



Uluslararası Yatırımcılar Derneđi
International Investors Association

Information and Communication Technologies on the Road to 2023

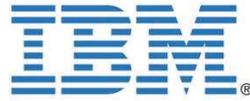
September 2012

Deloitte.

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YASED Information and Communication Technologies Working Group members who have supported the Report



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1. Executive summary

ICT, an acronym for Information and Communications Technologies, can be basically defined as all hardware, software and services regarding the creation, storage, access and management of information and data. Recently, this industry has become a prime attraction for investors and policy-makers. This increased interest can be traced back on its strategic location at the very core of innovation, competitiveness and economic growth.

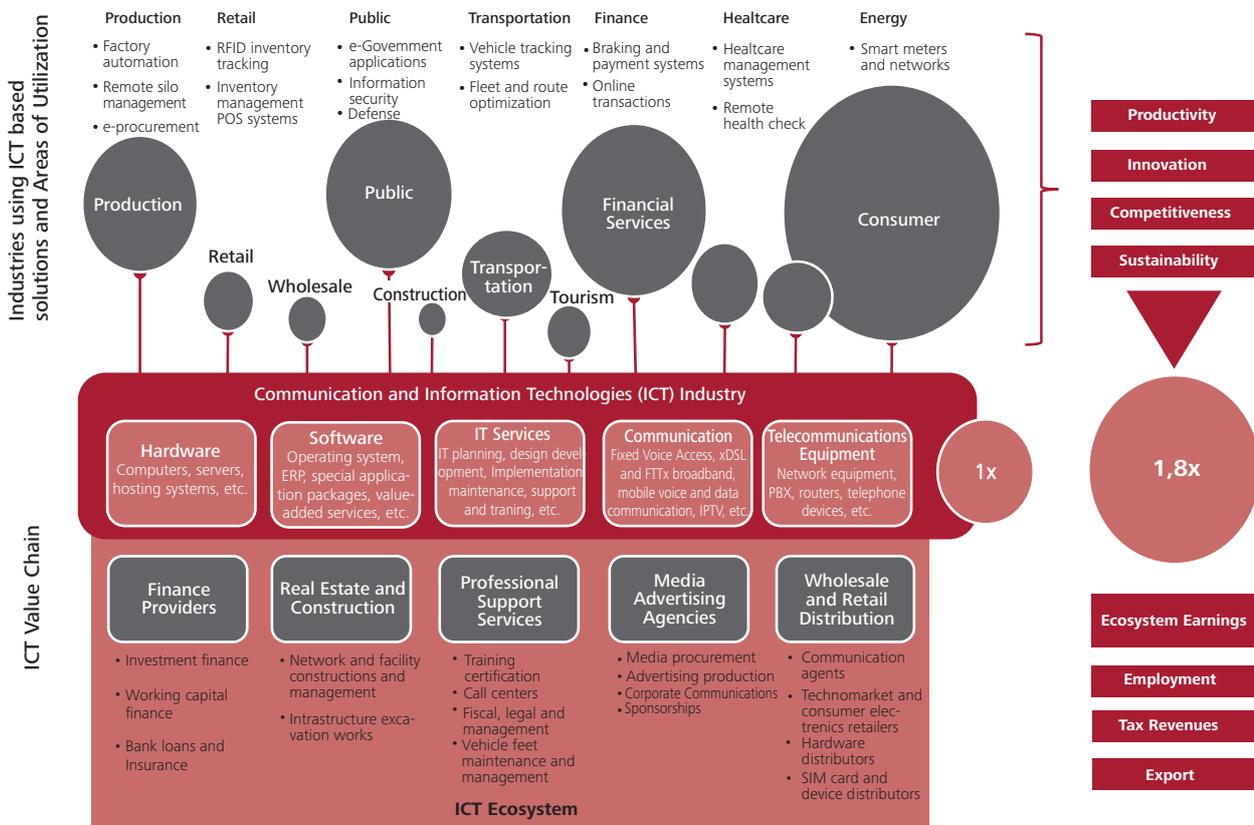
The rapid developments in Information and Communications Technologies since the 1970s resulted in an industry growth that reached \$4.1 trillion in 2011. Turkey's industry is estimated to be worth over \$30.3 billion. Our country is the 17th largest economy in the world. It holds more than one percent of both the global population and its economy, yet its share of the global ICT market stands at 0.75 percent. This difference is an indicator for the industry's growth potential in Turkey. The growth potential of the IT industry, which holds 0.4 percent of the global market share, is clearly higher when the sub-industries of the Turkish ICT market are evaluated as well.

Information and Communications Technologies is a horizontal sector which affects all industries, increases productivity, and takes an active role as a facilitator. Productivity and innovation are the basic elements of growth in a world witnessing the transition from industrial society, where capital matters, to an information society, where information matters. ICT acts as a trailblazer for the innovative development of business fields, current and developing technologies, and increase of productivity and competitiveness. The results of field research completed in EU countries over several years reveal that ICT is the most effective element for product, service and process innovation.

Productivity and innovation increases observed in industries most benefiting from ICT imply that economic growth will be boosted through total factor productivity, in the event that the industry's share in national economy is increased. The studies carried out in light of this report show that one unit of Turkish ICT industry growth leads to a 1.8 unit growth of the Turkish economy. Accordingly, an eight percent ICT share of the projected GDP worth \$2 trillion for 2023 would result with a total factor productivity contribution of around \$71 billion.

One unit of ICT sector growth in Turkey leads to a 1.8 unit growth of the national economy.

Figure 1: The Effect of the ICT industry on Turkey's Economic Growth



Source: Deloitte Analysis

Even if the ICT industry is defined as the whole of its sub-industries such as hardware, software, IT services, communications and telecommunications equipment; it still interacts with various players from other industries in the value chain and increases employment and tax incomes with its ecosystem.

Turkey is clearly an importer of ICT products and services. The industry's international trade volume for products and services is \$7.6 billion, of which \$2.5 billion contribute to the current deficit. Industry investments will both guarantee industry growth as well as decrease the current deficit, while positively affecting "associated" industries.

Close relations between two industries leads to mutual support. Investments in one industry and the resulting experience easily supports product and service manufacturing in the other industry. When considered in this manner, the international trade volume of industries associated with ICT is estimated to be over \$25 billion. Industries associated with ICT contribute \$7.8 billion to the current deficit.

On the other hand, a review of the ICT industry's international trade volume, including industries associated with ICT, shows an international trade volume of over \$30 billion and a current deficit exceeding \$10 billion. These values also indicate just how effective contributions towards the development of ICT will be on the current deficit.

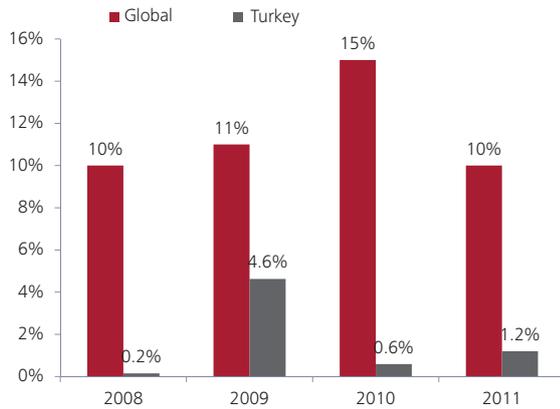
This industry, that bears great importance for our economy, is expected to reach a size of \$160 billion by 2023. This necessitates an annual growth rate of 15 percent (triple the current rate) for the next 10 years. To achieve this goal, the elements threatening the growth potential of the industry should be eliminated first. We carried out several meetings and studies with our stakeholders to determine those elements, and the areas below stood out:

To achieve the \$160 billion goal by 2023, the average annual growth rate of the industry for the next decade should be triple the current growth rate.

- Lack of Qualified Workforce
- High Tax Rates
- Non-Predictability of Regulations
- Price-Based Bidding Policy and Profit Margins Dropping Due to Price Competition
- Inadequacy of Venture Capital
- Violations Regarding Intellectual Property Rights
- Lack of University-Industry Collaboration
- Inadequate Incentives

All these obstacles pose as an obstacle that hinder investment to the industry, despite the demographic and logistic advantages our country offers. The industry has not been able to attract domestic and international investments befitting its potential.

Figure 2: The Share of ICT Industry Mergers and Acquisitions (M&A) In Total Transaction Value

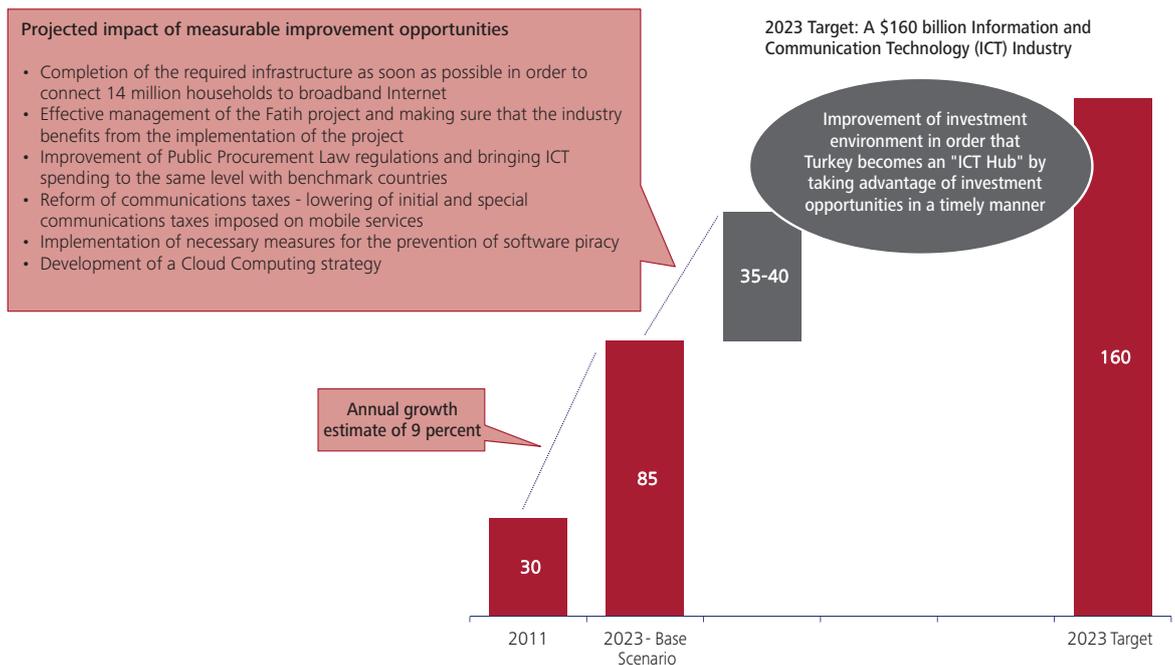


Source: Thomson Reuters, Deloitte Analysis

Industry investments not only play an important role for its financial development but also for the sharing of knowledge and experience. Encouraging international investments on all scales, from venture capital to large-scale investments, will both ensure international know-how and technology transfer as well as increase the recognition of Turkish entrepreneurs and companies. Therefore, our potential to meet the demands of overseas markets will be improved upon.

To remove the elements preventing the development of the industry, a series of suggestions for improvement are discussed in this study. Considering the average annual 9 percent base growth scenario anticipated for the industry (Figure 3), suggestions alone will not be enough to reach the \$160 billion goal of 2023.

Figure 3: Information and Communications Technologies Industry in Light of 2023 Goals



Source: "From Silk Road to Broadband - Policy Report of the Prime Ministry and Cisco Joint Project, Deloitte Analysis

To achieve its goals, Turkey should become a regional hub that meets the demands and needs of not only the domestic, but also foreign markets. It must maintain this position and meet the technological products and services needs of many countries by using its advantageous location and young demographic. If Turkey desires to be an "ICT Hub" it should follow other examples. It should strategically approach industry needs and without delay implement suggestions and solutions regarding the improvement of the investment climate. The most important suggestions presented in this report and shown graphically above are as follows:

Promoting a Venture Capital Culture: The importance of venture capital is most visible in non-traditional business models that are based on innovation, such as the ICT industry. Our country's legal and commercial framework poses certain difficulties for angel investments and venture capital. It is commonly expressed that our entrepreneurs' business culture and approach has not yet met international norms and expectations. The burden to create and popularize an entrepreneurship culture falls on the shoulders of NGOs, investors, educational institutions, industry players, and law-makers.

To achieve the 2023 goals, Turkey needs to become a regional ICT Hub that meets the technological product and service needs of both domestic and foreign markets

Finding a Qualified Workforce: Although Turkey has a young population, many industry players often complain about the lack of qualified employees, which are only available in large cities like Istanbul and Ankara anyway. Engineering faculties fail to produce adequate numbers of qualified software developers and technicians to meet the current needs of the industry. Also, for an industry aiming to become a regional ICT Hub, it suffers from a lack of English language skills. With the collaboration of industry and universities, Educational plans that address industry needs should be drafted. Current, topical content and hands-on practice should be featured within the curriculum. Beside technical education, working permits for transferring qualified, foreign executives and specialists from overseas should be facilitated, and related tax-related regulations implemented.

The biggest complaint many industry players express is the the lack of qualified employees, which are only available in large cities like Istanbul and Ankara anyway

Industry Focus on Added Value Solutions rather than Price Competition: The Turkish IT market includes many companies embracing price-based competition as a strategy, even if it is not sustainable. The scarcity of big players who achieved a certain size in the industry leads to negative effects on profitability rates when competition is solely price based, threatening the general condition of the industry. To prevent price-based competition in the industry, end-user companies should be informed of the added value of industry products and services. Granting certificates to service providers for better regulation of quality standards and achieving an economy of scale with the increased consolidation of industry players shine out as contributing elements in the long run.

