human resources and researchers, which are the most important capital for innovation, prefer to leave the country. Innovation policy actions should include measures to retain skilled human capital and researchers in the country and to reverse brain drain (Also see Annex 3-Output Paper of Innovation Policy Workshop).

⁵⁴ See Volume 2.8 of the study for further details

Development of human resources in favour of innovation has been given special emphasis in the Turkish innovation policies since mid-90s.

With regard to human resources in R&D, number of R&D personnel (full-time equivalent) per ten thousand total employment has been gradually increasing between 1990 and 2000, from 7.5% to 13.1%. The number of researchers (full-time equivalent) per ten thousand labour force has also been increasing from 5.4% in 1990 to 8.7% in 1999. Total number of R&D personnel (full time equivalent) is 27,003 in 2000 (22.3% in business enterprise sector) while it was 21,983 in 1996 (20.1% was employed in business enterprise sector).

Development of human resources in favour of innovation has been given special emphasis in the Turkish innovation policies since mid-90s. The project on “Impetus in Science and Technology” (1995) that was prepared in light of the Science and Technology Policy Document of 1993-2003 and embedded in the Seventh Five-Year Development Plan (1996-2000) focuses on the need for designing and implementing high quality, continuous and widespread training and education in line with the science and technology policies. The “Policy Agenda on Science and Technology for the Years 1996-1998” approved by the BTYK in August 1997, stresses the necessary actions to be taken for raising awareness on innovation; dissemination of techniques on technology management, innovation management, quality management and certification.

There are a large number of universities providing training and education in management throughout the country. Of 77 universities in Turkey, 52 offer management programmes⁵⁵. Eight universities also have executive MBA programmes. All of these programmes were designed by taking the ones implemented in the USA as models and most have close collaboration with the similar programmes in the USA and in Europe. Almost all of the programmes provide courses on modern management techniques. 17 universities with management programmes at undergraduate and graduate levels offer specific courses on technology and innovation management. Industrial Engineering Departments of several major universities provide courses covering the topics related with technology and innovation management. There are 4 universities with MS programs on Engineering Management offering courses on entrepreneurship and technology and innovation management. Participants of the opinion survey carried under this study underlined that local training and education institutions are capable of replenishing and increasing the supply of qualified human resources for innovation.

KOSGEB implements “Young Entrepreneur Development Programme” together with universities to train and educate undergraduate and graduate students for starting up their own businesses. During a one-year course, students are assisted with

⁵⁵ University websites can be reached from <http://www.yok.gov.tr/univbil/oku22.html>.

developing their business ideas and business plans. By 2002, 16 universities have co-operated with the programme. 18 Lifelong Learning Centres (LLC) which mainly belong to regionally reputable universities all over the country provide short term training and certificate programmes for the participants from business sector on quality management and entrepreneurship, amongst other topics. Some of these centres offer specific training courses and programmes on technology and innovation management. Information on major organisations involved in human resource development for innovation is presented in below table.

Table 8 - Main organisations involved in human resource development for innovation

Higher or further education organisation	Main type of innovation related training or advisory services	Commentary
Abant İzzet Baysal University	Courses on technology management, R&D management, productivity management, project management and total quality management (TQM), etc. in undergraduate and graduate levels of Management Department.	Close interaction with industry.
Ataturk University	Courses on entrepreneurship, strategic management of SMEs, TQM, technology and innovation management and globalisation at graduate level programmes of Management Department.	Efforts are being made to get industry involve in the courses.
Beykent University	MBA, Entrepreneurship and SME Management, and Strategic Enterprise Management Programmes provide training and education on entrepreneurship, technology and innovation management issues.	Close interaction with industry. Any company can apply to the university for providing MBA programme to its staff in its premises. University instructors go and train staff in company's place using it as a lab. At the moment there are two companies providing such MBA courses to their staff and the aim is to increase the number of similar companies.
Bilkent University	Courses on change management, quality management, TQM, quality assurance systems, global perspectives, project management, industrial competitiveness and strategy in undergraduate and graduate programmes of Industrial Engineering and Management Departments. There is also an interdisciplinary course called "Innovative Product Design and Development I-II".	Cooperation and student exchange with some universities in the USA, Canada, Denmark and Israel.
Bogazici University	Courses on new product management, TQM, technology management, knowledge management in a) Industrial Engineering Department, b) MBA Programme c) Executive MBA Programme and d) Graduate Programme in Engineering and Technology Management.	Courses are designed and carried out with large participation of business sector.

Higher or further education organisation	Main type of innovation related training or advisory services	Commentary
Gebze Technology Institute	Courses on technology management, new product and technology development, national innovation systems and strategic technology management in Science and Technology Strategies Graduate Programme.	Networking activities and cooperation with Stevens Institute of Technology and Temple University in the USA.
Isik University	Courses on technology management, new product management, TQM, e-commerce, globalisation in BA, MBA and Executive MBA programmes.	Cooperation activities with sister foreign universities.
Istanbul Bilgi University	MBA programmes in three categories: MBA, e-MBA and Executive MBA. Courses on e-commerce, entrepreneurship, venture capital, managing creativity, etc.	Cooperation with Manchester Business School on Executive MBA which is implemented as a modular and live-project based programme.
Istanbul Kultur University	Courses on technology management, innovation management, TQM, entrepreneurship, etc. in undergraduate and graduate Management programmes, and Executive MBA. Programme.	Entrepreneurs participate in the programmes to give seminars. Effort are being made a) for re-designing the courses in a way that two instructors -one academic, one practitioner (an entrepreneur or an expert from industry)- deliver the courses, b) for establishing cooperation with universities in Europe and in the USA.
Istanbul Technical University	Courses on technology management, innovation management, TQM and change management in a) undergraduate, graduate and executive level programmes of Management Department, b) Industrial Engineering Department and c) Engineering Management Programme. LLC of the university also provides certificate programmes and courses on R&D management, TQM, etc.	Close interaction with industry (company visits, seminars by businessmen and industrialists); know-how transfer on ITU's MBA programmes to some universities in Germany, France and the Netherlands; cooperation with State University of New York; visiting professor and student exchange with Berlin Technical University. Studies are being carried out for designing live-projects for students where they can work as teams.
Koc University	Courses on new product management and technology management in MBA and Executive MBA programmes	Student exchange programmes with Bocconi MBA (Italy), London Business School (UK), University of North Carolina (USA).
Middle East Technical University	Courses on different topics of management of technology and innovation in a) interdisciplinary MS Programme on Science and Technology Policy Studies, b) Undergraduate and graduate programmes of Industrial Engineering Department including its Engineering Management Programme (both MS degree and certificate –executive- programmes), c) Undergraduate, graduate and certificate – executive- programmes of Management	Student projects are being carried out with industry. Linkages with similar programmes in the USA. Efforts are being made to increase networking activities with industry and international organisations. In addition, efforts are being made to adapt senior design project course model of the Departments of Electric and Electronic Engineering and Mechanical

Higher or further education organisation	Main type of innovation related training or advisory services	Commentary
	Department and d) training courses of LLC. In addition, senior design project course for the forth grade students of Departments of Electric and Electronic Engineering and Mechanical Engineering are implemented as teamwork where students establish their virtual companies; prepare a business plan and develop an innovative product.	Engineering to the other departments.
Onsekiz Mart University	Courses on entrepreneurship, SME management, risk management, TQM, productivity management, project management in MBA programme.	Close interaction and cooperation with industry (for instance instructor of the course on entrepreneurship is an entrepreneur and the students are using his enterprise as a laboratory). Cooperation activities with sister foreign universities (student exchange with Silesian University in Czech Republic).
Sabancı University	Courses on technology management, entrepreneurship, TQM, etc. in a) MBA, b) Executive MBA and c) Leaders for Industry Programmes	Live-project based programmes implemented with participation of successful businessmen, industrialists and entrepreneurs.
Sakarya University	Courses on technology management, project management, TQM, etc. in undergraduate and graduate programmes of Industrial Engineering and Management Departments (including Executive MBA)	Efforts are being made to start e-MBA in the short term. Close interaction with industry and cooperation with Ziegen University in Germany.
Selçuk University	Courses on technology management, TQM, etc. at undergraduate and graduate levels at Management Department. Training seminars are provided to industry.	Cooperation with Leeds and Nottingham Universities (UK) and interaction with industry.
Yeditepe University	Courses on technology management, TQM, entrepreneurship, creativity and innovation, e-business, etc. at undergraduate and graduate levels at Management Department.	Close interaction with industry.

Box 2 - The “Innovative Product Design and Development” Course at Bilkent University

This one-year multidisciplinary senior design project course is set up for the fourth grade students from six different departments of Bilkent University: Computer Engineering, Economy, Electrical Engineering, Graphical Design, Industrial Engineering and Management. The following features of the course are listed as its unique features that distinguish it from the others:

- Innovation and creativity,
- Interdisciplinary collaboration,
- Project and team management,
- Real-life production and simulation,
- Simultaneous emphasis on the originality and the marketability of an idea,
- More objective evaluation of the final course grade,
- Involvement of large numbers of faculty and students.

The course has been implemented for two years and up to now 53 students have attended. It has been designed by reviewing similar approaches at foreign universities. Among the initiators and coordinators of the course (there are six coordinators one from each of above mentioned departments) are the university instructors who worked at the senior levels of RTD departments of major industrial companies. Knowledge and experiences of these people also make the course an attractive and successful one. While attending the course, students work as teams and they start with preparing a business plan for their innovative product development idea. After preparing the business plans, virtual companies are established by each team and their stocks are traded in a virtual stock market. Outside experts and entrepreneurs who started their own technology-based businesses -especially those supported by venture capital funds- are invited to give seminars to the students throughout the year. The experts and entrepreneurs are also asked to provide feedback on the design and implementation of the course. The unique features of the course attract students of other universities also. At the moment there is one Industrial Design student from an other university who attends the course and several others would like to join.

Continuous monitoring and evaluation is applied to the course for improvement and for keeping attention of the student at the highest level. New improvement topics cover the studies being carried out by the coordinators for increasing the number of departments participating in the course and for receiving the applications of the students at the third grade to be able to build the teams earlier. Another issue is to increase the level of participation by the industry. The most important target of the coordinators and students is to have the teams establish real companies for their projects after graduation. Two innovative product ideas in ICT sector that were commercialised recently by business enterprises in Turkey were among the projects of the first year's teams which is a sign of approaching success and guarantee for the motivation.