Improvement in Incentive and Support Programs: State incentive and support mechanisms are used as a strategic tool in many countries that have achieved progress in the IT industry sector since the 1970s, such as Ireland, Israel and India. Many successful support and incentive mechanism examples have been adopted and developed, especially since 2007. This report classifies three main areas in need of improvement, even though the scale of current incentive and support programs is positively received by ICT industry players. They are the optimization of current mechanisms, improving their inter-coordination, and extending their scope.

For an IT industry comprising of small-scale companies, which feel the profit margin pressure more than international ones, and an communications industry with a capital intensive structure, returns of investments should be on reasonable levels for investors, so they can continue to meet the industry's investment needs on a sustainable base.

Turkey, which aims to turn its word-rate city Istanbul into a **Financial Center** and which aims to become a fiberoptic intersection point between the region's countries, needs to become an **ICT Hub** that can export technology and services manufactured by its data, call, common service and excellency centers.

Istanbul can be reached in under four hours by plane from all European, North African and West Asian countries. Located within a four hour reach of 18 percent of the global population and 35 percent of global GDP, the city possesses the potential to become the regional IT services and joint services center. Turkey distinguishes itself from its regional neighbors with its young population, developed logistics, and relatively advanced technological infrastructure. Offering cost efficient services compared to European countries and high quality services and infrastructure compared to Middle East countries, Turkey has the potential to become a regional power by turning these opportunities into advantages. Thanks to Information and Communications Technologies, the Turkey of 2023 has a great chance to be a power both socially and economically.

Achieving the 2023 target will be difficult if these suggestions are not implemented rapidly

2. Overview on the Information and Communication Technologies Sector

The main source in the information society is information and the fundamental factor in the development of the information society is information technologies

Information and Communication Technologies (ICT) Sector is defined by OECD as "a set of the service and manufacturing sectors that display, transmit and store information and data electronically". Although the term ICT was used in 1997 for the first time, information and communication of information had a major role in transformation of the culture and economies of societies throughout history.

Information and communication technologies sector, which contributes to the emergence of many innovations, changes and evolves rapidly, increases welfare of individuals, companies and countries by affecting our daily lives and the way we do business directly and indirectly. The welfare levels of the countries, which completed their transformation into an "Information Society" using the ICT, appear to be relatively at higher levels. For the realization of this transformation, which is one of the essential conditions for welfare increase and economic growth, international financial and development organizations also endeavor and provide support and resources as well as national governments.

Information societies are defined as economies and social structures where information is used as a strategic production factor as well as capital, manpower and material resources. The main source in the information society is information and the fundamental factor in the development of the information society is information technologies. At this point, the industrial sector, the key element of creating a welfare in an industrial society, gives its place to information away. Therefore, organizations that want to be successful in today's competitive environment, must increase their investments in the communications industry to produce information and enable the spread of information and Information Technology.

ICT and productivity: Considering the effects of the Information and Communication Technologies which are observed and likely to occur in economical, political, cultural, social and many areas, the Information and Communication Technologies appear to be a triggering force of the transformation into an information society. The 10-year period after 1995, which was called as the productivity miracle where the difference between the output rates per employee had risen to 9.8% from 1.8% compared to the U.S. and European countries, reveals the impact of ICT in the economy. A large part of this difference results from the strong productivity growth of the U.S. in the ICT manufacturing and service sectors. Although ICT products and services allow minimizing imperfections in the market through rapid information dissemination by reducing transaction costs, it contributes to productivity growth and economic growth supporting the competitive and value-added structures.

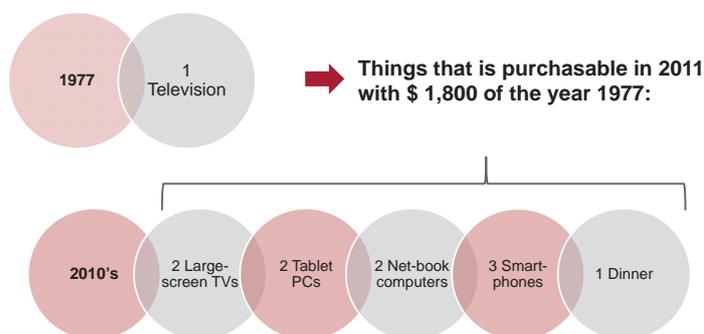
ICT and innovation: The Information and Communication Technologies lead to creative destruction, i.e emergence of entirely new firms and industries or destruction of existing ones also affecting organizational structures and employment conditions as well as improving productivity. The most general definition of creative destruction is that the new one takes the place of which precedes with a value-added approach. Leaving the use of typewriters upon the emergence and widespread use of computers is an example of creative destruction. Creative destruction causes the long-term existence of companies to be constantly questioned and requires them to change and turn towards innovation to continue their competitiveness in such a rapidly changing and growing world.

ICT and social community: When considered within the framework of the information society, the possible effects of the ICT sector are not limited only to economic field. The digital divide emerging with the development of the ICT sector describes the difference between the opportunities to access and use the ICT between individuals, households at different socio-economic levels, businesses and geographical regions and creates an important pillar of the social dimension of the ICT. In addition to that individuals can experience the social effects of acceleration and increase of accessibility to information in their daily lives with the development of the ICT, they have observed the possible social effects of the ICT in the "Arab Spring" developments recently occurred in the Middle East.

The products and services of the sector, which affect the lives of individuals and communities that much, become widespread day by day and reach a wider audience. This situation indicates that the sector will protect its growth trend and importance. The rapid developments we observe in the ICT sector and the social and economic benefits provided by the adaptation to these developments are the other factors that show the importance of the sector and allow it to become widespread. Rates of the changes in the sectors are summarized in the following laws, and moreover, it is possible to say that these periods will shorten more in the near future.

- The price / performance ratio in terms of information processing capacity (processor speed that can be purchased at the same price) increases two times in 18 to 24 months. **(Moore's Law)**
- Bandwidth capacity in the fixed communication systems increases two times in 2 (two) years. **(Gilder's Law and Nielsen's Law)**
- Bandwidth capacity in the fixed communication systems increases two times in 2.5 (two) years. **(Cooper's Law)**
- Digital data storage capacity (data to be stored in mm2 within the same unit area) increases two times in 2 (two) years. **(Kryder's Law)**

Figure 4. Reflection of the rapid change and productivity in technology on the purchasing power



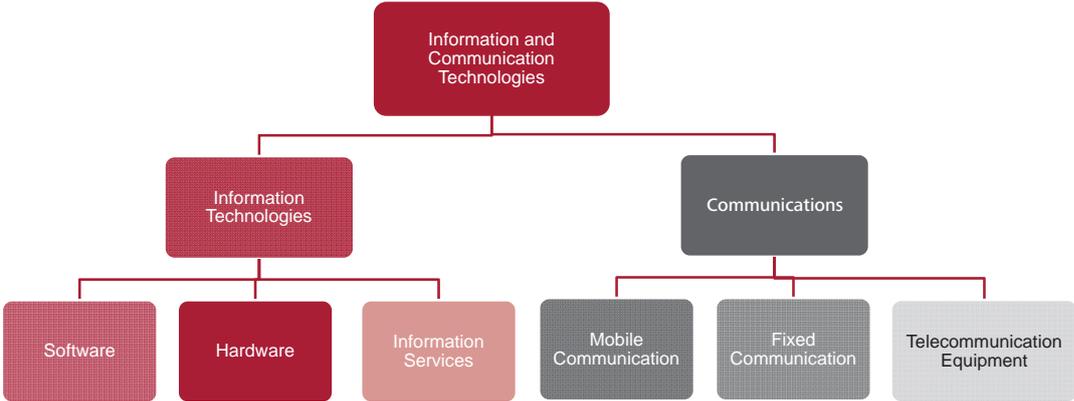
Source: Deloitte Analysis

The ICT sector is defined as a sector that produce goods and services aimed at adding functionality to or enabling information processing and communication functions through electronic intermediaries including transmission and display

As the ICT sector is a sector changing and evolving rapidly, the ICT-related concepts, methods and applications are quickly out-dated and consumed. For this reason, there is no a precise and clear definition of the sector agreed upon by all countries. However, the definition and classification, accepted by all OECD countries and recognized internationally, is prepared based on ISIC - United Nations International Standard Industrial Classification of Economic Activities All Economic Activities. On the basis of this classification, OECD, defined the ICT in 2002 as a set of the service and manufacturing sectors that display, transmit and store information and data electronically. Since 2008, the ICT sector has been defined as a sector that produce goods and services aimed at adding functionality to or enabling information processing and communication functions through electronic intermediaries including transmission and display.

In this study, the ICT sector is divided into two main sector as Information Technology and Communication. The Information Technology Sector is grouped in three sub-sectors as Software, Hardware and Information Services, and the Communication Sector as Mobile Communication, Fixed Communication and Telecommunication Equipment.

Figure 5. ICT Sector and sub-segments



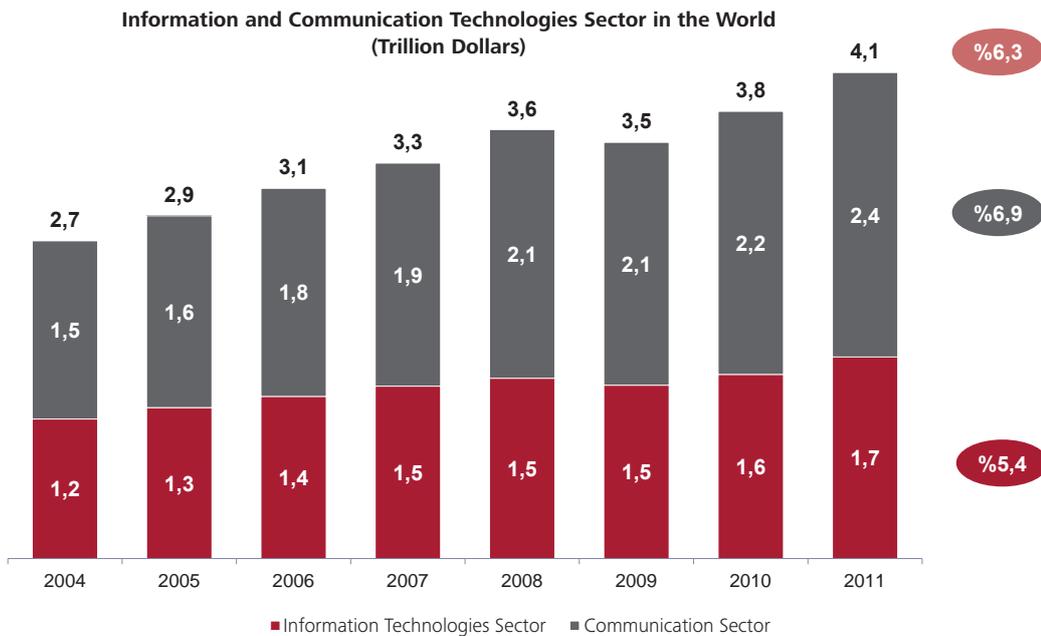
2.1 The Information and Communication Technology sector continues to grow world-wide.

The size of the global ICT market is estimated to be U.S. \$ 4.1 trillion as of 2011. The market, which has achieved a growth rate of 6.3% per year between 2004 and 2011, is expected to reach around the level of U.S. \$ 5 trillion in 2014 in the light of recent trends.

The growth rate in the market, which tends to grow all over the world, especially in the Asia-Pacific region is remarkable. Despite the ICT market in the Asia-Pacific countries, including developed countries such as Australia, Japan and developing countries such as China, India, Korea, is smaller than the EU market in the past, it left this region behind from 2008.

The Asia Pacific ICT market is expected to become a larger market than the North America Region in 2013 by maintaining its high growth trend. The increasing demand of this densely populated region for communication services, competencies of the countries, which have invested in the ICT sector like India in software and information services sectors, and competitive positions of the Far East countries in hardware, telecommunications equipment manufacturing come to the fore as the driving forces behind this rapid growth.

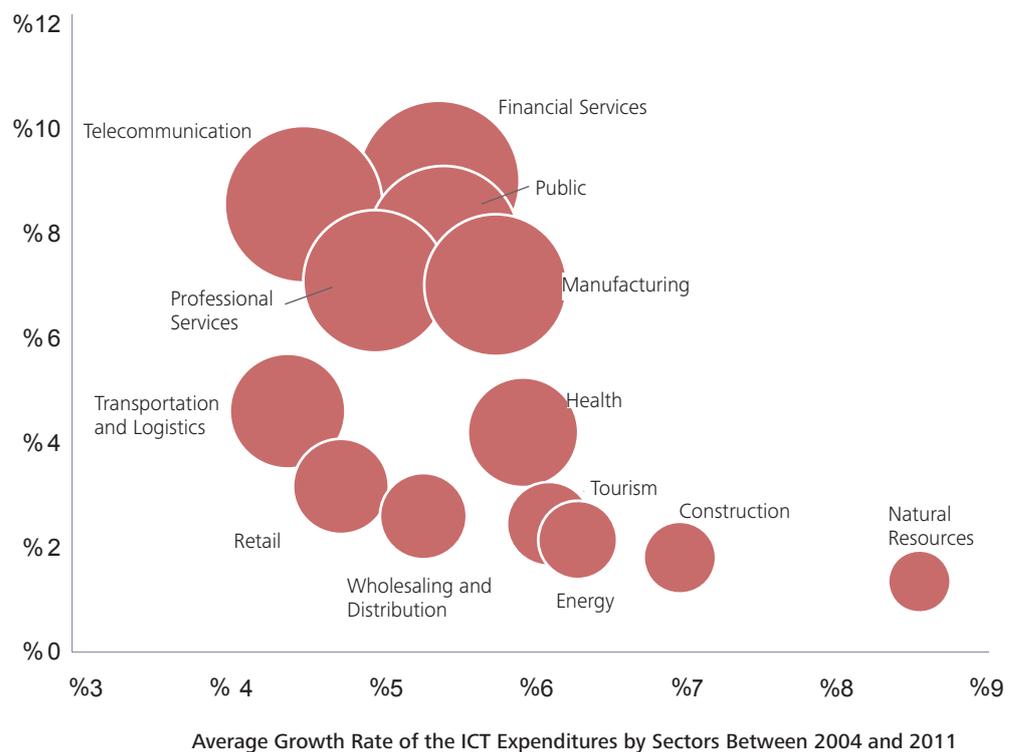
Figure 6. ICT sector and the growth trend in the world by years



Source: IHS Global Insight

When the ICT sector is analyzed broadly, it is seen that the communication sector constitutes about 59% of the total industry and ranks first in the mobile communication with a share of 27% in the sub-sectors. The mobile communication is followed by the information services with a share of 21%. When sectors making ICT expenditures are assessed, it is discovered that finance, telecommunication and public sectors except for individual users come to the fore.

Figure 7. Distribution of the ICT expenditures by sectors in the World, 2011

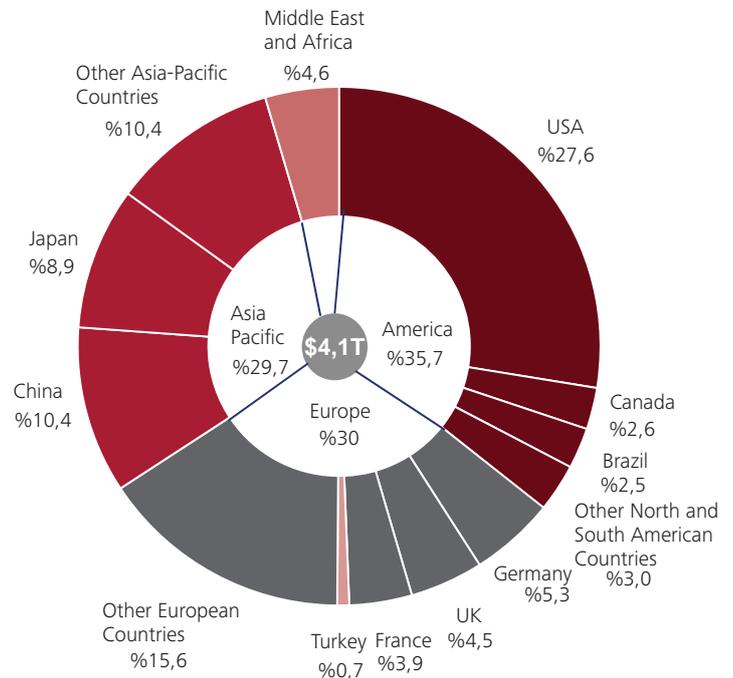


Source: IHS Global Insight

Although the global share of both the population and economy of our country, which is the world's seventeenth largest economy in terms of economic size, is above 1%, the share of 0.75% that our country receives from the global ICT sector indicates the growth potential of the sector in our country

Turkey represents 2% of the European ICT market of \$ 1.2 trillion and 0.75% the global market of \$ 4.1 trillion. Although the global share of both the population and economy of our country, which is the world's seventeenth largest economy in terms of economic size, is above 1%, the share of 0.75% that our country receives from the global ICT sector indicates the growth potential of the sector in our country.

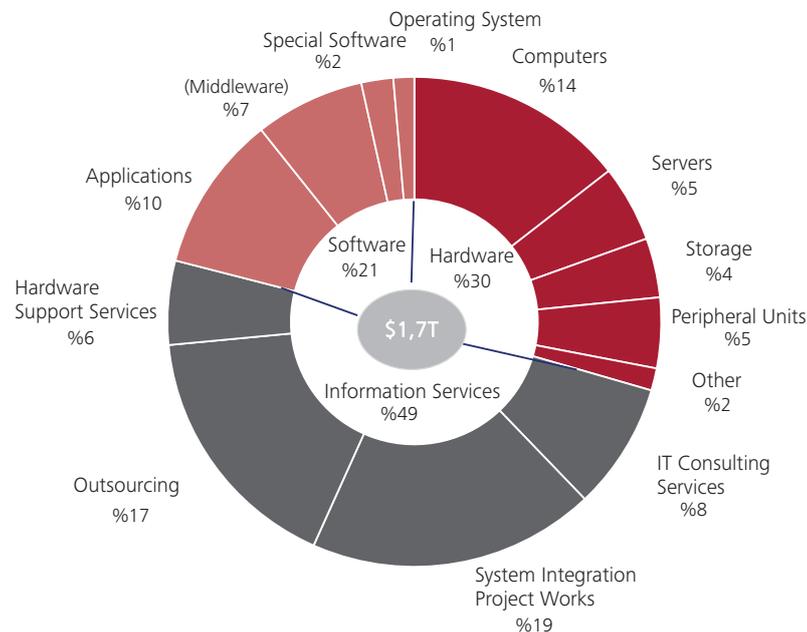
Figure 8. Geographical distribution of the global ICT sector, 2011



Source: IHS Global Insight, EITO, BTK

The condition for organizations to maintain their existences will vary depending on how they manage hardware and software and information

Figure 9. Distribution of the global IT sector on the basis of sub-sectors, 2011



Source: Forrester Global Tech Industry Outlook, IHS Global Insight, Deloitte Analysis

2.1.1 Information and Communication Technologies Sector in the World

In today's world, information is important at least as much as capital and human resources for organizations. In other words, like capital had taken the place of human labor, which was the most important input in the agriculture era, in the industrial era, information took that place in today's world which could be called as the information era. The condition for organizations to maintain their existences will vary depending on how they manage hardware and software and information.

Function of the sector, which was considered to be only limited to information-process in the past, left its place to the phenomenon of competitive advantage for companies. Today, companies acting upon this vision focus IT, which they consider as a strategic partner rather than cost center, and their resources on providing constant added value under the changing market conditions.

IT sector, like the other sectors, was affected by the crisis in 2008 that struck the entire world. In 2009, the market experienced a significant contraction of 4%. According to the estimates of the end of 2011, the market reached the level of \$ 1.7 trillion by re-entering into growth trend in 2010. The market is expected to reach a size of about \$ 2 trillion in 2013 with an average annual growth of 7%.

According to the estimates of 2011, while the U.S.A constitutes an important part, like 38%, of the IT market with \$ 1.7 trillion size, the market share of Turkey is 0.4% in total.

While nearly half of the Information Technology market is created by information services sub-sector, this rate for hardware sub-sector is 30% and for software sub-sector is 21%.

2.1.2 ICT Sector in the World

Communication sector or the Electronic Communication sector, which is the other name used in our country, showed a big change compared to 10 years ago. While the number of broadband Internet users is very limited in the early 2000s, today, over 600 million people in the world have a fixed broadband Internet subscription. Similar developments also take place in the mobile communication industry. While 3G technologies were new in commercial use 10 years ago, the concepts of time and space are no longer a barrier thanks to these technologies as faster and more quality services with lower costs are provided today. In a simple expression, the sector with each passing day continues to redefine the ongoing technological advances and innovative services and both the economy and trade and the inter-communal interactions.

Although the global communication sector tended to decrease between 2008 and 2009 due to the crisis, the sector re-started to grow as of 2010. According to the estimates, the size of the sector reached \$ 2.4 trillion as of the end of 2011. This figure is expected to exceed the threshold of \$ 3 trillion at the end of 2015 with an average annual growth of 7%.

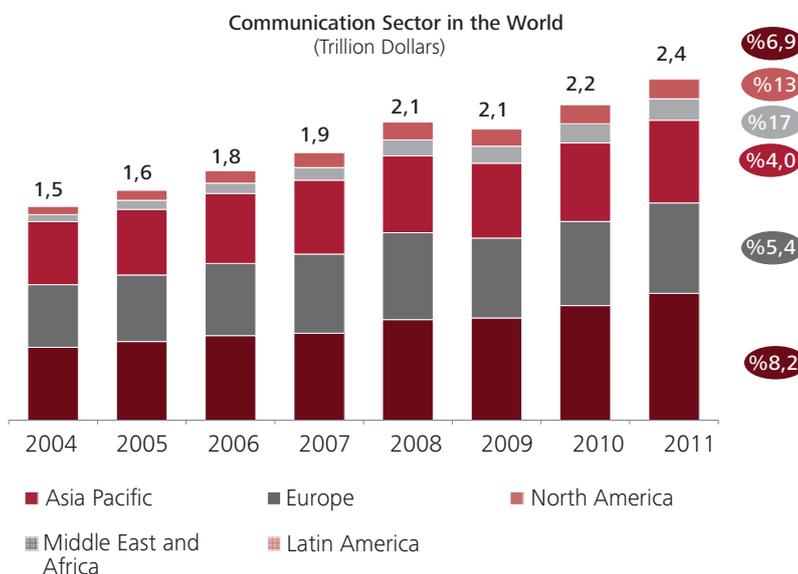
The Asia Pacific countries with the largest market share in the communication sector are expected to retain their market-leader position with a high growth rate and increase the difference with other regions especially thanks to the advantages of their populations.

Although the global communication sector tended to decrease between 2008 and 2009 due to the crisis, the sector re-started to grow as of 2010. This figure is expected to exceed the threshold of \$ 3 trillion at the end of 2015 with an average annual growth of 7%

With the increase exponentially growing in the use of mobile data and the spread of new services such as mobile payments, mobile signature, machine-to-machine communication (M2M), the need for investment in the sector will continue to grow

The largest sub-sector within the communication market is the mobile communication services sector. Mobile operators, which have reached 6 billion users all over the world, continues to grow with mobile broadband and value-added services especially as a result of the intense interest in smart-phones and tablets as well as becoming widespread voice services. The number of active mobile broadband users reached 1.2 billion people as of the end of 2011. According to the estimates, mobile data traffic leaved voice traffic behind worldwide as of the fourth quarter of the year (no text), grew two times from the year (no text) until 2011, and continues to grow rapidly. 2009. With the increase exponentially growing in the use of mobile data and the spread of new services such as mobile payments, mobile signature, machine-to-machine communication (M2M), the need for investment in the sector will continue to grow.

Figure 10. Geographical growth trends of the communication sector in the world



Source: IHS Global Insight, EITO, BTK

While the fixed communication market of \$ 780 billion is the sub-sector growing slowly, the sector has achieved saturation all over the world and has started to leave its place to mobile services. So much so that while the number of fixed telephone lines in the world per capita was 19.3% in 2005, this rate was recorded as 16.6% by decreasing to the level in 2001 back as of the end of 2011. On the other hand, the fixed broadband services continues to grow and video and television (IPTV) services are expanded provided by communication operators especially with the increase in investments in fiber network and access.

The telecommunication equipment market is dominated by sales of mobile devices. 2011 Approximately 57% of the telecommunication equipment market with a size of U.S. \$ 501 billion as of the end of 2011 is constituted by mobile devices. The growth in the sector continues as the number of users renewing their mobile phones increases rapidly. The number of mobile phones expected to be sold all over the world in 2012 is 1.5 billion, a very large portion of these phones will be purchased by subscribers who want to renew their existing mobile phones with a new model.

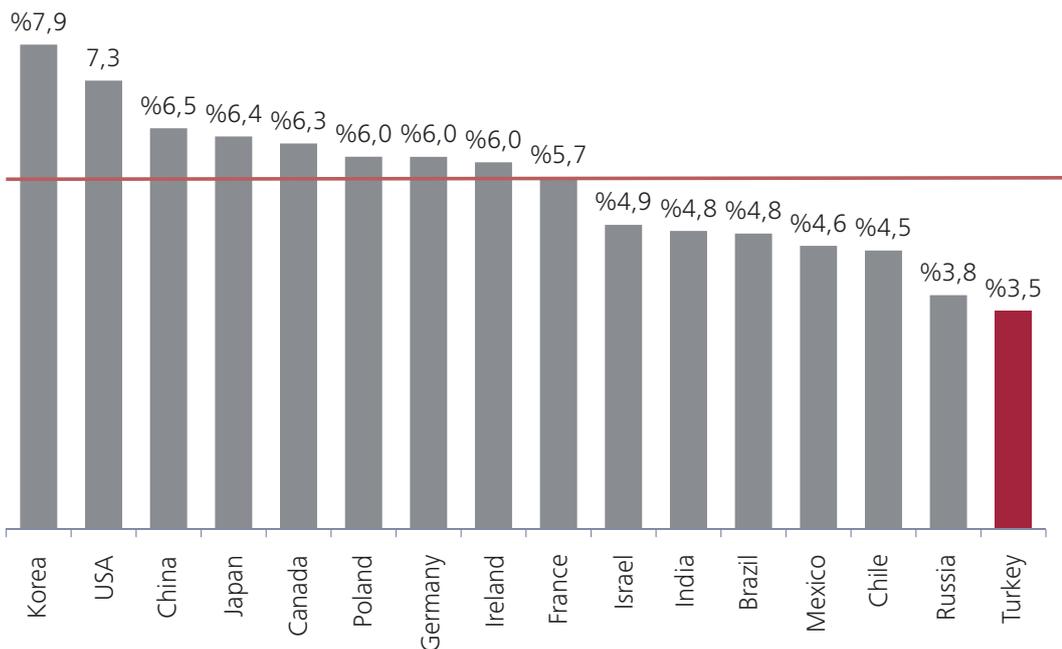
2.2 Turkey's Information and Communication Technologies sector has a significant growth potential

Although the ICT sector in Turkey downsized on U.S. dollar basis in 2009 like many countries in the global market, it has retained its growth trend and has reached approximately a size of U.S. \$ 30 billion as of the end of 2011. While the communication sector creates 71% of the market with U.S. \$ 21 billion; the Information Technology sector has a share of about U.S. \$ 9 billion.