Table 9 - Main initiatives taken in favour of human resources development for innovation

Organisations responsible	Objectives	Target public	Funding
Ministry of Education	Developing entrepreneurship culture and enabling individuals to acquire professional skills and to start their own businesses.	Students attending secondary vocational and technical schools.	State budget
Higher Education Board (YOK)	Developing human resources in accordance with the needs of industry under the Industrial Education Project.	Students attending at vocational high schools.	Co-financing by the State and World Bank
Ministry of National Education, TOBB, TESK (Confederation of Craftsmen and Tradesmen of Turkey), TISK (Turkish Confederation of Employer Associations), TURK-IS (Confederation Of Trade Unions Of Turkey) and MEKSA Foundation	Developing human resources in accordance with the needs of industry.	Students attending at vocational high schools.	Co-financing by the State and the EU
KOSGEB	Developing entrepreneurship culture and upgrading human resources for technology and innovation through its institutes, centres (Entrepreneurship Development Institute, Technology Development Centres, regional offices, etc.) and in collaboration with universities and other private and public organizations.	Students, potential entrepreneurs and SMEs	State Budget; some training programmes are partly self-financing
TIGV	Upgrading human resources for innovation by two ways under separate schemes: a) training and consultancy to industry on technological and managerial aspects of business, b) mentoring to industry by academics on technological issues (in the technology development projects support scheme).	Private industrial companies	Under-Secretariat of Foreign Trade, Under-Secretariat of Treasury through the resources of the World Bank and TIGV's own resources
TUBITAK (through TUBITAK-MAM and TUBITAK-TIDEB)	a) Training in new technologies, sectoral quality systems and international standards through its research institutes, b) mentoring to industry by academics on technological issues (in the R&D projects support scheme).	Industry	TUBITAK's budget; trainings are partly self-financing
TURKAK	Training and consultancy on upgrading human capital about accreditation.	Industry	National and international sources
UME	Training and consultancy on upgrading human capital about metrology and accreditation.	Industry	Self-financing

Organisations responsible	Objectives	Target public	Funding
TPE	Training on issues related with intellectual and industrial property rights (training seminars are organized jointly with related organizations (NGOs, universities etc).	Industry and researchers	TPE's budget and contribution by the organisation holding the training seminar
TSE	Training on quality management and quality standards.	Business sector and the students at secondary schools in cooperation with the Ministry of National Education.	Self- financing
In coordination of State Planning Organisation (SPO) by related public bodies	Training and technical assistance for entrepreneurship as well.	Employees of the privatised companies who are losing their jobs due to privatisation.	Co-financed by the Government and the World Bank
MEKSA Foundation	Entrepreneurship development.	Potential entrepreneurs (training is provided at 26 training centres throughout the country and seminars are organized in cooperation with vocational training schools, universities, chambers of arts and crafts, and chambers of industry).	Various national and international funding resources. The programmes are partly self- financing.
TESK (Confederation of Craftsmen and Tradesmen of Turkey) At the moment three different project are being carried out by TESK in cooperation with: a) EU (an initiative to be started); b) ILO/IPEC and Turkish Development Foundation; c) UNDP and GAP Administration (a initiative being designed).	Entrepreneurship development	a) Women entrepreneurs b) Families of working children in South-East Anatolia Region c) Potential entrepreneurs and SMEs in South-East Anatolia.	a) to be supported by the EU; b) financed by ILO/IPEC; c) to be financed by UNDP.
Turkish Employment Organization (ISKUR)	Training courses for upgrading human resources depending on the needs of industry and individuals for career development.	People from business sector and individuals.	State budget
GAP-GIDEM (Entrepreneurship Development Centres in South-East Anatolia Region).	Upgrading human capital by providing training and consultancy on various aspects of entrepreneurship.	Potential entrepreneurs and companies in South-East Anatolia Region of Turkey.	State budget, and national and international funding sources.

Organisations responsible	Objectives	Target public	Funding
Higher Education Board and the Foundation of Istanbul Chamber of Industry (initiative being implemented in cooperation with the universities and chambers of industry in the country).	Developing human resources both in industry and in universities.	Industrialists and academic people (training seminars and workshops are organized jointly and university people spent some time for bilateral training at industrial companies).	State budget
Turkish Institute for Industrial Management (TUSSIDE).	Developing human resources by providing training courses and seminars on technology forecasting, risk and cost analysis techniques in R&D projects, product development management, production management, information management, human resources management (such as creative innovative leadership), global and strategic marketing management, quality management, project management, etc.	Business sector, public sector, students	State budget; partly self-financing
National Productivity Centre	Upgrading human capital by providing consultancy and training on TQM, quality standards, strategic management, productivity management, creativity management, project management, human resources management etc.	Training courses are open to public. Mainly targeted to business sector.	Self- financing
Quality Association of Turkey (KalDer)	Awareness raising and developing human resources under the concept of “National Quality Movement” where training courses on TQM, quality standards, strategic management, benchmarking, customer satisfaction management, project management, etc. are organised (also cooperates with the Ministry of National Education, Ministry of Labour and Social Security, various universities and organised industrial zones).	Students, business sector, SMEs, public organisations	Self- financing
Technology Management Association	Seminars and conferences on various topics of technology management.	Business sector and students	Self-financing
MESS Training Foundation	Training courses on various aspects of management such	Business sector	Self- financing

Organisations responsible	Objectives	Target public	Funding
	as TQM, R&D management, quality standards, human resources management, etc. (Training activities are being carried out in cooperation with chambers of industry and universities).		
TOSYOY	Training and consultancy for small and medium business on various topics.	SMEs	Financing through various resources

In addition to above initiatives to foster innovation, there are a number of awards organized for the same purpose. These include business-planning contests at some universities, “The Award for the Most Successful MS and PhD Thesis Applied to the Industry” given by TTGV-YOK -TOBB-TUBITAK, “Technology Award” given by TUBITAK-TTGV-TUSIAD, “National Quality Award” given by TUSIAD and KalDer, “Innovativeness and Creativity Award” by TESID (Turkish Electronics and Information Industries Association). TUBA organises “The Programme for Awarding Young Successful Scientists” for financially supporting research carried out by people younger than 37 years of age. During the debates at the innovation policy workshop held under this study, participant emphasised the success and usefulness of such awards in fostering innovation (Annex 3).

Another important action being taken for upgrading human capital is that TOBB is in the process of establishing business centres in three cities in Turkey (İzmir –Aegean Region-, Kocaeli –Marmara Region- and Gaziantep – South-East Anatolian Region) where training and consultancy will be provided to SMEs. The initiative is financed through MEDA funds. TOBB has also started to design a new entrepreneurship training programme for potential entrepreneurs that will be provided in cooperation with the universities. A recent initiative of TOBB includes reaching an agreement with the YOK in order to add entrepreneurship courses in the curricula as a compulsory course at all universities in the country. In addition, YOK is preparing a project to be financed jointly by the Government and the World Bank in order to change six vocational high schools into Lifelong Learning and Technology Centres that will serve for upgrading human resources in favour of technology and innovation. Some chambers of industry in the regions where industrial companies concentrate, e.g. Istanbul Chamber of Industry, and various chambers of engineers provide training seminars to their members on various issues of management such as quality management, project management, performance management and learning organisations. These seminars are designed and implemented in close cooperation with the industry, universities and research organizations. Moreover, KOSGEB is in the process of designing

new training programmes for specific sectors such as clothing, shoe-making, etc. that will be co-financed by the EU.

There are also some active sectoral associations that work on providing training and consultancy for their members. For example, the Association of Automotive Parts and Components Manufacturers (TAYSAD) has started a comprehensive project that will be supported by KOSGEB and funds of MEDA programme. The project includes a “training for structural change” module through which TAYSAD member companies will get training on new technologies, international standards and new management practices. Another worthwhile effort for upgrading human capital is made in city of Yalova with the commitment of the Municipality, public bodies, private sector and NGOs. As a building block of a broader IT based city development project, in Yalova, which was also designated as the pilot city under the e-Europe+ Project, training seminars and conferences at the whole range of schools are organised with participation of young successful entrepreneurs as speakers.

In general, design of above programmes was started with a formal training needs analysis. At the same time, recent developments in global context, such as developments in international standards, new technologies and new management techniques were also taken into account while designing such initiatives. In most of the schemes, for instance those of KOSGEB and MESS Training Foundation, any demand for training on a specific topic from SMEs can lead to organization of a training seminar on that topic for the SMEs in question. The general objective of the training courses set by above initiatives is to increase the competitive advantage of the business sector and increasing the number of entrepreneurs. Therefore the needs being addressed are determined taking this objective into consideration and it is tried to be as flexible as possible to meet the changing needs. While designing the content and implementing the initiatives, mostly it is tried to apply international best practices.

For most of the schemes formal monitoring and evaluation is assured by the responsible organization. Implementing organizations of these schemes report that necessary actions for improvement are being taken depending on the findings of the evaluations, but a number of issues and constraints negatively affect the efforts made for developing human resources for innovation. The most important issue reported is the low level of awareness of business enterprises on their training needs. Companies request such training where there are external driving forces for them like the need for a specific training on an international standard. Another important constraint is indicated as lack of sufficient financial resources, which hampers dissemination and accessibility of such initiatives. As also emphasised in the opinion survey, small companies that constitute

more than 98% of Turkish enterprises see training of their personnel as a cost rather than an investment. Both awareness raising activities and stimulating financial instruments would contribute to convincing such companies in training.

A lack of qualified trainers and high quality consultants for some of the schemes (for instance for business planning, technology management, innovation management, high-tech entrepreneurship, etc.) is also pointed out as a handicap for disseminating and increasing the efficiency and effectiveness of the training and consultancy programmes. Therefore the need for training trainers is highlighted as an important issue. While the opinions of business sector are parallel with that of implementing organizations with respect to accessibility and affordability of the initiatives and qualified trainers and consultants, problems in reaching information resources to learn about qualified service providers and available initiatives are also underlined.

Awareness raising initiatives for technology-based entrepreneurship should be designed and implemented countrywide.

Interviews with experts about possible options for further development of training and education in favour of innovation indicate that first of all awareness of investing in innovation and management of innovation should be raised throughout the country. Secondly, training, education and awareness raising initiatives for technology-based entrepreneurship should be designed and implemented countrywide. More specific and customized training and consultancy focused on change in culture, business practices and organization for innovation (such as value analysis, benchmarking, creativity tools, etc.) are emphasized as the topics to be taken on the agenda of the business sector. These efforts should be supported by subsidy schemes designed and implemented to reduce the cost of training and consultancy making it more widely affordable for start-ups and SMEs.

Two other important areas of development are underlined as having one-stop-shops where training needs of SMEs are identified, training plans are developed and information is provided on available initiatives and service providers; and reinforcing coordination and cooperation between various bodies responsible for training and education. Need for more active collaboration with the business sector both in the design and implementation of the training and education programmes - especially at secondary school (more importantly at vocational and technical schools) and university levels- is also deemed significant. Establishing a more widespread and structured lifelong learning system for continuously upgrading human capital across all industrial sectors (especially for SMEs) is emphasized as a significant necessity.

Key findings

- Of 77 universities in Turkey, 52 offer undergraduate and graduate levels of management programmes and 17 universities provide specific courses on technology and innovation management in different departments.
- There are also a large number of initiatives being taken by public bodies and NGOs for development of human resources for innovation. These initiatives are designed on the basis of a formal training needs analysis and a review of recent developments in global context, such as developments in international standards, new technologies and new management techniques. Most of them are quite flexible to respond changing needs of enterprises.
- Considering the scale of the country there is a need for increasing the number of such initiatives and disseminating them for reach of target population.
- Not having enough financial resources, and sufficient number of qualified trainers and high quality consultants for some specific topics are reported as the most important handicaps for such efforts.
- Awareness rising on innovation and high-tech entrepreneurship, and trainings and consultancies on specific topics of innovation management at enterprise level are main areas of concern for further development.
- Need for more active collaboration with the business sector both in design and implementation of the training and education programmes especially at secondary school (more importantly at vocational and technical schools) and university levels is also deemed important.
- Establishing a more widespread and structured lifelong learning system (there are 18 lifelong learning centres in the country) for continuously upgrading human capital in all industrial sectors (especially for SMEs) is emphasized as a significant necessity.

2.2 Initiatives in favour of the uptake of information and communication technologies (ICT) in enterprises

Turkey had a very fast development in terms of telecommunications infrastructure during the 1990s. A variety of networks and services were developed using advanced digital technologies. To give a brief overview of recent infrastructure, changes in the Turkish telecommunication network and mobile service between 1997-2001 are summarized in Table 10 below:

Table 10 - Data for Turkish Telecommunication Network and Mobile Services

	1997	1998	1999	2000	2001
Population	62,866,000	63,926,000	64,848,000	65,700,000	*68,610,000
Household	13,200,000	14,000,000	14,202,000	14,400,000	*15,086,158
Main telephone lines in operation	15,744,000	16,960,000	18,060,000	18,395,000	18,900,000
Digital Mobile Phone	1,483,000	3,382,000	8,000,000	16,041,000	18,350,000
% digital mainlines	81.6	82.9	84	87.3	88.8
% of residential mainlines	74.1	75	74.8	75.9	76.3
Residential mainline per 100 households	88.3	90.9	95.1	97	95.6
Cable TV Subscribers	512,000	611,000	734,000	883,000	908,000

*Source: Turk Telekom and International Telecommunication Union (ITU) database.
estimated by the State Institute of Statistic.

As regards the data on penetration of information technologies (IT), the rate of households with personal computers (PCs) is 12.3%. The percentage of population who regularly use the Internet is estimated as 3% while the ratio of households with Internet access at home is 7 % for 2000. Compared with the figures of 1997, number of households with computers increased by two folds while that of with Internet access increased by six folds. Studies⁵⁶ and expert opinion indicate that there is a big potential for the rest of the households with PCs to get Internet access as it is directly related with the need felt by the users for accessing the Internet. Therefore, it is expected that when most of the public services start to be provided on the Internet, the rate of population with access would reach 15 % in a short time. The number of Internet hosts in 2000 was 69,923 and increased by 100% between 1996-2000, which makes Turkey one of two OECD countries with the highest growth in the number of the hosts for the period. On the other hand, there is quite a large number of Internet cafés spread all over the country. In 2000, the number of Internet cafés that provided cheap Internet access for the public was estimated at around 10,000. The ratio of secure servers, a basis for the rapid development of e-commerce, per million inhabitants is quite low (1.8 % for year 2000) with an increase by 779% between 1998-2000⁵⁷. Private Internet service providers (ISPs)⁵⁸ dominate the market. Most of these ISPs are subsidiaries of GSM operators, media companies and banks that accelerate dissemination of Internet awareness and usage as a result of their large investments in marketing and promotion of their services.

Size of the ICT market in Turkey was nearly €15 billion by the beginning of 2000, the share of IT being around 30 %. As of 2000, annual rate of growth in the ICT sector in Turkey is around 20%. Although the share of IT in ICT sector is low, its growth rate is higher than that of the communications technologies sector. It grew by 55.7% over the period between 1998-2000. As for the components of the IT sector, IT hardware, which accounts for 67% of the sector, has a growth rate of 40 % between 1998-2000. Services accounts for 18% of the IT sector with a growth rate of 64% in the same period. On the other hand, growth rate of software in IT is the highest at 84.3% between 1998-2000. The ratio of the revenues from ICT sector in GNP is around 0.8%. Turkey is lagging behind in investment in IT as a percentage of GDP, (1.7 % compared to 2.7 % for EU15⁵⁹). IT investments and

⁵⁶ The result of a survey conducted under the preparation studies of the Master Plan on National Information Infrastructure of Turkey (1999) indicates that there is a very strong demand from the business sector and civil society to use ICT for communication with other people or enterprises and for access to public services and information, which in turn stimulates the supply side.

⁵⁷ OECD, Communications Outlook 2001.

⁵⁸ There are 65 ISPs as of 2002.

⁵⁹ Innovation capabilities of the seven EU candidate countries by UCL-SSEES (Annex 2).

ICT take-up rates for large Turkish companies are very high and they are quite successful in using ICT in their operations.

expenditures per capita in 2000 was 55 Euro. In accordance with the Master Plan on National Information Infrastructure of Turkey, total amount of investment needed for entire population to have access to national information infrastructure by the year 2010 is nearly €40 Billion. It is foreseen that €15 billion of this amount is required for the infrastructure investments while the rest is needed for the terminals like PCs, web TV, etc.

ICT take-up rates for large Turkish companies are very high and they are quite successful in using ICT in their operations. Nowadays most of the large companies have started their e-transition projects by which they will transform their business processes in electronic environment. The SIS planned to start a survey by the second half of 2002 for collecting information on ICT dissemination and usage in the business sector. Results of this survey are very important especially to understand ICT take-up rates in SMEs⁶⁰.

Another development in ICT sector has been taking place in e-business side: e-commerce and Internet banking activities started to develop rapidly since 2000. Today almost all banks have Internet branches where they offer brokerage, on-line billing, currency exchange and other banking services. From the e-commerce point of view, there is a number of Internet portals developed and operated by private sector in which companies have their e-commerce web sites. At the moment there are eight e-commerce portals serving nearly 33,000 companies for their e-commerce activities. On the other hand large companies have already started to offer their goods on their own e-commerce sites. From educational perspective, e-commerce started to be taught at vocational schools in Autumn 2002.

ICT penetration and diffusion of knowledge has been an integral part of the innovation policies of Turkey since 1993.

ICT penetration and diffusion of knowledge has been an integral part of the innovation policies of Turkey since 1993. In connection with these policies, there have been a large number of policy and strategy studies carried out jointly by public and private sectors and NGOs specifically for penetration and diffusion of ICT in the country. As one of the policy actions, Turkish Academic Network and Information Center (ULAKBIM)⁶¹ was founded in 1996 in association with TUBITAK to establish and operate a computer network enabling interaction between universities and private and public research organizations, and to provide information technologies support for facilitating information production and dissemination. Preparation of the national information infrastructure master plan, establishment of national e-commerce network, stimulation of establishment of Internet cafés for public use and establishment of national academic network and information centre have been among

⁶⁰ According to the results of a survey announced in 2002 by Microsoft-Turkiye, only 20% of SMEs are using computer systems.

⁶¹ <http://www.ulakbim.gov.tr/english/?lang=en>

important decisions of the BTYK in 1997. In line with these decisions, the Master Plan on National Information Infrastructure of Turkey was prepared by the Ministry of Communication and Transportation, Turk Telecom, TTGV, TUBITAK, the Association for Electronics Industrialists of Turkey (TESID) in 1999. With the plan, after a very comprehensive set of studies on the sector, policies for penetration and take-up of ICT in the economy and society were developed.

Another important study on the subject is the report by the “Specialization Committee on ICT Policies” which was prepared for the Eighth Five-Year Development Plan. Main issues emphasized in the report for ICT take-up are the high rate of value added tax (18 % VAT)⁶² and deficiencies in terms of finance and qualified personnel for knowledge management. Some important actions underlined in the Eighth Five-Year Development Plan for the period of 2001-2005 for achieving ICT penetration and take-up include increasing the share and quality of the services in IT sector, investing in R&D and innovation in ICT, decreasing costs and prices to make it affordable, providing Turkish language support for imported software products, taking necessary actions for dissemination of e-commerce activities, taking measures for transition to e-Turkey, and taking necessary actions in Turk Telekom’s privatisation process considering that telecommunications market will be opened to full competition by the end of 2003.

The most important Government level initiative is the “e-Turkiye Project”.

There are a number of initiatives being taken by various organizations to foster ICT uptake in enterprises by providing financial support for specific ICT related activities of SMEs.

At the moment, the most important Government level initiative is the “e-Turkiye Project” being implemented under e-Europe+ Project. The studies for the e-Turkiye is being carried out by 13 working groups covering all aspects of the issue from education and human resources to legal framework where experts from public bodies, business sector and NGOs participate. In addition, there a number of activities were organized in 2002 under the project (the Internet Week in April, ICT Convention in May, ICT 2002 Summit in September and the Internet Conference in November). The ICT Convention was held between May 10-12, 2002 to formulate the strategies for penetration and dissemination of ICT and to determine an action plan for that purpose. It was organised jointly by the Prime Ministry and NGOs representing the ICT sector. Draft reports proposing policy and strategy actions prepared by six main working groups -with participants from public sector, academia, business sector and NGOs- were opened to debate during the convention on education, legal framework, e-Government, e-economy, development of the ICT

⁶² On the other hand, based on the interviews, decreasing the VAT is not sufficient to make ICT affordable for the users. There are a number of mechanisms that should be employed like long-term loans for purchasing ICT devices. In addition, it is suggested that there are some options where the Government triggers decrease of the prices; for example, equipping schools –there are around 60,000 schools in the country- with PCs could create a big market for suppliers which could reduce the prices for the other end users.

sector, communication infrastructure and R&D. While the results of debate cover many policy and strategy actions on the issue, three key conclusions of the final declaration of the convention are worth highlighting: 1) The education policy should be reviewed and revised in a way that it makes use of ICT to change the way of thinking, learning and communicating of the society to meet the challenges of the future and to develop a creative, entrepreneurial, flexible and innovative mindset; 2) dissemination of R&D culture in the sector and implementation of R&D in selected areas of ICT should be given higher importance, 3) entrepreneurship and university-industry relations should be stimulated, and mechanisms like technoparks and venture capital should be promoted by improving legislations and employing incentives.

Turkey also took steps to participate in the eContent programme of the EU, which aims to support the production, use and distribution of European digital content and to promote linguistic and cultural diversity on the global networks⁶³.

There are a number of initiatives being taken by various organizations to foster ICT uptake in enterprises by providing financial support for specific ICT related activities of SMEs. These initiatives are listed in below table.

Table 11 - Main initiatives taken in favour of the uptake of ICTs

Organisations responsible	Objectives	Target public	Funding
KOSGEB	<ul style="list-style-type: none"> a) Grant for procurement of specialized software; b) Establishment of Internet cafés together with NGOs (sectoral chambers, managements of organizes industrial zones, etc.); c) Free of charge Internet related service for SMEs through its KOBI-NET portal (services provided: web pages of SMEs in 6 different languages, e-mail, web-mail, hosting and updating services, help desk, online information bank). 	SMEs	<ul style="list-style-type: none"> a) Grant financing between 50-70% of software price (max. €11,312 per year) through state budget; b) State budget; c) State budget.
TTGV	Grant for e-business activities and ICT related consultancy and trainings under its scheme called Technology Support Services.	SMEs	Grant up to 75% of the cost for training and consultancy through Under-Secretariat of Treasury -through the resources of the World Bank.

⁶³ EU SME Charter, Turkey Report, September 2002.
http://www.europa.eu.int/comm/enterprise/enterprise_policy/enlargement/charter_ccs_2003.htm

Apart from above listed schemes, there are a number of initiatives for increasing the number of innovative ICT companies. These include matching funds provided through soft loans of TTGV and grant support of TUBITAK-TIDEB for software R&D; support by private and public sectors for providing infrastructure in the incubators and technoparks, and consultancy and mentoring for small ICT firms and start-ups (those activities are carried out in the incubators such as KOSGEB's Technology Development Centres, Ericsson Crea-World, Siemens Business Accelerator and Koc Holding's IT Group).

Another activity carried out for business enterprises is the ICT related services provided by the Exporters Unions⁶⁴ of the Under-Secretariat of Foreign Trade (UFT). These services mainly cover providing information on their members (the manufacturing companies and exporters) on the Internet. Meanwhile, preparation studies for establishing a "virtual fair" by Exporters Unions are carried out under the coordination of the UFT. Through this service, members of the unions will take part on a virtual fair area and make use of the on-line information services to be provided.

Main initiatives for ICT uptake in enterprises were developed based on the demand by the business sector.

Main initiatives for ICT uptake in enterprises were developed based on the demand by the business sector. KOSGEB is quite active in providing SMEs with Internet services especially in the regions where such services are not widespread. At the moment there are 44 Internet cafés established for this purpose throughout the country and the demand from SMEs is remarkable. As reported by KOSGEB, SMEs that have access to the Internet at those cafés subsequently own their computer systems and establish Internet connections as they understand the benefits⁶⁵. Another important service provided by KOSGEB is the KOBINET portal where SMEs have their web pages in six different languages and make use of ICT related business services free of charge as explained in above table. As of December 2002 there are 14,500 SMEs with web sites on KOBINET and a large number of others using the information provided at the portal. A project started recently to enhance the KOBINET portal in a way that it makes e-commerce possible for its member SMEs. The project is being finance by the EU and KOSGEB and is expected to be finalized by the end of 2003. KOSGEB's software support is designed for the SMEs in manufacturing industry for their specific software needs.