Given Turkey's economic size, it can be seen that the market of U.S. \$ 30 is still below the potential. While the ratio of the size of the ICT sector to GDP in Turkey in 2010 is only 3.5%, this ratio in Korea is 7.9%. While this ratio is around 5% for Israel, India and Mexico, it is 6% for Poland.

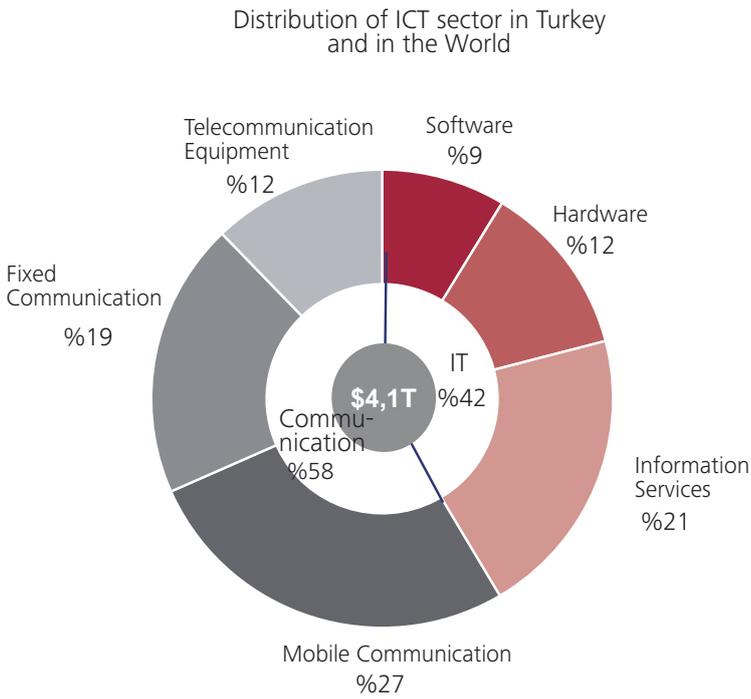
While the ratio of the size of the ICT sector to GDP in Turkey in 2010 is only 3.5%, this ratio in Korea is 7.9%

Figure 11. Comparison the size of the ICT sector to GDP ratio, 2010

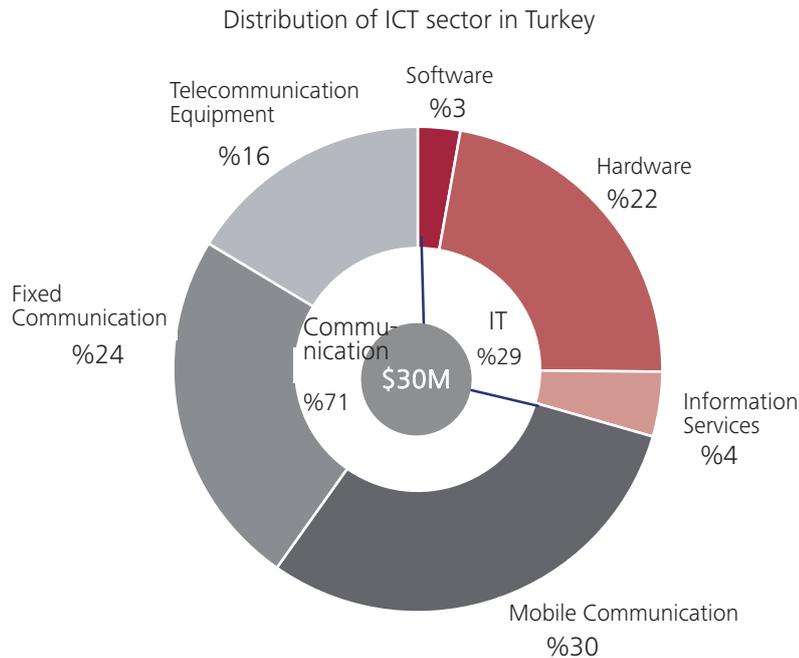


Source: WITSA Digital Planet 2010 & IMF World Economic Outlook Database & Deloitte Analysis

Figure 12. Distribution of ICT sector in Turkey and in the World, 2011



While the Information Technology Sector in Turkey creates the portion of 29% of the total ICT market, this ratio is 3%, 4% and 22%, respectively, in the software, hardware and IT services sub-sectors. When compared proportionately to the ICT sector structures in other countries, the IT industry in Turkey appears to be relatively much smaller. The main reason of this fact is the small scale of the software and IT services sub-sectors in Turkey. The fact that there are only 5 to 10 companies with an annual turnover exceeding U.S. \$ 100 million by the end of 2010 among the domestic and foreign-owned software and IT service companies operating in Turkey stands out.



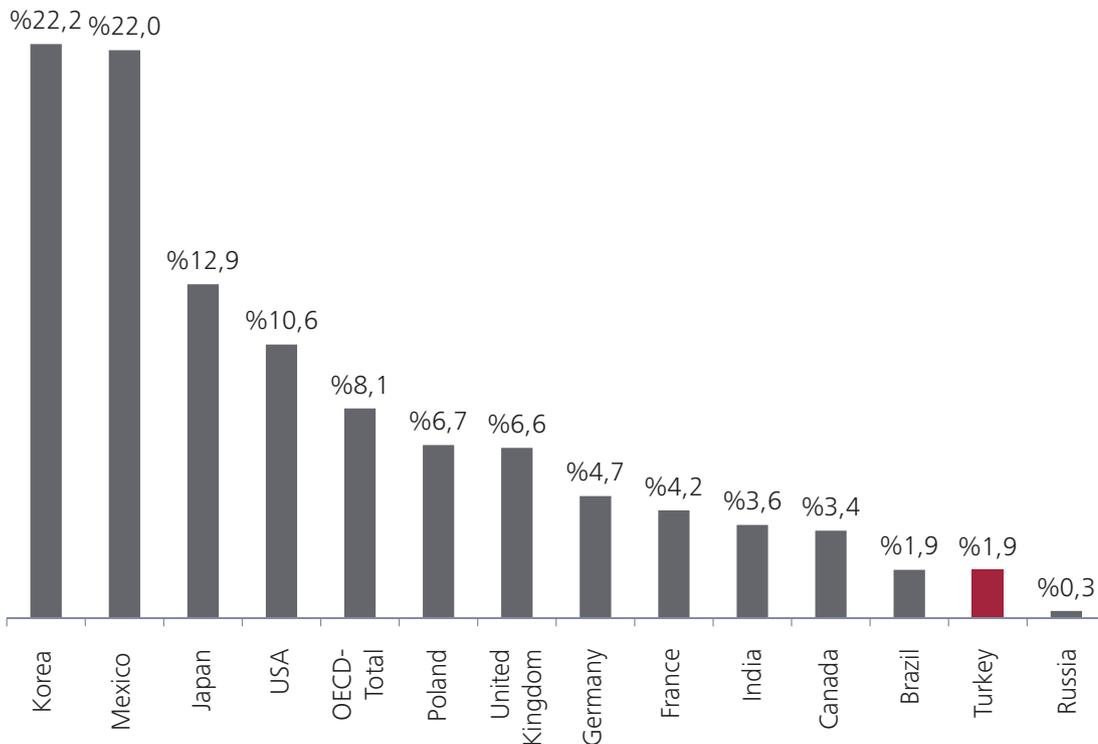
Source: IHS Global Insight, EITO, BTK

On the other hand, the exports of ICT products in Turkey constitute a very small part of the total exports. While the share of the exports of ICT products in OECD countries in the total exports is an average of 8%, this ratio is above 20% in Mexico and Korea. Approximately 2% of the exports of Turkey is constituted by ICT products and services.

When these comparisons are taken into account, the ICT sector exports must increase three to four times of the existing situation in order for Turkey to realize exports at the level of the exports of OECD countries. To achieve this, improvement of strategies and solutions that will ensure development of the exports in the sector becomes important.

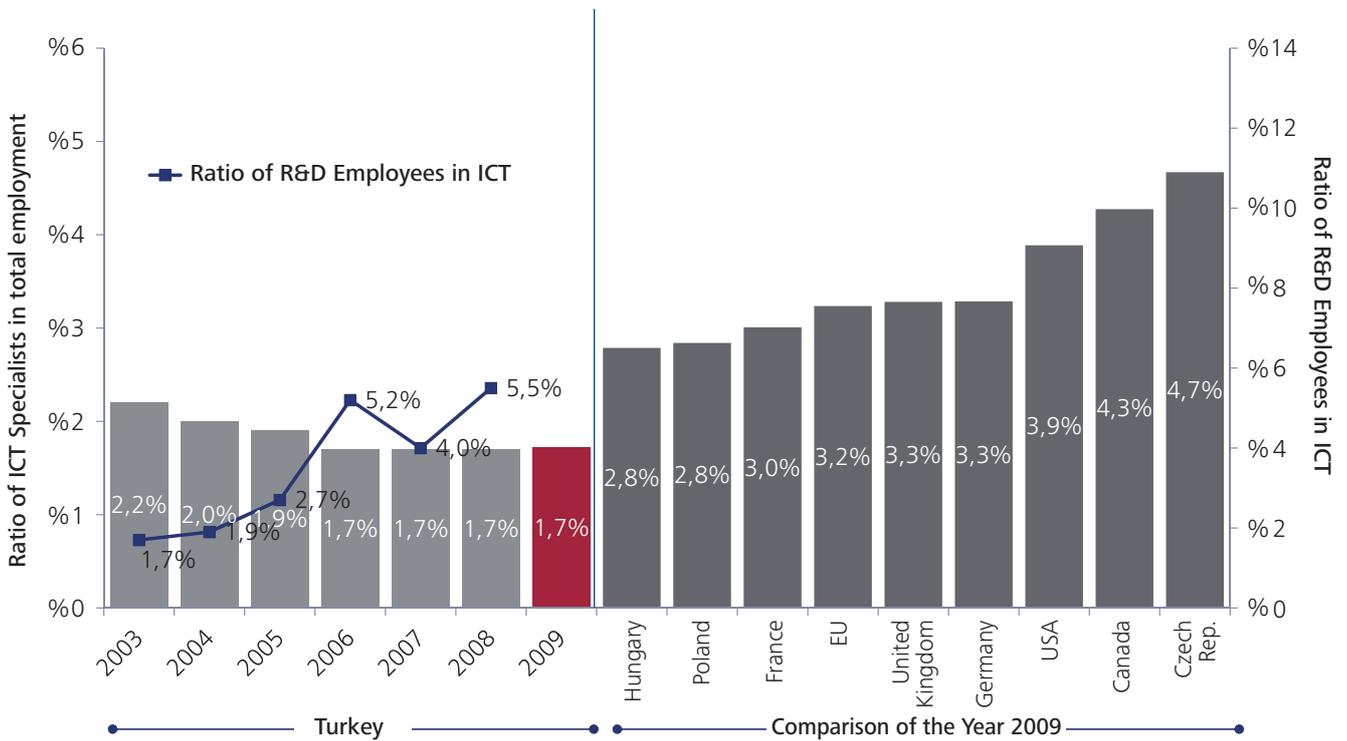
While the share of the ICT product exports of OECD countries in the total exports is an average of 8%, approximately 2% of Turkey's exports consists of the ICT products and services

Figure 13. Share of ICT product exports in total exports



Source: OECD

Figure 14. Employment in the ICT sector in Turkey and ratio of R&D employees; comparison with other countries



Source: SPO Information Society Statistics 2011, OECD

When the statistics released by Turkish Statistical Institute are analyzed, it can be seen that the ICT sector employment, which constituted 2.2% of the total employment in 2003, decreased to the level of 1.7% in 2006 and remained at this level.

When the data of ICT Specialists of the year 2009 published by the OECD is analyzed, it is seen that Turkey has the lowest ratio among OECD countries compared. The OECD defines ICT Specialists as persons who develop, manage and maintain ICT systems and do these as their primer jobs.

While the ratio of ICT Specialists in Turkey is 1.7%, this ratio in the Czech Republic is 4.7% and in the EU-15 countries is 3.2% averagely. This difference indicates approximately 150,000 additional ICT specialists in the scale of Turkey.

On the other hand, when the share of R&D employees in the ICT sector employment is analyzed, it is seen that the ICT sector employment, which is 174,000 as of the end of 2008 in total, only corresponds to the portion of 5.5%. This ratio is quite improved compared to the level of 1.7% in 2003. It can be said that the supports and incentives for R&D activities in recent years have a role in this increase.