⁶⁴ There are 16 Exporters Unions that design and implement activities for increasing the exports, organizing the exporters of related region and dealing with the issues they face. These unions are established by the Under-Secretariat of Foreign Trade and have Boards of Directors from business sector. They are linked together by a wide area network (WAN) throughout the country and work on an on-line, real-time environment.

⁶⁵ For details, please see EU SME Charter, Turkey Report, September 2002. http://www.europa.eu.int/comm/enterprise/enterprise_policy/enlargement/charter_ccs_2003.htm.

TTGV's e-business support comprises of initial consultancy studies needed for an SME to start its e-business activity. It has been started as one of the components of a pilot programme called Technology Support Services (TSS) where a total budget of €3.4 million has been allocated. Starting from August 2001 to December 2002, 240 e-business projects of SMEs were supported by TTGV for an approximate amount of €648,000. The projects mostly cover services procured for taking part in e-commerce portals. However, demand by SMEs is growing very rapidly and it is much higher than the budget of the programme. TTGV's TSS support also includes specific ICT related trainings for SMEs.

Besides these initiatives, there are a large number of short-term training seminars organized by various private companies and NGOs for business sector on e-commerce activities. These kinds of trainings are generally organized by the developers and operators of the e-commerce portals as a part of their marketing and promotion activities, which helped awareness raising on e-commerce in business sector to a large extent. Both these seminars and news on stories of SMEs taking part in e-commerce portals lead to considerable increase in the demand for financial and technical support for e-commerce applications. Therefore there is a need for designing new e-business support schemes for SMEs and finding new financial resources for them. These efforts should also be reinforced with consultancy and training initiatives for SMEs on establishing international relations and conducting international business and trade. The results of the opinion survey also underlined that the Government should increase the level of effort to stimulate the take up and implementation of ICT in enterprises.

Key findings

- Turkey's telecommunications infrastructure is well equipped with digital technologies for enabling dissemination and use of ICT services.
- Indicators for penetration of IT are quite low but show a rapidly increasing trend in recent years.
- ICT take-up rates for large Turkish companies are very high and they have started their e-transition projects by which they will transform all of their business processes in electronic environment. There are no official data on ICT take-up in SMEs but the SIS plans to start a survey by the second half of 2002 for this purpose.
- E-commerce and Internet banking activities develop rapidly and while large companies have already started to offer their goods on their e-commerce sites there are 7 e-business portals serving nearly 30,000 –mostly small- companies for e-commerce activities.
- ICT penetration and diffusion of knowledge has been an integral part of the innovation policies of Turkey since 1993.
- One of the most important studies on ICT in Turkey is the Master Plan on National Information Infrastructure that was prepared by the Ministry of Communication and Transportation, Turk Telecom, TTGV, TUBITAK, the Association for Electronics Industrialists of Turkey (IESID) in 1999 and proposes policies for penetration and take-up of ICT in the economy and society.

- e-Turkiye Project, under e-Europe+, is being implemented by 13 working groups covering all aspects of the issue from education and human resources to legal framework where experts from public bodies, business sector and NGOs participate and is supported by a number of activities like conferences and summits.
- There are a number of initiatives being taken mainly by KOSGEB and TTGV to foster ICT uptake in enterprises by providing supports for financing specific ICT related activities of SMEs.
- E-commerce portals designed and operated by private groups and NGOs carry out big campaigns for awareness raising on the issue and these efforts lead to considerable increase in the demand from SMEs for financial and technical support for e-commerce applications.
- To be able to meet this demand there is a need for designing new e-business support schemes for SMEs and finding new financial resources for these schemes. This kind of efforts should also be reinforced with consultancy and training initiatives for SMEs on establishing international relations and conducting international business and trade.

Section 3 - Business innovation interfaces and support measures

3.1 Research community – industry co-operation

Promoting interactions and co-operations between the research community and the business sector has increasingly been given importance in the science and technology policies of Turkey since the 1990s.

Promoting interactions and co-operations between the research community and the business sector has been given increasing importance in the science and technology policies of Turkey since the 1990s. In particular, establishing and developing university-industry relations has been an integral part of the project on “Impetus in Science and Technology” (1995), the Seventh and Eighth Five-Year Development Plans (1996-2000 and 2001-2005) and the Decisions of the BTYK. The issue has also been considered by the scientific and industrial community in various joint studies, such as the Working Group of University-Industry Relations (1995-1996) founded under the Science, Technology and Industry Policy Discussions Platform. As a result of these efforts, a number of initiatives have been taken to promote interactions and co-operation between research community and business sector.

On the implementation side, initial steps to tackle the issue were started in 1991. Since that time, TTGV has been co-operating with experts from universities and research institutes to evaluate and supervise technology development projects of industry. A pool of nearly 1500 experts has been formed for this purpose. Regular visits to the companies by these experts who also act as mentors for projects supported by TTGV, increase the interaction between science and industry, and create a common ground for future co-operation. The same applies to the industrial R&D projects supported by TUBITAK-TIDEB since 1996. In addition, as a means for stimulating the co-operation between the research community and industry on research, technology development and innovation (RTDI), TTGV shares the cost of service purchase by the industry from a university and/or a research centre for the projects it supports.

Another important measure taken was adoption of the Decree on State Support for R&D in December 1994. In accordance with the Decree, TUBITAK-TIDEB increases the amount of support by 30% in case an industrial company cooperates with a university and/or a research institute in its R&D project (See also Table 2). Moreover, the Decree allows for a grant to the universities and/or public research centres of up to €100,000 for an R&D project if they cooperate with a local industrial company in international programmes such as Eureka.

The “University-Industry Joint Research Centres Programme” implemented by TUBITAK-TIDEB since 1996 aims at creating an environment favourable to joint R&D activities of universities and industrial companies. TUBITAK-TIDEB’s financial support for organization of the brokerage events by universities aims to facilitate transfer of research results from universities to industry.

The Technology Development Zones Law provides incentives for mobility of academic staff to work with the private companies located in the technoparks.

Technology Development Centres (incubators) being established jointly by the universities and KOSGEB are also important for closing the gap between universities and business sector. There are 11 incubators established in the technical universities throughout the country. Another important step taken to stimulate interaction and co-operation between research community and business sector is issuance of the Technology Development Zones Law to regulate establishment of technoparks in co-operation with the universities and research centres to provide the infrastructure required for facilitating technological innovation. The law provides incentives for mobility of academic staff to work with the private companies located in the technoparks as well as stimulating academics to establish their companies or to be a shareholder in the companies and/or to take part in the managements of companies located in technoparks. TTGV acts as a catalyst in the establishment of technoparks by providing financial and technical support.

Table 12 - Main initiatives taken in favour of research – industry co-operation

Organisations responsible	Objectives	Target public	Funding
TTGV	<ul style="list-style-type: none"> a) Support for technological product and process innovation projects; b) Support for establishment of technoparks in universities and research centres in accordance with the Technology Development Zones Law; c) Award for the MS and PhD thesis best applied to industry. 	<ul style="list-style-type: none"> a) Business enterprises; b) Business enterprises and academics; c) Business enterprises, MS and PhD students and academics who are the thesis supervisors. 	<ul style="list-style-type: none"> a) Co-financing up to 50% (funding provided by the Under-Secretariat of Treasury through the World Bank resources, by the Under-Secretariat of Foreign Trade, and by TTGV’s resources); b) Co-financing up to 50% (funding provided by the Under-Secretariat of Treasury through the World Bank resources); c) Prestigious national award for target public (expenses are financed by TTGV’s own resources).
TUBITAK-TIDEB	<ul style="list-style-type: none"> a) Support for industrial R&D projects; b) Support for establishment of university-industry joint research centres; c) Support for organizing brokerage events. 	<ul style="list-style-type: none"> a) Business enterprises and universities cooperating with industry in international programs; b) Business enterprises and universities; 	<ul style="list-style-type: none"> a) Grant finance up to 60% (30% of which is provided if the company co-operates with a university and/or public research centre); maximum €100,000 is provided for a university and/or public research centres for a project if they cooperate with a local industrial company in international

Organisations responsible	Objectives	Target public	Funding
		d) Business enterprises and academics.	programmes such as Eureka (funding provided by the Under-Secretariat of Foreign Trade); b) Grant finance around €100,000 per centre, up to 50 %, rest must be provided by industry (Funded by TUBITAK's budget; total amount is determined by the annual budget); c) Grant finance depending on the demand according to an agreed budget (Funded by TUBITAK-TIDEB's budget).
KOSGEB	Establishment of incubators in universities.	Business enterprises	Establishment is jointly funded by the budgets of universities and KOSGEB.

Those mechanisms implemented by TTGV and TUBITAK-TIDEB are found to be very effective in promoting research community-industry co-operation.

Those mechanisms implemented by TTGV and TUBITAK-TIDEB have been found to be effective in promoting research community-industry co-operation. According to the results of a first monitoring and evaluation study of the state R&D supports in 1998, 70.8% of the companies with projects supported by TUBITAK-TIDEB and 80.3% of those supported by TTGV have co-operated with the universities or public research institutes on R&D whereas only 14.3% of companies that did not apply for any of these schemes have co-operated with a university or a public research institute. TTGV's and TUBITAK-TIDEB's mechanisms also have a very positive impact on the level and quality of co-operation. While the most important area for co-operation for the companies that did not apply for TTGV and TUBITAK-TIDEB's support is "solution of technical/operational problems" (54.4%), it is "new product development" for the companies with projects supported by TTGV and TUBITAK-TIDEB (65.5% and 45.9% respectively).

In spite of the efforts of TUBITAK-TIDEB to establish joint university-industry centres, these initiatives have not been very successful.

When the number of applications for university-industry joint research centres is compared with the number of established centres, in spite of all efforts of TUBITAK-TIDEB for establishment of such centres, initiatives have not been quite successful. As of August 2002, only three centres have been established out of sixteen centre project applications since late 1996. These are the Ceramics Research Centre in Eskişehir Anadolu University, Textile Research Centre in Ege University and Adana University-Industry Joint Research Centre. There are also three more centres in preparation stage which are expected to be successful. Those are the Microelectronic Research Centre in Middle East Technical University (METU), Biotechnology-Biomedical Research Centre in Hacettepe University, and a centre being designed by METU and Ankara-OSTIM Industrial Zone. The main reason for failure in 10 other centre initiatives has been

underlined as lack of strategy and long-term commitment by the universities to co-operate with the industry⁶⁶. On the other hand, there are also problems in bringing the industrial companies together to establish a centre for carrying out joint R&D projects with universities, as they do not open for co-operation with the others due to their conservative structures.

Nevertheless, the “University-Industry Joint Research Centres Programme” has been very important to demonstrate success stories of university-industry collaboration. The Ceramics Research Centre (SAM) in Eskisehir Anadolu University has been successful since its establishment in 1998. The centre has 19 partners from industry and nine laboratories for ceramics research and testing. 30 projects have been implemented in four years and two patent applications have been filed as a result of the projects.

TUBITAK-TIDEB has started to finance the brokerage events of universities in 1997. In 2002, three brokerage events were organized by METU (on construction technologies and design technologies) and Ege University (on agro industry) and 283 projects were presented in total.

Between 2000 and 2002, 6 technopark sponsoring institutions have been provided with the assistance of international experts hired by TTGV.

Since 1999, TTGV has been proactively stimulating establishment of technoparks by various means including organizing seminars, providing and distributing information, and providing technical and financial support. Between 2000 and 2002, 6 technopark sponsoring institutions (5 of them are universities and one is a municipality) have been provided with the assistance of international experts hired by TTGV to help them prepare their technopark business plans in accordance with the international best practices. As of August 2002, technopark projects of Istanbul Technical University and Bilkent University (in Ankara) have been allocated approximately €12 million by TTGV through the funds provided by the Under-Secretariat of Treasury from the World Bank resources.

In order to facilitate interaction and co-operation with industry, some major universities have established centres in their field of expertise. Two examples of these centres are Biltir⁶⁷ at METU and Ebiltem⁶⁸ at Ege University. The former was established by nearly 95 academics from 14 different departments, including various engineering departments as well as the departments of industrial design, management and economy. The centre has “units” to provide consultancy and perform contractual research to the industry and those units are established depending on the demand by the business sector. At the moment there are three units: Industrial Design and Manufacturing; Automation, Robotics,

⁶⁶ Ulusal Inovasyon Sistemi Acisindan Universite-Sanayi Isbirligi (University-Industry Co-operation from National Innovation System Point of View), A. Goker, 2002.

⁶⁷ <http://www.biltir.metu.edu.tr/>

⁶⁸ <http://www.ebiltem.ege.edu.tr/>

Electrics and Electronics; and Numerical Modelling, Analysis and Design. Ebiltem Centre of Ege University provides technical consultancy services to the industry while it also acts as a liaison office for university-industry relations. The centre commercialises university research projects by finding suitable industrial partner and provides any kind of consultancy to finalize the commercialisation process.

Automotive Industrialists' Association (OSD) together with Istanbul Technical University (ITU) has taken action to establish an Automotive Technology R&D Centre. The initiative is co-financed by the EU and local sources. It is aimed to carry out pre-competitive research for the industry, and implement testing in co-operation with the university. At the beginning it will be developed under the framework of TUBITAK-TIDEB's University-Industry Joint Research Centre Programme. The aim is to have a European partner and to turn the centre into an independent institution in the future.

Other significant initiatives have been taken by the Istanbul Chamber of Industry (ISO) and Ankara Chamber of Industry (ASO). Both chambers provide academics with the opportunity of working 2-weeks every year for an industrial company. ISO also started a pilot project to bring together university and industry on the Internet. ISO is in the process of establishing a working group by the academics and industrialists to carry out a study for identifying the problems faced in university-industry relations. It is planned to review ongoing university-industry collaboration programmes of the Chamber and design new ones based on that study.

In addition to above actions and initiatives to facilitate interaction and co-operation between the research community and industry, there are informal private networks established in a bottom-up manner by the business sector, universities and research centres to co-operate on research, technology development and innovation (RTDI). Detailed information on these networks is given in Section 3.3 below.

The main problems in establishing a strong linkage between the research community and business sector lie on cultural differences.

Based on the interviews, the main problems in establishing a strong linkage between the research community and business sector lie on cultural differences. In general, there is a need for building confidence, as the business sector has concerns about confidentiality issues when interacting with universities on R&D projects. This is also evident in the figures given above for comparing the percentages of companies co-operating with a university/research centre with and without TTGV's and TUBITAK-TIDEB's support and the areas of co-operation. Since the companies supported by TTGV and TUBITAK-TIDEB have already overcome with the fear of disclosure of their confidential information by proposing their RTD projects to those institutions,

they are much open to collaborating with the research community on such projects.

Other actions proposed to increase the interaction and co-operation between academics and industry include:

- Setting new rules for academic promotion which must mainly be based on the performance in co-operating with the industry; and
- Revising necessary legislative regulations in a way that the academics are granted with the opportunity to establish their companies.

Although the latter has been possible with the recent legislation on technoparks, it is being suggested that it should not be restricted to the academic staff located in a technopark. On the other hand, it is expected that both the new legislation on technoparks and Turkey's participation in the 6th Framework Programme will be important driving forces to increase the interaction and co-operation between the research community and business sector as both parties show great interest on these developments.

Key findings

- Promoting interactions and co-operation between research community and business sector has increasingly been given importance in the Science and Technology Policies of Turkey since 1990s.
- TIGV, TUBITAK-TIDEB and KOSGEB have been stimulating collaborations between university/research centre and industry in their programmes which have been proved to be successful.
- There are also efforts both by the business side, through Chambers of Industry and private informal networks, and by the university side, through various centres to facilitate collaboration between the two.
- Increasing the level of co-operation requires a change in culture both for the research community and for the business sector which must be achieved by education, training and awareness raising activities as well as some initiatives and legislative improvements to encourage such co-operations.

3.2 Support for start-ups and new technology based firms

There are no direct measures to encourage establishment and growth of new innovative companies.

There are four venture capital companies to support NTBFs and total amount of fund of these companies is nearly €40 million. By August 2002, these funds had invested in 12 NTBFs.

As specified in Section 1.2 despite a policy recognition of the role of start-ups in economic development, there are no direct measures to encourage establishment and growth of new innovative companies. On the other hand, the creation of new technology-based firms (NTBFs) has been promoted by KOSGEB since 1991 through establishing incubators together with universities. Some 200 companies have been assisted by those incubators to date, 70 of which had exited the incubators as of mid-2002.

The market for venture capital and seed capital funds for NTBFs is underdeveloped in Turkey mainly due to the current macroeconomic environment. In general, investors take a short-term perspective and lack potential interest in investments bearing risk, because of the high rate of inflation and interest rates. Another problem concerns the existing legal framework. As mentioned in Section 1.5, in accordance with the Venture Capital Regulations of the Capital Market Board, venture capital companies have to be established as joint stock companies. In accordance with the venture capital regulations of the Capital Market Board, public offerings by the venture capital companies must be 10% of the shares in the first year, 30% by the third year and 49% by the fifth year. The reason for this is that the only way for a venture capital company to obtain tax exemption is by becoming a public company. There are four venture capital companies to support NTBFs and the total amount of fund of these companies is nearly €40 million. By August 2002, these funds had invested in 12 NTBFs. There are also some private incubators and/or investors such as Ericsson Crea-World, Siemens Business Accelerator and Koc Holding's IT Group. Those organizations assisted nearly 75 NTBFs in start-up phase by providing infrastructure, mentoring and/or financial support.

Table 13 - Main initiatives taken in favour of start-ups

Organisations responsible	Objectives	Target public	Funding
KOSGEB	Establishment of NTBFs	Entrepreneurs	Infrastructural and administrative support, mentoring; plus €25,000 soft loan for R&D related equipments and €35,000 grant for procurement of training and consultancy services.
TTGV	Establishment of venture capital funds to support NTBFs	Potential investors of venture capital to support NTBFs.	Capital investment in venture capital companies up to 30 % of total investment (up to €4.5 M) (Total amount available is €7.9 M).

Ericsson Mobility World (Crea-World)	Support for infrastructure in the incubators, and consultancy/mentoring	Small ICT firms and entrepreneurs (with innovative projects on mobile Internet applications).	Private resources (Ericsson's) and financial support from UNIDO.
Siemens Business Accelerator	Support for infrastructure in the incubators and provision for cooperation with Siemens divisions	Small ICT firms and entrepreneurs.	Private (Siemens's) resources.
Koc Holding	Support for infrastructure in the incubator, and acting as a business angel.	Entrepreneurs (invests especially in innovative e-business ideas).	Private (Koc Holding's) resources.

As explained above, NTBFs are supported through incubators of KOSGEB and there are a few private groups helping such firms in start-up and early stage growth phases. However, an insufficient amount of seed and venture capital funds has been the major problem for entrepreneurs although there is a very high potential of such individuals who would like to start up their technology based companies. A pilot survey carried out by TTGV in September 2001 among 143 young Turkish university graduates and PhD/MS students in Turkey and abroad (especially in the USA and Canada) indicated that 80% of the respondents were interested in establishing their own technology based companies in case necessary mechanisms and incentives are provided; most importantly start-up capital fund is provided. The percentage of those who would start up his/her technology based business in two years time if necessary support programmes were in place is as high as 94%. While 92% of them require a start-up capital of less than \$200,000 (58% less than \$100,000) for their high-tech project, all of them require consultancy and advice on almost all aspects of a business needed to establish and grow.

One of the recent developments is that Turkey is participating in the Multiannual Programme on Enterprise and Entrepreneurship and in Particular for SMEs (2001-2005), where initiatives for supporting start-up companies will be taken under the coordination of KOSGEB.

In summary, not having a developed venture capital market and business angels network are significant handicaps for new technology based firms. There needs to be actions taken to improve the legislation for establishment of venture capital funds, to raise awareness on the importance of investing in NTBFs, and to demonstrate to the private sector (venture capital funds and business angels) that such investments can be financially attractive. Moreover, there are not enough mechanisms and tools to stimulate exploitation of research results by establishing spin-offs although it is indirectly encouraged by the technology development zones law which permits academics establish their companies in technoparks. Therefore, specific policy actions and

mechanisms are required to stimulate establishment of high-technology start-ups and spin-offs (Also see Annex 3-Output Paper of Innovation Policy Workshop).

Key findings

- Science and Technology Policy Documents of Turkey cover actions for creation and growth of innovative enterprises by means of financial supports, venture capital finance, tax incentives, training and consultancy with a special emphasize to SMEs; but there are not direct specific measures to encourage establishment and growth of innovative start-ups.
- Creation of NTBFs has been promoted by KOSGEB since 1991 in the incubators established together with the universities. 200 companies were assisted by those incubators to date.
- The market for venture capital and seed capital funds for NTBFs is less developed in Turkey mainly due to the uncondusive macroeconomic environment and inconvenient legislation for establishing venture capital funds.
- There are four venture capital companies to support NTBFs and total amount of fund of these companies is nearly €40 million. The number of NTBFs invested in by those funds is found to be 12 as of August 2002.
- There are also some private incubators and/or investors such as Ericsson Crea-World, Siemens Business Accelerator and Koc Holding's IT Group which assisted nearly 75 NTBFs in start-up phase by providing infrastructure, mentoring and/or financial support.
- Above efforts and initiatives are quite insufficient to meet the demand by the entrepreneurs who would like to start up their technology based companies.
- There needs to be actions taken to improve the legislation for establishment of venture capital funds, to raise awareness on the importance of investing in NTBFs, and to demonstrate to the private sector (venture capital funds and business angels) that such investments can be financially attractive.
- In addition, specific policy actions and mechanisms are required to stimulate establishment of high-technology start-ups and spin-offs.

3.3 Business networks for innovation

Since 1996, the Under-Secretariat of Foreign Trade (UFT) has been stimulating establishment of “sectoral foreign trade companies” (SFTC) as a formal network between SMEs. The main objective of this initiative is to create a framework in which SMEs come together and form a new joint company with the idea of using their innovative capacity jointly to compete in global markets. In accordance with the legislation, sectoral foreign trade companies are established by at least 10 SMEs (five SMEs if located in the developing regions) each of which has a share not more than 10 % of the SFTC. At present, there are 29 SFTCs (six in developing regions) in various sectors that are established by 948 SMEs⁶⁹.

Inter-firm networks have also been created by establishing common facilities and centres for companies by TTGV, TUBITAK and KOSGEB. Between 1996 and 1998, TTGV established Technology Service Centres together with private

There are four centres operating as joint stock companies and active in biotechnology, advanced materials, software and electronics to provide R&D services, testing, measurement and training for their sectors.

⁶⁹ See <http://www.bigfood.gen.tr/> for an example of SFTC.

sector companies. There are four centres operating as joint stock companies and active in biotechnology, advanced materials, software and electronics to provide R&D services, testing, measurement and training for their sectors. University-Industry Joint Research Centres established by TUBITAK-TIDEB provide interaction and networking between the companies. The centres mainly promote pre-competitive research. R&D projects carried out in the centres are designed based on the common demand of the sector and implemented together with the R&D staff of the member companies of the centre. Results of these projects are available to all member companies (see Section 3.1 above for detailed information on these centres).

KOSGEB's Common Facility Workshops (ORTKAs) and Common Purpose Laboratories (ORTLABs) create an environment for SMEs to interact by using the workshops and laboratories established with the support of KOSGEB and regional umbrella organisations, such as chambers of industry and sectoral associations. ORTKAs and ORTLABs are established as private companies jointly by at least eight SMEs (four in developing regions) active in the same and/or complementary sectors. Moreover, KOSGEB is in the process of starting MEDA financed projects that would facilitate networking between firms for innovation. Those include establishment of business innovation centres, centres for shoe making, textile and clothing, and automotive parts and components sectors (with a total budget of €14 million).