2.2.1 Information Technologies Sector in Turkey

It is estimated that the Information Technologies sector in Turkey reached to a market size of U.S. \$ 9 billion in 2011. The hardware sub-sector constitutes more than 75% of the market, and the sector's share tends to increase. While the software sector has the smallest share of approximately U.S. \$ 850 million, the market size of the IT services is estimated to have reached U.S. \$ 1.3 billion. While the sum of the IT services and software sectors in Turkey is far from reaching the ratio of 1/4, the share of these two sub-sectors in the global IT market is at the level of around 70%.

The reasons that the public and many large-scale private sector companies mainly have turned towards to their internal sources for software and IT services, the price-oriented procurement policies of the public sector and inadequate awareness of the SMEs and individual users on intellectual property rights can be shown among the main reasons why the activity in the sector could not redound on the market size. The fact that the professionals in the market, where the value added perception is insufficient, focus on price competition also prevents these professionals to reach a certain scale, keeps profitability ratios under pressure and leads to a vicious circle.

While the share of the sum of information services and software sectors in the ICT sector in Turkey is far from reaching the ratio of 1/4, the share of these two sub-sectors in the global IT market is at the level of around 70%

The IT sector expenditures in Turkey constitute only 0.8% of the GDP.

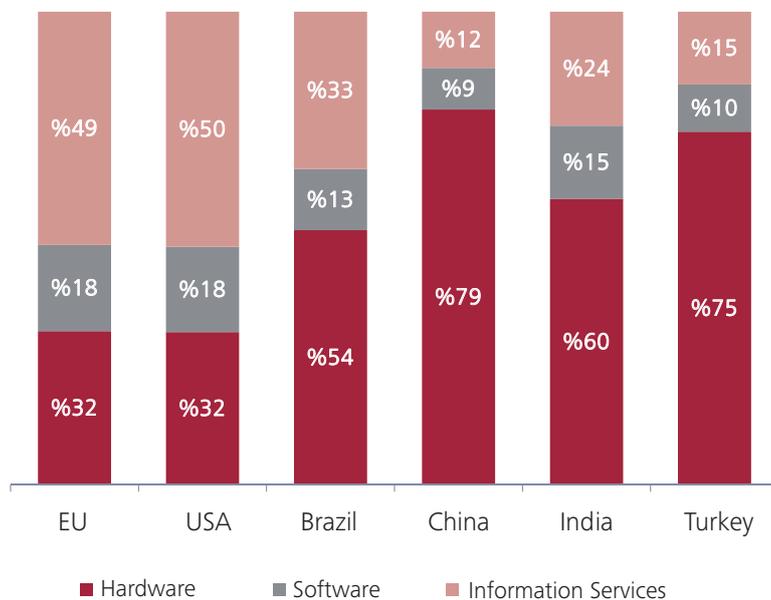
While the IT sector expenditures in the U.S. constitute 4% of the GDP, this ratio is 3% in Germany, France and Ireland

On the other hand, it is seen that Turkey falls behind considering the sector's share in the GDP. The IT sector expenditures in Turkey constitute only 0.8% of the GDP.

It is seen that the developed countries invest in the IT sector more comparing to the developing countries. While the IT sector expenditures in the U.S. constitute 4% of the GDP, this ratio is 3% in Germany, France and Ireland. The IT sector expenditures in Russia, Brazil and India correspond to 1% of the GDP and this ratio yet remains above the ratio of Turkey.

Turkey stands out with its strong growth figures in the IT sector. In 2009 the IT sector in Turkey grew while the sector in developed countries like the EU countries downsized in the global crisis. Turkey achieved a growth rate between 2009 and 2010 higher than Brazil and Russia of the BRIC countries and was one of the countries with the highest growth rate in the IT sector in 2009. It is known that the reduction in VAT, made to prevent the sector to be affected by the crisis, also supported this growth.

Figure 15. Distribution and Comparison of the IT Sector in Turkey, 2010



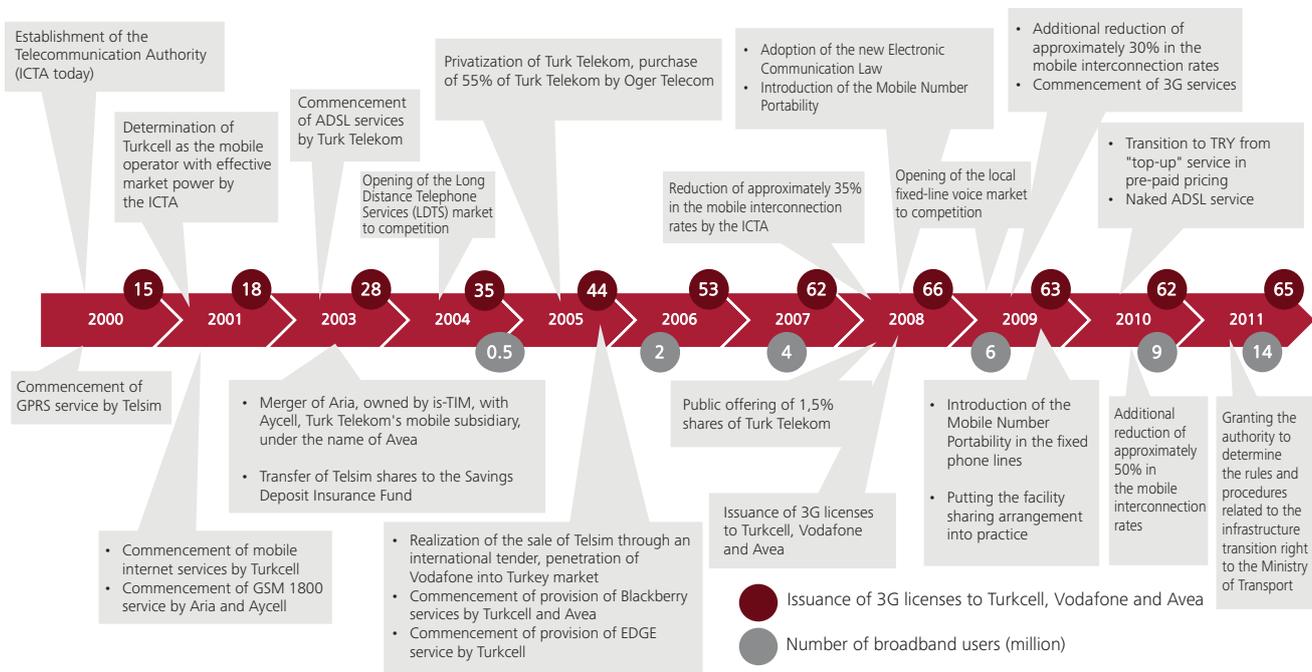
Source: EITO

2.2.2 ICT Sector in Turkey

Foundations of the modern communication sector in Turkey were laid in 1994. In the same year, Turk Telekomunikasyon A.S. (Turkish Telecommunications Inc.) separated from PTT by Law No. 4000 and began to provide telephone services; TR.NET, Turkey's first internet service provider, started to provide internet accounts to institutions, and Turkcell and Telsim started to provide service over GSM-900 network within the scope of the revenue-sharing agreement with Turk Telekom.

In 1994, only 81,000 people had mobile phones in Turkey where 12 million fixed-line subscribers existed and 700,000 people waited in the line to have a fixed telephone line. After 10 years, the number of fixed telephone subscribers reached 19 million and the number of mobile subscribers reached 35 million in 2004 when the privatization of Turk Telekom through block sale of 55% of its shares was decided. In the same year, Turk Telekom started to provide fixed broadband services with ADSL technology and the Long Distance Telephone Services (LDTs) market was opened to competition.

Figure 16. Major Developments in the Turkish Communication Sector, 2000-2011



Source: Deloitte Analysis

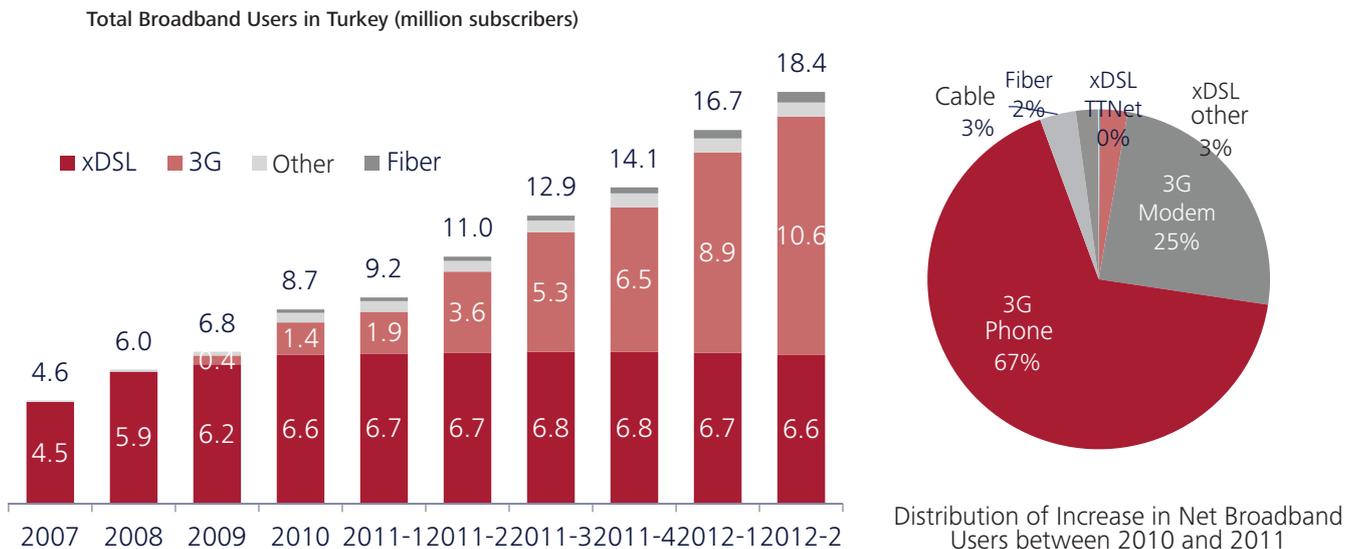
When the spreading rates of fixed and mobile broadband users in Turkey compared to other countries, it seems that an important growth potential continues.

The communication sector in Turkey, which has been growing rapidly in the last decade, is estimated to have reached a size of U.S. \$ 21 billion as of the end of 2011. The portion of U.S. \$ 9.2 billion of the sector is constituted by the mobile communication services.

While the number of fixed line subscribers in 2004 was 19 million, this figure decreased by 15 million as of the end of 2011 as a result of the spread of mobile telephone services. Although population of the fixed-line penetration decreased by 21%, it is possible to say that 82% of households in Turkey has a fixed telephone line when evaluated on the basis of households.

The penetration in the mobile communication as of June of the year 2012 is approximately at the level of 89% with 66 million subscribers. As a result of the introduction of number portability and reduced mobile interconnection rates, the tendency to use a single mobile phone / SIM card showed an increase with the increased off-net calls and the number of mobile subscribers decreased as of 2009.

Figure 17. The number of fixed and mobile broadband users in Turkey



Source: BTK

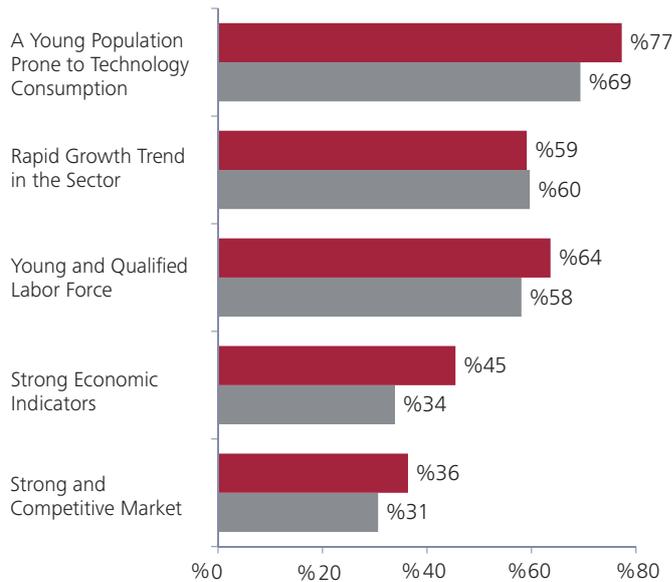
On the other hand, the number of broadband internet users increasing with the spread of use of xDSL has maintained its rapid growth trend with 3G technology. The number of total broadband (mobile and fixed) internet users has reached 18.4 million as of the second quarter of 2012. The portion of 10.6 million of this figure is (58%) subscribers accessing the internet through a computer or mobile phone using 3G mobile standard. While the number of new broadband subscription was 5.4 million in 2011, the portion of 92% of this figure was 3G modem and mobile device users. The number of fiber to the home (FTTH/B) users was around the level of 470,000. When the spreading rates of fixed and mobile broadband users in Turkey compared to other countries, it seems that an important growth potential continues.

2.2.3 Overview on Information and Communication Technologies Sector in Turkey

In order to determine the strengths and weaknesses of the ICT sector in Turkey and to predict the opportunities offered and threats that may arise, face-to-face interviews with senior managers of the sector's leaders, domestic and international investors, public institutions providing incentives and supports and other civil society organizations were conducted and a survey was conducted with the participation of representatives of 74 different companies. The findings obtained from the interviews and the survey results are summarized in the table below.