Table 14 - Main initiatives taken in favour of inter-firm co-operation

Organisations responsible	Objectives	Target public	Funding
UFT	Establishment of “sectoral foreign trade companies” by SMEs for using the innovative capacity jointly to produce and export.	SMEs in any sectors that aim to export.	No funding is provided but the status of SFTC is granted by the UFT.
TTGV	Technology service centres for industrial R&D, measurement, testing, training and consultancy.	There are four centres active in biotechnology, advanced materials, software and electronics that serve to companies throughout the country.	Soft loan up to 50% of project budget (not more than €2 M); rest should be financed by the founders of the centre (Total amount of funds is €6.3 M).
TUBITAK-TIDEB	Joint R&D and product development.	There are three centres; two are sectoral and active in ceramics and textile that serve to companies active in these sectors and one is regional.	Around €100,000 per centre, up to 50 %, rest must be provided by industry (Total amount is determined by annual budget).
KOSGEB	Workshops and laboratories for common use.	There are 35 ORTKAs and ORTLABs established in 8 different sectors by SMEs in the same and/or complementary sectors.	Soft loan up to €300,000-machinery and equipment is provided by KOSGEB; premises and staff by the chamber or sectoral organisation.

There are also two active informal networks that were initiated by the business sector for joint RTDI as well as information and experience exchange. One of them is TARGET established in 2001 as a result of a focus group activity led by Tofas, one of the biggest automotive manufacturers of Turkey. As a result 63 members established a private informal network, the majority of which are large companies and SMEs active in various sectors. Groups of companies and universities within the network jointly carry out RTDI projects. The members of the network meet regularly in the premises of one of the network members, and interact through the Internet. Detailed information is given on TARGET in Box 3 below. Another private network is called TEKNORAMA which was initiated again by the business sector at the beginning of 2002. The group has more than 100 members with a balance between business sector, universities, NGOs and media members who meet regularly every month and also interact through the Internet. There are various working groups established within the network to carry out specific studies for the common interest of the network members.

Box 3 - Technology Research and Development Group: TARGET

TARGET has been established with the leadership of TOFAS, one of the biggest automotive manufacturers of Turkey and partner of FIAT. In May 2001, TOFAS organised a focus group activity for two days with participation of 50 people from industry, university and TUBITAK. The aim was to identify strategies and co-operation needs to be able to develop technologies on specific areas and to prepare an action plan for this purpose. TARGET has been formed to be able to continue information, experience and resource exchange between participant organisations, to include new participants in the group, and to develop and implement joint projects. It has been designed as a network open to anybody and any organisation that wants to co-operate on research, technology development and innovation. The network was established by 63 member organisations from a wide range of sectors from large companies, SMEs, universities, research centres, NGOs and public organisations.

Activities of TARGET are being carried out through regular meetings, e-mail lists and its website. Each meeting is held at the premises of a different organisation and a tour to its R&D department is organised for the participants. Project groups are formed to carry out the projects designed by TARGET and results of projects are shared by every member.

One of the most important projects being implemented by the group aims to establish a "Seat Excellence Centre". The project has been initiated by TOFAS. The approach of the project has been defined as a) knowledge acquisition by creating knowledge infrastructure and understanding current technologies and trends; b) capability development by creating capable human resources in relevant disciplines, by means of product benchmarking, and practical applications and knowledge creation; c) assuming responsibility for the development of seating of global model, assuming total seat development responsibility on behalf of FIAT Auto, challenging world leadership in seat conceptualising, design and development.

At the moment, various innovation projects are being carried out on the subject by various partners. In product design and development, four universities, two domestic and one foreign research centres and eight small and large companies have started co-operation. There is always room for other partner organisations that would like to become a member of the project teams. TARGET provides a common ground for this purpose and creates synergy. At every meeting of

TARGET, update on the “Seat Excellence Centre” project and its sub-projects is presented and participants of the meeting are requested to explain their views and provide feedback. Project leader of the “Seat Excellence Centre” emphasizes the importance of TARGET platform which contributes to the ongoing projects to a large extent as they have the opportunity of getting feedback from various experts and many innovative ideas from the participants who are not involved in the project. Another significant feature of TARGET is the environment it creates for horizontal and vertical communication: Not only high level but also junior staff of many innovating companies participate in TARGET meetings and it facilitates a two way learning process.

Effect of foreign direct investment in supply chain relationship is mainly observed in automotive parts and components sector.

Effect of foreign direct investment in supply chain relationship is mainly observed in automotive parts and components sector. There are nearly 350 original parts manufacturers and exporters in the sector. The Association of Automotive Parts and Components Manufacturers (TAYSAD) is establishing an organized industrial zone that will have common facilities and centres for R&D, training and consultancy. Establishment of these centres are being supported by KOSGEB through the funds of MEDA programme.

Traditionally, inter-firm cooperation has been difficult for Turkish business sector due to their conservative structures as family-owned and owner-managed companies.

Traditionally, inter-firm cooperation has been difficult for Turkish business sector due to their conservative structures as family-owned and owner-managed companies. Therefore, a top-down approach has been needed to initiate networking oriented initiatives mentioned in Table 14. The common problems experienced in initiating such structures have been convincing the companies to co-operate. In addition, some recent changes deserve a notice. Driving forces such as globalisation, EU candidacy (especially participation in the EU’s 6th framework programme), Government initiatives (e.g. incentives for technology development zones) and most importantly effects of the severe macroeconomic crises in 2000 and 2001 (i.e. export orientation of the industry due to narrowed local market) have forced the business sector to become innovative. As a result networking and co-operation have started by the business sector itself in a bottom-up manner as in the cases of TARGET and TEKNORAMA. Based on the interviews, the most important tool to facilitate such networking activities is to demonstrate to companies positive effects of such activities on competitive advantage of a company. It is emphasised that awareness raising on the benefit and importance of networking by presenting the results of such efforts is very effective.

Key findings

- Inter-firm networks have been stimulated through sectoral foreign trade companies by the UFT and by common facilities and centres by TTGV, TUBITAK and KOSGEB since 1996.
- Effect of foreign direct investment in supply chain relationship is mainly observed in automotive parts and components sector where companies became aware of networking and co-operation for increasing competitive advantage.
- Traditionally, inter-firm co-operation has been difficult for Turkish business sector due to their conservative structures as family-owned and owner-managed companies.
- However, driving forces such as globalisation, EU candidacy, Government initiatives and most importantly effects of the severe macroeconomic crises in 2000 and 2001 have forced the business sector to become innovative to survive and compete, and to start networking for joint R&D as well as information and experience exchange.
- It is required to raise awareness on the benefit and importance of networking by presenting the examples of such efforts that have contributed to the competitive advantage of other companies.

Section 4 - Conclusion and Policy Options

4.1 Key conclusions Turkey

The following key conclusions can be drawn from the analysis:

Turkey has an institutional structure with a long-tradition of policy development and an “evaluation culture” in the field of technological development and innovation policy. However, a problem arises from weak implementation of the policies both due to lack of commitment by politicians and governments, and insufficient awareness about innovation among firms. Being aware of this fact, the Vision 2023 Project has been started to design science and technology policies that would include Turkish innovation policy as explained in the first chapter of this report. The aim is that the Vision 2023 project guarantees a shared vision, commitment and active involvement by all stakeholders in policy making.

On the other hand, there is a need to focus on raising awareness on innovation. While doing that, it is important to develop a common understanding on the concept of innovation. In general, definition of innovation has been given a narrow perspective and is mostly linked with research and development (R&D). A broader definition of innovation should be established and disseminated.

Above issues are also evident in the results of the opinion survey and innovation policy workshop implemented under this study. Only 22% of the respondents to the survey agreed that there exists an innovation policy in Turkey; although there is a full-fledged policy, which is very nearly coherent with the objectives set out in the 2000 Commission Communication on innovation. Considering the fact that the survey covers those private sector actors who are already aware of the concepts linked to innovation policy, it is imperative to establish a concept of what innovation and innovation policy mean and what they are for.

As stated above, there are a large variety of institutions in Turkish innovation system, which have been long in existence. There is also a monitoring and evaluation system developed and applied for the main institutions of the innovation system. The results of analysis and innovation workshop indicate that cooperation and coordination among institutions of the national innovation system should be enhanced and strengthened. In addition clear roles and responsibilities should be defined for implementing bodies of innovation policy actions, and impacts and results of every policy action should be monitored and evaluated systematically and continuously.

Although the current legal and administrative environment is not fully conducive for innovation there are recent efforts to improve the situation. The “Reform Programme for Improvement of Investment Climate” is of crucial importance both for domestic and foreign direct investments as mentioned in the first chapter of this report. Increasing the level of FDI is seen as one of the solutions to prevent brain drain in Turkey as qualified human resources and researchers, which are the most important capital for innovation, prefer to leave the country. Therefore, mechanisms to increase the level of FDI and of innovative activities of such companies are important in this respect as well as encouraging establishment of start-ups and spin-offs by improving the investment environment. Moreover, special measures should be taken to increase innovation activities of foreign enterprises in the country and interaction and cooperation of them with domestic enterprises.

To facilitate starting up and operating a business, one of the most important improvement action needed is to open one-stop-shops. It is also required to place innovation at the core of legal and regulatory reforms.

There is no question that macroeconomic environment is a major disincentive for firms to innovate. In the same way, it also makes investors risk averse. As a result entrepreneurs face serious problems in terms of finance. Most importantly market conditions and regulatory framework are not conducive to creation and growth of innovative firms. It is imperative to revise venture capital legislation and to increase the level and number of venture capital and seed capital/start-up funds to enable establishment and growth of new technology based firms (NTBFs). Both the results of opinion survey and innovation workshop attest to the fact that access to finance is a major problem for small innovative firms and start-ups, and must be solved by improving the market condition and regulatory framework as well as implementing various financial support schemes.

There are a remarkable number of training and education activities implemented to develop human resources for innovation. On the other hand, it is necessary to place innovation, creativity and innovative entrepreneurship at the heart of national education system. As a result of the analysis, important areas of development are identified as a) establishing one-stop-shops where training needs of SMEs are identified, training plans are developed and information is provided on available initiatives and service providers; b) training trainers to increase the number of qualified trainers and high quality consultants for some specific topics (e.g. business planning, technology management, innovation management, high-tech entrepreneurship, etc.); c) delivering more specific and customized training and consultancy focused on change in culture, business practices and organization for

innovation (such as value analysis, benchmarking, creativity tools, etc.); d) reinforcing coordination and cooperation between various bodies responsible for training and education; e) establishing a more widespread and structured lifelong learning system for continuously upgrading human capital across all industrial sectors (especially for SMEs); f) designing and implementing subsidy schemes to reduce the cost of training and consultancy making it more widely affordable for start-ups and SMEs.

Although initiated in a top-down manner, there is an increasing tendency for co-operation and networking between research community and industry and “business-to-business” collaboration, as elaborated in the third chapter of this report. Further efforts are required to increase the level of co-operation through a change in culture both for the research community and for the business sector which must be achieved by education, training and awareness raising activities as well as some initiatives and legislative improvements to encourage such co-operations. Recent developments such as Turkey’s participation in the EU’s 6th framework programme and incentives brought about by the technology development zones law provide valuable opportunities in this respect both for research community and for business sector.

4.2 Main steps to developing an innovation policy in Turkey

As the report has outlined, thinking at the level of policy makers and other stakeholders about how best to promote innovation in Turkey is developing and various initiatives have already taken place. The objective of this final section is to contribute to the debate and policy development by proposing a series of orientations or concrete actions which various interested parties (Government, business association, research and technology organisations, etc.) may wish to take into account in developing their own initiatives in favour of innovation in enterprises.

The conclusions of the analysis of this report lead to the following proposed options for innovation policy:

Design and implement a national campaign to raise awareness on innovation and innovative entrepreneurship by the beginning of 2004 jointly by TUBITAK, TTGV, KOSGEB, TOBB and other related public bodies and NGOs. Such a campaign should have components to promote a culture of innovation among all stakeholders. One of the main purposes should be demonstrating firms the importance of investing in innovation to gain and sustain competitive advantage, and to encourage them to do so. It should also aim at creating a

wide range of awareness on innovation in society and educating demand side for stimulating firms to innovate.

Investors and finance sector should also be addressed to demonstrate them the high potential of investing in innovative businesses.

Fully implement the actions identified under the “Reform Programme for Improvement of Investment Climate” by 2004 by Coordination Council for the Improvement of the Investment Climate, related ministries and public bodies. To implement improvement actions for investment environment it is required that nine technical committees (those responsible for employment, sectoral authorisations, establishment of companies, investment location, taxes and subsidies, customs and standards, IPR, legislation on FDI and investment promotion) complete their studies. Necessary regulatory, institutional and legal measures should be taken following completion of these studies.

Revise and improve venture capital legislations before end 2004 by Capital Market Board and related ministries. As mentioned in the first and third chapters of this report, existing venture capital legislation is not favourable for establishing and operating venture capital funds in accordance with the international best practices. It requires a number of legislative changes to facilitate increase in the level and number of venture capital and seed funds to help establishment and growth of NTBFs.

Review and revise the curricula from primary to higher education levels (including life long learning) to place innovation, creativity and innovative entrepreneurship at the core of national education system by 2005 by the Ministry of National Education and Higher Education Board. Such an action is a prerequisite for creation of a society open to innovation and to achieve a change in culture with respect to innovation. It is also extremely necessary for establishment and growth of innovative firms, which are the key for a sustainable economic growth, creation of jobs and social welfare.

Annexes

Annex 1 - List of people interviewed

Name	Position	Organisation	Contact details
Ahmet Arkan	Member of Parliament between 1999-2002	Grand National Assembly	
Ahmet Ayhan	Rector	Gebze Technology Institute	ayhan@gyti.edu.tr
Ahmet Duyar	General Manager	Artesis	ahmet.duyar@arcelik.com
Alev Gunal	Deputy Secretary General	TESK	agunal@tesk.org.tr
Ali Akurgal	Director; R&D, University and Government Relations	Netas	akurgal@netas.com.tr
Alparslan Yılmaz	Coordinator	MESS Training Foundation	mevgebze@messegitim.com.tr
Atilla Tezeren	Deputy Secretary General	MPM	atilla@mpm.org.tr
Aydan Erkmén	Vice President	TUBITAK-TIDEB	aerkmen@tubitak.gov.tr
Aykut Goker	Former Head of Science and Technology Policies Directorate of TUBITAK -Consultant to TTGV	TTGV	agoker@ttgv.org.tr
Aylin Helvacı	Researcher	Yeditepe University	aylinhelvaci@hotmail.com
Baha Kuban	Business Development	Sisecam	bkuban@sisecam.com.tr
Barbaros Demirci	Secretary General	Association Of Automotive Parts And Components Manufacturers	barbaros@taysad.org.tr
Bayram Mecit	Vice President	KOSGEB	bmecit@kosgeb.gov.tr
Burç Ozkan	Deputy Manager	ATA Yatırım	bozkan@atayatirim.com.tr
Cem Ucan	Director	Ilab	cucan@ilab.com.tr
Cengiz Ton	Expert	Ministry of Industry and Trade	cengizto@sanayi.gov.tr
Deniz Genez Aydın	Project Coordinator	TOBB	kobi@tobb.org.tr
Dilek Cetindamar	Associate Professor	Sabancı University	dilek@sabanciuniv.edu
Elif Elci	Technical Expert	Ankara Chamber of Industry	elif.elci@aso.org.tr
Elif Sönmez	Expert	Istanbul Chamber of Industry	esonmez@iso.org.tr
Emrehan Halici	Member of Parliament between 1999-2002	Grand National Assembly	emrehan@halici.com.tr
Ercan Orhan	Expert	TUBITAK-TIDEB	ercan@tubitak.gov.tr
Ercan Tezer	Secretary General	Automotive Industrialists Association	tezer@osd.org.tr
Ergun Turkcan	Former Head of Science and Technology Policies Directorate	TUBITAK	eturkcan@tubitak.gov.tr
Erol Sayın	Professor	Middle East Technical University	sayin@ie.metu.edu.tr

Erol Taymaz	Advisor to the President at TUBITAK and professor at Economics Dept. of METU	TUBITAK METU	etaymaz@metu.edu.tr
Ertugrul Yilmaz	Technology Director	Brisa	e.yilmaz@brisa.com.tr
Faruk Eczacibasi	President of ICT Foundation of Turkey-Vice Chairman of Eczacibasi Holding	Eczacibasi Holding	faruk@eczacibasi.com.tr
Fatih Kavaslari	R&D Project Manager	Inform	fkavaslari@inform.com.tr
Fazilet Vardar Sukan	Manager of Ebiltem	Ege University	biotech@bornova.ege.edu.tr
Ferda Kermelioglu	Chairman/International Relations Committee	Young Businessmen Association of Turkey	ferda@panel.com.tr
Filiz Cimen	Manager of Vision 2023 Technology Foresight Project	TUBITAK	filiz@tubitak.gov.tr
Filiz Sullu	Head of Research and Economic Relations Department	Aegean Region Chamber of Industry	Fsullu@ege.ebso.com.tr
Gunes Gencyilmaz	Professor	Istanbul Kultur University	g.gencyilmaz@iku.edu.tr
Gungor Yildizbayrak	Executive Vice President	Assan	Gungory@kibarholding.com
Haluk Zontul	Group Coordinator	TUBITAK-BILTEN	Haluk.Zontul@bilten.metu.edu.tr
Hande Keser	Head of Science-Technology and IT Indicators and Analysis Division	SIS	hande.keser@die.gov.tr
Harika Coskunoglu	Head of International Relations and Promotion Department	General Directorate of Foreign Investments of the UT	harika.coskunoglu@hazine.gov.tr
Hilal Derici	Research & Development Coordinator	MEKSA Foundation	hilalderici@meksa.org.tr
Huseyin Ugur	Director	UME	huseyin.ugur@ume.tubitak.gov.tr
İsmail Dalay	Dean	Sakarya University	idalay@sakarya.edu.tr
Mahmut Kiper	Expert	TUBITAK-TIDEB	mkiper@tubitak.gov.tr
Metin Durgut	Professor	METU	mdurgut@metu.edu.tr
Mevlut Dinc	Managing Director	Dinc Interactive Ltd.	Mevlut@vividimage.co.uk
Mine Onurtak Onduygu	Specialist	Siemens Business Accelerator	mine.omurtak.siemens.com.tr
Murat Ozgen	Investment Manager	Is Risk	mozgen@isrisk.com.tr
Murat Sayar	Technical Chief	TSE	msayar@tse.org.tr
Mustafa Atilla	Manager	Ankara Cyberpark	mustafa.atilla@mobilsoft.com.tr
Mustafa Colakoglu	Director of Technology Promotion Dept.	KOSGEB	mcolakoglu@kosgeb.gov.tr
Nazan Yelkikalan	Professor	Onsekiz Mart University	nyelkikalan@comu.edu.tr
Necla Haliloglu	Director	KOSGEB-Entrepreneurship Development Institute	neclah@gge.kosgeb.gov.tr
Nukhet Yetis	Director	TUSSIDE	nyetis@tussid.gov.tr

Nuray Guner	Professor	Middle East Technical University	nguner@ba.metu.edu.tr
Nurullah Genc	Professor	Ataturk University	nurullahgenc@hotmail.com
Olgun Tanberk	Plant Manager	Sinter	olgun@sinter-metal.com
Omer Oz	Director	METU-KOSGEB Technology Development Centre	oz@kosgeb.tekmer.gov.tr
Onder Koparan	Ass. Manager – Project Planning and Control	ASELSAN	okoparan@hc.aselsan.com.tr
Orhan B. Alankus	R&D Manager	TOFAS	orhana@tofas.com.tr
Orhan Yildirim	Member of Biltir	METU	orhany@metu.edu.tr
Refik Ureyen	Former R&TD Centre Director of Arcelik-Manager of Istanbul Liaison Office of TTGV	TTGV	rureyen@ttgv.org.tr
Sedat Inan	Manager	TUBITAK-MAM	sedat.inan@posta.mam.gov.tr
Sefik Senyurek	R&TD Centre Director	Arcelik	sefik.senyurek@arcelik.com
Selim Sarper	Former Assistant General Manager of Alcatel-Consultant to Oksijen Ltd.	Oksijen	selim.sarper@o2.com.tr
Selma Gurbuzer	Head of Department	Under-Secretariat of Treasury	selma.gurbuzer@hazine.gov.tr
Sema Sarac Kayabasi	Manager	Crea-World Ankara	sema.kayabasi@crea-world.com
Serif Simsek	Head of Management Department	Selcuk University	
Serkan Valandova	Expert	State Planning Organisation	svalan@dpt.gov.tr
Suat Teker	Professor	Istanbul Technical University	tekers@itu.edu.tr
Suleyman Balkan	Manager	Yalova Project Office	acsprm@superonline.com
Suleyman Nat	Coordinator	MEKSA Foundation	Meksa@tr.net
Tarik Reyhan	Professor	Bilkent University	treyhan@ee.bilkent.edu.tr
Tayfun Ugur	Coordinator	Koc Bilgi Sistemleri	tayfunu@kocbilgi.com
Tugrul Celebi	Executive Committee Member	KalDer	tcelebi@kalder.org.tr
Tugrul Tekbulut	Leader, Innovation and Entrepreneurship Work Group	Turkish Industrialists and Businessman Association	tugrult@logo.com.tr
Turgut Tumer	Associate Vice President	TUBITAK	ttumer@tubitak.gov.tr
Ugur Yuksel	Manager	METU Technopolis	ugur.yuksel@metutech.metu.edu.tr
Unal Alkan	Secretary General	Turkish Electronic Industry Association	info@tesid.org.tr
Yalcin Tanes	RTD Centre-Manager	Arcelik	yalcin.tanes@arcelik.com
Zerrin Ozbek	Head of EU Relations Dept.	Ministry of Industry and Trade	zerrinoz@sanayi.gov.tr

Annex 2 - List of documents received and consulted (bibliography)

Title	Author/organisation	Year of publication	Availability
Economic Program Report	Under-Secretariat of Treasury	July-August 2002	Available in English at http://www.treasury.gov.tr
Pre-accession Economic Programme	Republic of Turkey	August 2002	http://ekutup.dpt.gov.tr/ab/kep/pep2002.pdf
Ekonomik Gelismeler (Economic Developments)	State Planning Organisation	October 2002	Available in Turkish at http://www.dpt.gov.tr
Country Report-Turkey	The Economist Intelligence Unit	November 2002	15 Regent St, London SW1Y 4LR United Kingdom http://www.eiu.com
Turkiye'nin Teknoloji Tarihi (Technology History of Turkey)	Akin Cakmakci	1999	Available in Turkish
Dunyada ve Turkiye'de Yuksek Ogretim (High Education In Turkey and In the World)	Kemal Guruz	2001	Available in Turkish; published by OSYM
Sekizinci Bes Yillik Kalkinma Planı (Eight Five Year Development Plan)	SPO	2000	Available in Turkish at: http://ekutup.dpt.gov.tr/plan/viii/plan8.pdf
Science and Technology Strategies and Policies Archive	TUBITAK	1994-2001	Available in Turkish at: http://www.tubitak.gov.tr/btpd/arsiv.html
An overview of vocational education and training in Turkey	European Training Foundation	1999	http://www.etf.eu.int
Master Plan on National Information Infrastructure of Turkey	Ministry of Communication and Transportation	1999	Whole sets of documents are available in Turkish and with Final Report in English at http://www.tuena.tubitak.gov.tr/
Turkey ICT Profile	Michael Minges	March 2002	http://www.itu.int/ITU-D/ict/cs/letters/turkey.html
Information and Communication Technologies, Enlargement Futures Series 05	Elissaveta Gourova, Jean-Claude Burgelman, Marc Bogdanowicz, Christoph Herrmann	March 2002	European Commission Joint Research Centre (DG JRC) Institute for Prospective Technological Studies http://www.jrc.es
Reports of ICT Council	Prime Ministry	April 2002	Available in Turkish at http://www.bilisimsurasi.org.tr
Report of Specialization Committee on Higher Education	DPT	June 2000	Available in Turkish at http://ekutup.dpt.gov.tr/egitim/oik550.pdf
Report of Specialization Committee on ICT Policies	DPT	December 2001	Available in Turkish at http://ekutup.dpt.gov.tr/bilim/oik576.pdf
Turkey-Pre-Accession Economic Programme for EU	High Planning Council	2001	Available in English at: http://ekutup.dpt.gov.tr/ab/kep/pep2001.pdf