<p>Strengths</p> <ul style="list-style-type: none"> • A Young Population Prone to Technology Consumption • Labor Force Young and Prone to Develop • Rapid Growth Trend in the Sector • Strong Economic Indicators and Growth Trend 	<p>Weaknesses</p> <ul style="list-style-type: none"> • High Tax Rates • Predictability of Regulations • Price-Oriented Tender Policies • Insufficiency of Venture Capital • Violations on Intellectual Property Rights • Bureaucracy Functioning Slowly
<p>Opportunities:</p> <ul style="list-style-type: none"> • Consumers Quickly Adapting to Innovations • Proximity to Developed and Developing Markets • Existence of Virgin Markets • Capacity of Training Qualified Labor Force • Gradually Increasing Innovative Products • Outlook on the Sector and the Importance Laid by the Government • Interest of International Investors in the Sector 	<p>Threats</p> <ul style="list-style-type: none"> • Decreasing Profit Margins and Declining Investment Trend Due to Price-Oriented High Competition • Lack of Sufficiently Developed Collaboration Culture in R&D and Innovation • Macroeconomic Uncertainties (Current Account Deficit, Exchange Rate, Inflation, etc.) • Lack of a Broad Vision in Product and Brandization • Lack of a Training Policy Required for Qualified Workforce and Research

Figure 18. Strengths of the ICT Sector in Turkey



Source: Research of the Information and Communication Technologies Sector Deloitte, February 2012

The strength element that the professionals in the sector emphasize on is our technology consumption-prone young population

2.2.3.1 Strengths

A Young Population Prone to Technology Consumption

The strength element that the professionals both in the Information Technology and Communication sector emphasize on with their answers to the survey questions is our technology consumption-prone young population.

The adoption of users to technology especially in the young population gradually increases also in Turkey with technology products increasingly becoming cheaper all over the world and new technologies continuing to spread rapidly in recent years. 68% of the population in 16 to 24 age group in our country uses computer and 66% uses the Internet (4). When the Internet users in Turkey are asked how many devices providing mobile internet access (phone, laptop, tablet, video console with mobile internet connection, and so on.) they have, about 70% of them answers that they have "three or more" (5). It is estimated that one in three of these Internet users in 16 to 24 age group has a smart phone (6). On the other hand, social media rapidly becomes the main platform of our social life and the number of social media users in fixed and mobile environments gradually increases. Nine out of every ten people, who have access to the Internet in Turkey, have a Facebook user account, and Turkey is the world's sixth-largest community in this widest social media platform with a total number of 31.5 million users (7). There are great opportunities for content, application and game developers and innovative payment, advertising, marketing and security service provider enterprises for these platforms in our country where the use of mobile internet and social media especially in the young population is that high.

Labor Force Young and Prone to Develop

While 60% of the total population in Turkey is under 35 years of age (8), this ration in EU countries remains at the level of 41%. It is known that Turkey has the capacity to compete with other developing countries in terms of labor force groups such as qualified engineers and experienced managers*. While the number of students entered into engineering faculties is 216,000 in 2009, the number of students graduated from these engineering faculties is 35,000 in the same year (10). However, although the labor force defined as "ICT Specialist" Looking in the total employment in Turkey remains at a rate of 1.72% when examined under the OECD data, this ratio appears to be 3.24% on average in OECD and EU countries. Graduation of this potential from the faculties with ICT skills and trainings according to the needs of the ICT sector is extremely important in our country where the number of students enrolling to engineering faculties has significantly increased due to the number of placement and universities increased in the recent period. Both creation of market and provision of employment that will support the growth of the sector by this labor force are among the expectations of the sector professionals.

Strong Economic Indicators and Growth Trend

In 2010, the Turkey's Gross Domestic Product (GDP) increased to the level of U.S. \$ 736 billion from the level of U.S. \$ 231 billion in 2002 with an increase of more than three times. The per capita gross domestic product in our country reached the level of U.S. \$ 10.6 thousand and the inflation rates, which remained very high for a long time, decreased to single digits in recent years. The economic development of Turkey is expected to continue with the objectives of "U.S. \$ 2 trillion in GDP", "U.S. \$ 25 thousand in GDI" and "inflation rate of 5%" aimed to be achieved by the year 2023. Turkey, which currently is the world's 17th largest economy, aims to rank in the top 10 countries in 2023 and intends to maintain the sustainable growth figures by establishing its policies within this framework. Strong basic economic indicators are an important source of attraction for investments in the ICT sector as well as for each sector.

* Turkey ranks in the first three in the comparisons made between Brazil, Czech Republic, China, Hungary, India, Poland, Romania and Russia, which could be considered as nearest competitor countries, when the qualified labor force, skilled experienced managers, skilled engineers, experience in international business and information technology skills in the IMD World Competitiveness Index are taken into account.

2.2.3.2 Weaknesses

It was discovered that the weaknesses of the sector differentiated on the basis of the sub-sectors in the survey and the face-to-face interviews conducted. The following matters are listed as weaknesses in the Information Technology sub-sector differently from the communication sub-sector:

- Insufficiency of Venture Capital
- Violations on Intellectual Property Rights
- Lack of Business Doing Culture and Business Planning
- Value Attached by Users on the Services

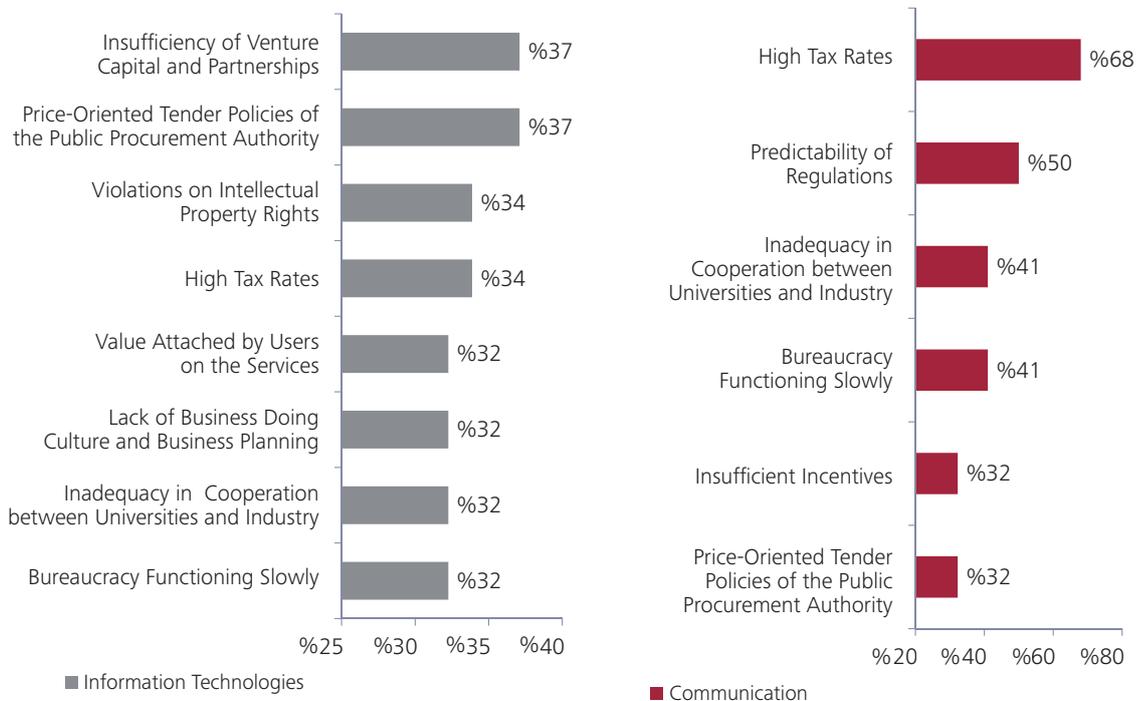
On the other hand, the following matters come to the fore in the IT sector differently from the communication sub-sector:

- Predictability of Regulations
- Insufficient Incentives

The following matters come to the forefront as common weaknesses in the two sub-sectors:

- High Tax Rates
- Price-Oriented Tender Policies
- Bureaucracy Functioning Slowly
- Inadequacy in Cooperation between Universities and Industry

Figure 19: Weaknesses of the ICT Sector in Turkey



Source: Research of the Information and Communication Technologies Sector Deloitte, February 2012

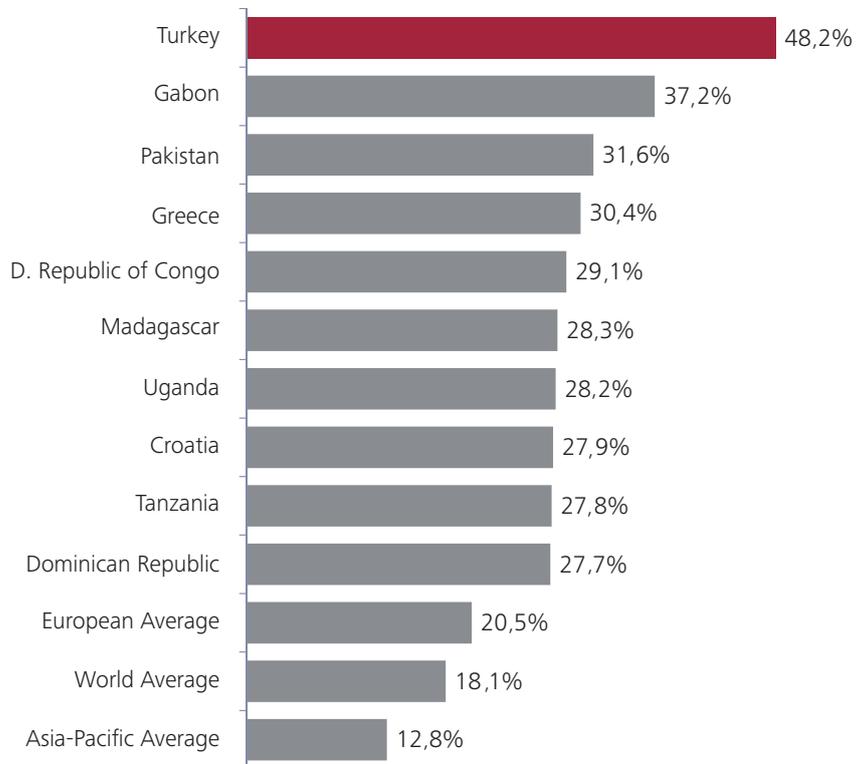
High Tax Rates:

There are many tax incentive programs designed for the ICT sector. The most prominent one among these programs is the tax burden reductions provided within the scope of the Technology Development Zones and R&D Centers established with the Law No. 5746. However, given the fact that many small enterprises still cannot benefit from these incentives due to the reasons such as lack of space and high rental costs, it is observed that the regulations for tax burden reduction that will cover companies in every size in the regions with intense skilled labor force, which is needed in cities such as especially Istanbul, Ankara and Izmir, are required.

On the other hand, high taxes in the communication sector constitute an impediment for investments in the sector. When device, connection and usage costs of a mobile phone subscribers in Turkey are evaluated together, it can be seen that 48% of the total cost of the mobile voice and data services is allocated as a tax. In other words, only half of the value paid out by the users for mobile services are transferred to the investors as a net income, and the source remaining after operating costs, treasury share, collected as 15% of the revenue, and contribution margin, administrative fines, interest payments and other tax liabilities are deducted from the above-mentioned figure is not enough for mobile operators to be able to continue to their investments.

The taxes reflected in communication bills and consumption amounts of users make Turkey the world's highest tax imposing country in terms of monthly usage

Figure 20. Tax rate within the total of mobile ownership cost in 2011



Source: GSMA Global Deloitte Tax Review, 2011

The main reason for the world's highest tax rate imposed on mobile communication services to be in Turkey is the tax called Special Communication Tax (SCT) which entered into force with the statutory decree dated 07.16.2004. The special communication and consumption tax items collected from users as of 2012 are as follows:

Taxes on the purchase of mobile devices:

This tax, calculated over device prices during the purchase of mobile devices by consumers, is calculated as 25% SCT and 18% VAT with a fixed price of 100 TRY. In addition, a fee for IMEI registration of 41 Kurus, collected for each mobile device, is charged.

Taxes collected during line allocation:

Taxes amounting to 51.56 TRY in total charged per new subscription which also known as the "First Allocation Tax":

- The special communication tax amounting to 37 TRY charged during allocation of a mobile line to a user
- Wireless License Fee amounting to 14.56 TRY charged for once only

Such high initial taxes even though non-recurring create a high cost for subscribers with low monthly usage and price sensitivity and adversely affect the expansion and growth potential of services with monthly communication costs of only 2 to 3 TRY such as machine-to-machine (M2M) communication.