Sekizinci Bes Yillik Kalkinma Planı (Eight Five Year Development Plan)	SPO	2000	Available in Turkish at: http://ekutup.dpt.gov.tr/plan/viii/plan8.pdf
Towards A Sound Turkish Banking Sector	Banking Regulation and Supervision Agency	2001	Available in English at: http://www.bddk.org.tr/english/mainpage/index_eng.htm
Yatirim Ortaminin Iyilestirilmesi Reformu (Reform for Improving Investment Environment)	UT	2001	Available in Turkish at: http://www.hazine.gov.tr/yatirim_web.pdf
Sirket Yapilari ve Kurulus Asamalari (Company Structures and Establishment Procedures)	KOSGEB	2001	Available in Turkish; published by KOSGEB
Ulusal Inovasyon Sistemi Acisindan Universite-Sanayi Isbirligi (University-Industry Co-operation from National Innovation System Point of View)	Aykut Goker	August 2002	Available in Turkish
Building Venture Capital in Turkey: The Potential and How to Develop it	Melvin Goldman	2000	Position Paper for TTGV, not available for circulation

Annex 3 - Output Paper of Innovation Policy Workshop

The Innovation Policy Workshop in Turkey in the framework of the EU study on “Innovation Policy in Seven Candidate Countries: the challenges” was held in Istanbul on 25 October 2002. Representatives of eight innovating firms (large firms, SMEs and multinationals), two industrial federations (Automotive Industrialist Association and Young Businessmen Association of Turkey), one chamber of industry (Istanbul Chamber of Industry) and two governmental bodies as policy makers and implementers (TUBITAK and KOSGEB) were invited to discuss and present their views on the analysis already presented, as well as on the results of the opinion survey (List of participants is given in Attachment 1). The Sector Manager and Economic Section Expert from European Commission Ankara Delegation, Ms. Ilknur Aslan, has also been present during the workshop as an observer.

In the half-day workshop, Core Team Member Mr. George Strogyloupolous presented the key findings of the comparative analysis for all seven countries, and National Expert Ms. Sirin Elci presented the main conclusions of the national level analysis of innovation performance of Turkey, strengths and weaknesses of the national innovation system and a critique of current level of policy development, and the results of the opinion survey (Presentations made are given in Attachment 2). Reactions and debate sections were held at the end of each presentation with participation of the workshop attendees. The key points arising from the debate and the main conclusions drawn from the debate are summarized below.

Key points arising from the debate

- 1) In Turkey, there exist well-articulated innovation policy documents. However, the problem arises from weak implementation of the policies both due to lack of commitment by politicians and governments, and insufficient awareness on innovation among firms. Innovation policy actions should primarily be focused on raising awareness on innovation.
- 2) The Vision 2023 Project that has been implemented nearly for a year to design the Science and Technology Policies 2003-2023 is an important initiative as it has been started with participation of all stakeholders. However, interest has been diminishing in the panel activities of the “National Technology Foresight”, one of the most important sub-projects of the Vision 2023, due to political and macroeconomic environment. It is very important to keep the interest high by setting a public agenda supportive of these efforts through media. This again recalls the need for creating awareness on S&T and innovation issues among the stakeholders.
- 3) It is important to develop a common understanding on the concept of innovation. In Turkey, definition of innovation has been given a narrow perspective and is mostly linked with research and development (R&D). A broader definition of innovation should be established and disseminated among the stakeholders.
- 4) One of the reasons for not having a well functioning innovation system in Turkey is that until recent years industrial companies did not feel the need to innovate. Most of the companies producing for the domestic market could sell their products without increasing the quality, adding innovative features, etc. as the consumers in general did not demand such changes. On the other hand, especially because of the effects of globalisation and increasing competition, companies have started to be forced to be innovative. However, the level of innovation by the firms is still quite low and one of the reasons is that there is not enough demand by the society for innovation. The demand by society should stimulate innovation. Non-governmental organizations have a very important role in that respect. Co-operation and

synergy among such organisations should be created to promote innovation for stimulating both demand and supply sides.

- 5) Enterprises, as the main sources of innovation, should be educated and encouraged on innovation. In general, there needs to be a cultural change among industry to feel the need for innovation against the increasing threats of global competition. Turkish enterprises should learn to be proactive in innovation by specifying the market needs and reacting in time.
- 6) Both due to macroeconomic conditions of the country and less developed R&D base, qualified human resources and researchers, which are the most important capital for innovation, prefer to leave the country. Innovation policy actions should include measures to retain skilled human capital and researchers in the country and to reverse brain drain. Employing mechanisms to increase the level of foreign direct investment (FDI) and of innovative activities of such companies are important in this respect as well as encouraging establishment of start-ups and spin-offs.
- 7) The level of FDI has been low in Turkey and has not been influential on innovation. However, the studies started at governmental level to attract FDI should be given higher priority. Special measures should be taken to increase innovation activities of foreign enterprises and interaction and cooperation of them with domestic enterprises.
- 8) Training courses on entrepreneurship should be developed and disseminated. Some major universities recently started to realize the importance of it and as a result included entrepreneurship courses in the curricula. Similar initiatives should be disseminated and education policies of the Government should be integrated with innovation policies.
- 9) Sectoral organisations could play a more important role in innovation. They should be more active in promoting innovation and guiding their members in innovation related issues. It is also important for efficient use of scarce resources. For instance, the Automotive Industrialist Association took the lead for establishment of a joint R&D centre for automotive industry and mechanisms to increase cooperation in supply chain. Developing similar examples in other sectors would have a multiplier effect. Such initiatives of sectoral organisations should trigger pre-competitive research as well.
- 10) Not having a developed venture capital market and business angels network are significant handicaps for new technology based firms. There are some venture capital companies but they mostly prefer to invest in expansion and growth stages of companies. Macroeconomic environment prevents investors taking risk. In addition, existing legislation is not conducive enough to establish venture capital companies. Therefore, market conditions and regulatory framework need to be improved for this purpose.
- 11) National awards on technology and quality that are being organised nearly for five to ten years have been quite effective in promoting innovation in Turkey. Such efforts should be diversified and disseminated to create awareness in large target groups.
- 12) Considering the scale and diversity of development levels between regions of Turkey, there is a need to formulate regional innovation policies and strategies. Regional innovation policies should be designed and implemented in co-operation with the regional stakeholders (public bodies, business sector, universities, NGOs, etc.).
- 13) Actions should be taken to increase awareness on industrial and IPR both among the firms and society.
- 14) Policy actions should cover supporting “top-down” projects in selected sectors and initiatives to promote pre-competitive research. Although there are mechanisms in place to stimulate cooperation between universities and industry, more emphasis should be given to transfer

university researches to the industry for commercialisation. In parallel with these actions, the public procurement policies should be revised.

- 15) There are not sufficient measures to support creation of start-ups and spin-offs, except for a number of incubators run by KOSGEB and some private companies. Moreover, there are not enough mechanisms and tools to stimulate exploitation of research results by establishing spin-offs. Creation of spin-offs is indirectly encouraged by the technology development zones law which permits academics establish their companies in technoparks. However, specific policy actions and mechanisms are required to stimulate establishment of high-technology start-ups and spin-offs.
- 16) Cooperation and coordination among institutions of the national innovation system should be strengthened. Impacts and results of every policy action should be monitored and evaluated systematically and continuously.

Main conclusions drawn from the debate

- 1) Recent efforts of designing S&T policies that would include Turkish innovation policy (the Vision 2023 Project) should guarantee a shared vision, commitment and active involvement by all stakeholders.
- 2) Increased commitment especially by politicians and governments, and growing awareness on innovation among firms should be achieved for effective implementation of innovation policies.
- 3) Cooperation and coordination among institutions of the national innovation system should be enhanced and strengthened.
- 4) Clear roles and responsibilities should be defined for implementing bodies of innovation policy actions. Impacts and results of every policy action should be monitored and evaluated systematically and continuously.
- 5) Common understanding on the concept of innovation with a broader definition should be established and disseminated.
- 6) Education policies of the Government should be integrated with innovation policies, and training on entrepreneurship and innovation should be given special emphasis.
- 7) Innovation policy actions should include measures to retain researchers in the country and to reverse brain drain.
- 8) In innovation policy actions, creating a society open to innovation should be given higher priority and demand by society should act as stimuli for innovation.
- 9) Attracting FDI that would carry out innovation activities in the country should be attached special importance.
- 10) Market conditions and regulatory framework to increase the level and number of venture capital funds and investments by business angels should be improved to enable establishment of NTBFs.

Annex 4 - List of participants of the innovation policy workshop in Turkey, in the framework of the EU study on Innovation Policy in Seven Candidate Countries: the Challenges

Institution	Participant	Position	e-mail Address
Large firms			
Arcelik	Mr. Sefik Senyurek and Ms. Iffet Iyigun	R&TD Centre Director – Project Manager	sefik.senyurek@arcelik.com iffet.iyigun@arcelik.com
Assan	Mr. Gungor Yildizbayrak	Executive Vice President	Gungory@kibarholding.com
Small and medium sized firms			
Artesis	Mr. Ahmet Duyar	General Manager	ahmet.duyar@arcelik.com
Sinter	Mr. Olgun Tanberk and Ms. Tilsim Tanberk	Plant Manager – General Manager	olgun@sinter-metal.com tilsim@sinter-metal.com
Onuk	Mr. Baris Gumusluoglu	Engineering Manager	yonca-onuk@superonline.com
Inform	Mr. Fatih Kavaslar	R&D Project Manager	fkavaslar@inform.com.tr
Multinationals			
Hyundai	Mr. Gungor Yildizbayrak	Executive Vice President	gungory@kibarholding.com
Industrial federations			
OSD (Automotive Industrialist Association)	Mr. Ercan Tezer	Secretary General	tezer@osd.org.tr
TUGIAD (Young Businessmen Association of Turkey)	Ferda Kermelioglu	Chairman/International Relations Committee	ferda@panel.com.tr
Chambers of commerce and industry			
ISO (Istanbul Chamber of Industry)	Ms. Elif Sonmez	Coordinator of Quality, R&D and Technology Dept.	esonmez@iso.org.tr
Innovation Support Organisations			
KOSGEB	Mr. Omer Oz and Ms. Selma Okur	Director of METU-KOSGEB Technology Development Centre - Expert	oz@kosgeb.gov.tr sokur@kosgeb.gov.tr
TTGV	Mr. Medar Okte Mr. Refik Ureyen	Director of Technology Groups – Manager of Istanbul Liaison Office	mokte@ttgv.org.tr rureyen@ttgv.org.tr