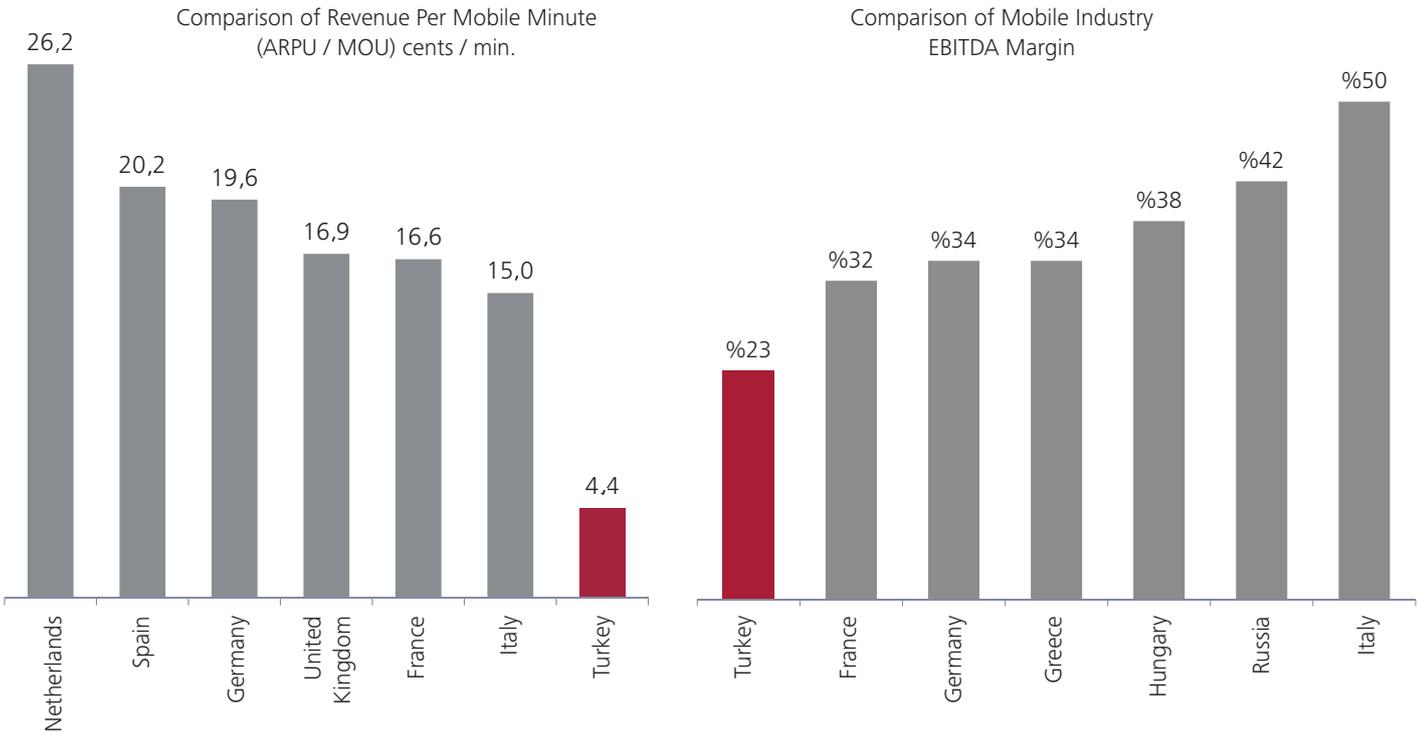
Usage Taxes: The taxes reflected in communication bills and consumption amounts of users make Turkey the world's highest tax imposing country in terms of monthly usage.

- Special Communication Tax (SCT) of 25% charged from mobile lines for voice and SMS-based services and of 15% charged from fixed lines for voice and SMS services
- Special Communication Tax (SCT) of 5% for internet (data) service charged over mobile or fixed lines

- Even the rate of SCT for data services in mobile lines is 5%, the practice applied to the subscribers with pre-paid lines is different. All pre-paid subscribers are assumed to use voice service and they are charged SCT at the rate of 25% regardless of their actual usage details as it is not possible to know whether the service in pre-paid lines is to be used as voice or data service in advance. However, in a calculation, made taking the current use of pre-paid mobile subscribers into account, it is revealed that the pre-paid mobile subscribers in Turkey pay an extra tax amounting to 180 million TRY per year due to this practice.

- Wireless Usage Fee with a current value of 14.56 TRY charged every year during continuation of subscription

Figure 21. Mobile telephony costs (after tax) and operator profitability by countries, 2011



Kaynak: Wireless Intelligence, BTK, Deloitte Analizi

Monthly service revenue per subscriber (ARPU) of the operators remains very low comparing to other countries due to these high tax rates and intense price competition in the sector, and it is observed that the net revenues per minute of the operators are very low especially minutes used are taken into account.

This is one of the main reasons for the rates of Earnings Before Interest Taxes Depreciation and Amortization (EBITDA) of the mobile operators in Turkey to be relatively low. According to the third quarter data of the ICTA in 2011, EBITDA margin of Avea was 14%, Vodafone 15% and Turkcell 35%.

It is observed that monthly service revenue per subscriber (ARPU) of the operators remains very low comparing to other countries due to these high tax rates and intense price competition in the sector

Table 1: Taxes Applied to the Fixed Communication Sector in our Country and Other Statutory Payment Obligations

Tax Item / Statutory Payment Obligations	Assessment	Rate
VAT	Service Cost	%18
Special Communication Tax (services outside of the Internet)	Service Cost	%15
Special Communication Tax (Internet)	Service Cost	%5
Contribution to the ICTA costs	Net Proceeds of Sales	%0,35
Universal Service Fund	Net Proceeds of Sales	%1
Corporation Tax	Financial Profit	%20
Communications tax*	Telephone and data revenues collected by Turk Telekom (excluding tax)	%1

Other services and products	Tax Item	Assessment	Rate
Radio - Television (Cable - Satellite - IPTV)	SCT	Service Cost	%15
Radio - Television (Cable - Satellite - IPTV)	Contribution to the ICTA costs	Net Proceeds of Sales	%0,35
Radio - Television (Cable - Satellite - IPTV)	Universal Service Fund	Net Proceeds of Sales	%1
New device (Radio and TV receivers)	Bandrol	Ürün bedeli	%16
New device	Banderole	Product Price	%16
New device	SCT	Product Price	%20
New device	VAT	Product Price	%18

* Turk Telekom

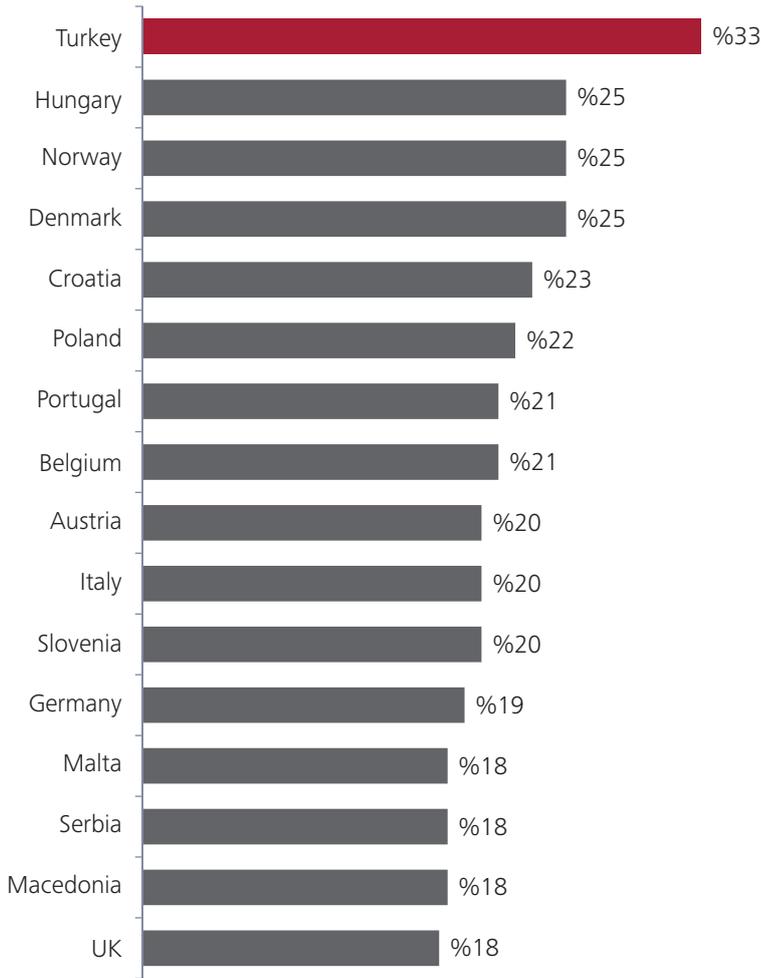
It can be said that one of the biggest impediments for creation of the telecommunication infrastructure set out during the process of transition to information society in the fixed communication sector in our country like in the mobile communication sector and fulfillment of the objectives of achieving high access rates is the taxes applied to the communication services. Taxes levied on the fixed communication services are both considered highly complex in terms of the manner they are constructed and constitute an impediment for the sector to grow and increase its penetration due to their high tax rates.

When taxes applied to the communication services around the world are compared to the taxes in our country, it is seen that both the taxes applied in Turkey are wide-ranging and complex and the taxes are applied at very high rates. While the tax ratio levied on usage cost of the fixed communication services around the world is an average of 20%, this ratio is 34% in our country.

Predictability of Regulations

The fact that the regulations in sectors subject to regulation, such as communication, are not predictable and the Authority takes decisions without receiving opinions of the companies in the sector, granting a time period that will allow investors to make a healthy planning and sharing the grounds of such decisions stands out as an important problem.

Figure 22. Consumption taxes of fixed communication services by countries (VAT + SCT)



Source: ETNO (European Telecommunications Network Operators' Association)

That the regulators give weight to their supervisory duty instead of focusing on taking decisions that will improve the market and competition and lay claims from investors that may be disproportionate in terms of cost-benefit balance while respecting the rights and interests of consumers have a negative effect on profitability of the operators and investment potential in the sector. At this point, it is important to perform the related regulatory impact analysis before making any arrangement in the communication sector and structure regulations to be made based on these analyzes. Predictability of the medium and long-term effects of regulations and building the regulations on solid foundations will only be possible in this way.

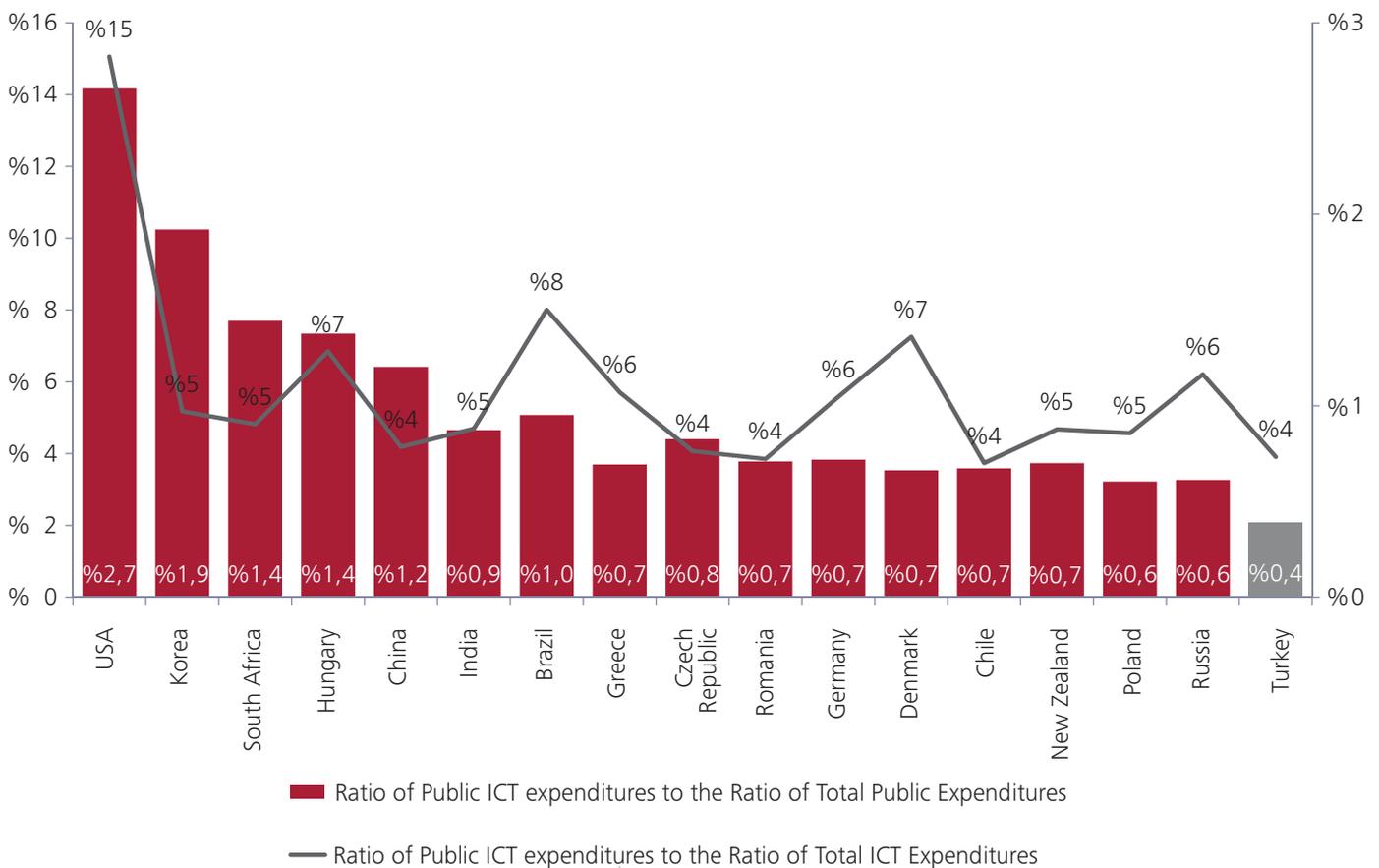
Price-Oriented Tender Policies of the Public Procurement Authority

Price oriented purchases in public procurements especially for software and IT services sub-sectors without taking the characteristics of the sector into account is put forward as a major problem by the companies in the sector interviewed face-to-face.

Public procurements have an important role in the development of the sectors in Turkey as well as all over the world. The public ICT investments within the scope of e-government transformation program and in particular social security, health, education and defense come to the forefront in our country. It is estimated that only about 4% of the public procurements creates the size of the ICT market in Turkey. It is observed that this ratio remains low compared to other developed and developing countries. However, the ratio of public expenditures in the ICT Sector in Turkey to the total public expenditure is lower than both developed and developing countries.

The general total cost of ownership of the public procurements and price-oriented purchases made without taking into account their contribution to the sector lead the companies in the sector to aggressive pricing. This situation creates a significant pressure on profit margins, and constitutes an obstacle for the companies in the sector to grow

Figure 23. Ratio of Public ICT expenditures to total public expenditures and total ICT expenditures, 2011



Source: IHS Global Insight, IMF World Economic Outlook Database, Deloitte Analysis

One of the reasons for the public ICT expenditures remain behind other countries as a value is presented as the price-oriented purchasing policies of the Public Procurement Authority (PPA) mechanism performing public procurements.

The general total cost of ownership of the public procurements and price-oriented purchases made without taking into account their contribution to the sector lead the companies in the sector to aggressive pricing. This situation creates a significant pressure on profit margins of the sector companies, which already are mainly SMEs, and hinders the companies to grow. Discounts are usually in software and IT services as the amount of discount on hardware prices for purchases by the Public Procurement Authority is limited. Therefore, the price-oriented competition especially in these sub-sectors prevents the growth and reduces the resources allocated to innovation, research and development.

On the other hand, the precedent project work completion certificates asked for the Public Procurement Authority tenders constitute an impediment especially for R&D activities and during the process of commercialization of products of enterprises developing new products and without previous practical experience.

Insufficiency of Venture Capital

Since the newly established enterprises have more difficulties to obtain finance and management supports through conventional resources, the opportunities provided by angel investors and venture capital formations come to the fore. Although in the resources allocated as venture capitals in recent years in our country seem to have increased, Turkey ranks ninety-ninth with a score of 2.2% among 139 countries according to the index data of the year 2011 of the Venture Capital Asset of the World Economic Forum.

According to the index data of the year 2011 of the Venture Capital Asset of the World Economic Forum, Turkey ranks ninety-ninth among 139 countries

The international venture capital firms, which have invested in our country recently, have complained about the inexperience of the entrepreneurs on the generally accepted universal venture financing culture of angel investors and legal advisers, the awareness of investment process and the related standard tools. Turkey still does not have a legal regulation on angel and venture capital investors, and the legal infrastructure in Turkey is not sufficient to ensure venture capital investors to invest in our country.

Impediments such as inapplicability of global applications easily such as preferred shares, right of repurchase, share options, difficulties in obtaining foreign funding, obligation of going public within three years for venture capital investment companies in initiatives hinder development of venture capital funds.

The level of angel investments in Turkey is almost is little or no. Increasing the number of angel investors (presently estimated to be less than 200) and supporting new companies with minority shares emerge as a key requirement".

The effect of the decline in the use of pirated software piracy to the level of 52% with a decrease of 10 percent on the GDP of Turkey is calculated to be U.S. \$ 839 million

Violations on Intellectual Property Rights

Intellectual Property Rights are critical in terms of attracting high technology and R&D investments to our country. The sector companies interviewed face-to-face have stated that one of the biggest impediments for the growth of the sector and the production of value-added products and services is violations on Intellectual Property Rights. While the software sub-sector is the sector most exposed to fraud with the ratio of 35% according to the European Brands Association, the ratio of violation and fraud in Turkey is estimated to be two times higher than the world average (12).

According to the Business Software Alliance (BSA) data, unlicensed software installed on personal computers in Turkey reached 62% in 2011 and the lost economic value rose to U.S. \$ 526 million with an increase of 24% compared to the previous year. The effect of the decline in the use of pirated software to the level of 52% with a decrease of 10 percent towards achieving the level of 42%, the world average, on the GDP of Turkey is calculated to be U.S. \$ 839 million.

Unawareness in Turkey on purchasing licensed software and installing to family members' or friends' computers or downloading such software from web-sites free of charge is not legal emerges as an important issue.

The research conducted by BSA in 2011 shows that about 40% of software users in Turkey is not aware of that the pirated software they use are obtained illegally. Given the fact that the related legislation and the laws in Turkey are compatible with the international examples to a great extent, it can be said that the main problem is not with the regulations but its enforcement and increase the level of awareness of the community (13).

Intense violations of Intellectual Property Rights significantly hinder the growth of the sector especially in software and attracting the international investment. Acting responsibly towards enforcement of the existing laws is of critical importance.

Bureaucracy Functioning Slowly

One of the greatest impediments for international capital investments appears to be long and complex bureaucratic processes. Long duration of the legal process, relatively difficult company opening and closure process, slow functioning of approval procedures in company acquisitions and mergers are among the challenges especially raised by the international financial investors and small-scale entrepreneurs. According to the Ease of Doing Business Index published by the World Bank, Turkey ranks seventy-first among from 183 countries is behind countries such as Hungary, Poland, Czech Republic, Kyrgyzstan, Azerbaijan.

On the other hand, both the insufficiency in collaborations of mobile operators for selection of place for base stations and infrastructure sharing and the problems experienced by the fixed establishments in obtaining the necessary permissions regarding right-of-way and excavation operations for fiber network installation come to the fore as factors that delay infrastructure investments and prevent the effective use of resources.

Inadequacy in Cooperation between Universities and Industry

The sector companies states that education in the universities is not capable of answering the today's needs of the rapidly changing sector by emphasizing the insufficiency in co-operation between universities and the industry especially in the field of IT. Lack of a performance system encouraging academics to support the works with the private sector and innovative initiatives, insufficiency in planning the educational curriculum and internship opportunities taking the industry needs into consideration adequately and difficulties experienced by the private sector organizations to reach expert academic staff in areas they need are the outstanding issues open to development.

Lack of Business Doing Culture and Business Planning

The lack of preparation skills for and familiarity to comprehensive business plans in the new companies is described as a major problem by financial and strategic investors in the sector. The lack of staff, appointed to key duties such as finance, sales, marketing and supply within the companies, and specialized task distribution poses an obstacle in growth and productivity of the companies.

Doing business based on the price cut policies in order to ensure short term yields without making long-term planning causes both failure in provision of the services at the desired quality and negative effect on the sustainability of the sector.

Doing business based on the price cut policies in order to ensure short term yields without making long-term planning causes both failure in provision of the services at the desired quality and negative effect on the sustainability of the sector

Value Attached by Users on the Services

Absence of standards for the service competencies especially in the IT services and software sectors and lack of awareness of the added-value created, preference of the companies for meeting their IT needs within their own bodies without choosing to calculate the total cost of ownership due to the reasons such as security and flexibility and so on, may cause the price-oriented preferences to come forward in the private sector as well as the public sector. This situation forces the companies to price much below value and hinders the development of the sector and the international capital to invest especially in the services and software sub-sector. On the other hand, insufficient perception of the concept of added value among the users cause intellectual property violations in the market.

Although the intensity of the current incentives and support programs are found positive by the ICT sector companies, some improvement opportunities regarding the implementation of the programs, the coordination between them and their scope have been expressed

Insufficient Incentives

Although the intensity of the current incentives and support programs are found positive by the ICT sector companies, some improvement opportunities regarding the implementation of the programs, the coordination between them and their scope have been expressed. The following sub-headings appear as inadequacies and basic improvement opportunities in the current incentive and support mechanisms.

- Limited incentives except for the Technology Development Zones (TDZ)

- Limitation on the opportunity to benefit from the incentives, provided by the Law No. 5746 on Support of R&D activities, for small and medium-sized companies unable to establish a R&D center (due to the conditions such as fulfillment of criteria like the necessity of existence of a project supported by the public sector or internationally).
- Inability of companies in all sizes to benefit from TDZs fairly
- Less TGB supply in areas with demand
- Insufficiency of incentives varying according to geographical regions in areas with an intensive supply of qualified employees
- Difficulty of the criteria to benefit from project supports, insufficient initial funding
- Inconsistency between the support mechanisms, existence of legislation conflicting with each other time to time and differences in reviews of the Ministries
- Failure to follow up technical and commercial success of the incentives and measure their impacts
- Inadequate investment incentives for software
- Insufficient incentive mechanisms to encourage the consumption of ICT products in the private sector and the public sector
- Failure to provide sufficient incentive for the added-value developed on hardware and devices of which sub-components cannot be manufactured locally
- That the resource, created in order to promote the sectoral research, development and training activities, including technical and financial support, with the Law No. 5809 on the Electronic Communications, has not been yet available for use.

2.2.3.3 Opportunities

Labor Force and Consumers Quickly Adapting to Innovations

A young and technology-interested population is an important factor for the development of the ICT sector in Turkey both in terms of a producer and consumer. Creation of an important as a consumer as well as a labor force quickly adapting to innovations for the ICT sector by this population comes forward as a significant opportunity for the sector.

Proximity to Developed and Developing Markets

While the ICT sector in Turkey develops itself by easily experiencing the knowledge, best examples and high quality standards in the developed markets due to its proximity to both developed and developing markets thanks to its geographical location, the ICT sector in Turkey has the potential of expansion to foreign markets by taking the logistics cost advantage. In this context, Turkey has the opportunity to become a regional distribution and service center.

Existence of Virgin Markets

The ICT sector in Turkey offers many companies the opportunity to operate because the ICT sector in our country is still very small and has many virgin areas considering Turkey's economic size as well as strategic goals.

Figure 24: Opportunities in the ICT sector in Turkey



Source: Research of the Information and Communication Technologies Sector Deloitte, February 2012

Turkey, which stands out among from the countries in the region due to the economic uncertainties and the aging population in Europe, its more stable environment and sophisticated infrastructure comparing to the Middle East and African countries in the region, attracts investors' interest

Capacity of Training Qualified Labor Force

The fact that the number of universities is increased, the computer and electrical and electronics engineering departments of the universities are preferred by the country's most successful young people at the university entrance exam and there are many Turkish researchers with master and doctorate degrees both home and abroad, is an indication of the capacity of Turkey to train a qualified labor force. 7.8% of the students, who graduated in 2009, graduated from engineering faculties and 7,8% from basic sciences faculties. The number of students entered in engineering faculties in 2009 was 216,000 by reaching six times more of the number of graduated students. This labor force is possible to become a driving force in the growth of the sector when led to create innovation for the sector.

Outlook on the Sector and the Importance Laid by the Government

The importance laid on the ICT sector in Turkey gradually increases. Both the important market potential created by the projects developed in the country (for example, Fatih project) for the ICT sector and the targets set for the year 2023 reflect the importance laid on the sector. The initiatives such as establishment of the Ministry of Technology, the IT Valley, which is planned to be established in Muallim Village in Kocaeli, the Entrepreneurship Council, established to promote entrepreneurship, are important steps taken for the development of the sector. Appropriate policies to be introduced in accordance with these objectives and supports to be provided will also create an important opportunity for the sector.

Interest of International Investors in the Sector

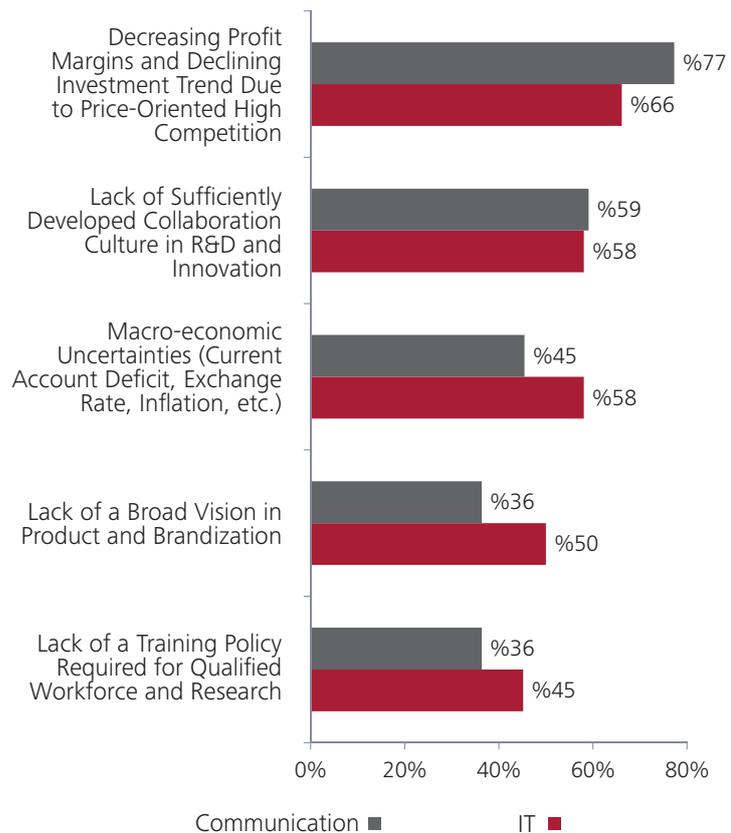
Given the economic and demographic size of Turkey as well as the trends in consumption, Turkey is an attractive market for both strategic and financial investors. In 2011, the web-sites especially dealing with e-commerce became the focus of attention of the international financial investors. Turkey that strengthens its position as market in which global companies continue their existence intensely with the regulatory reforms performed, existence of an economic and political stability and both privatization and greenfield investments gives the message of decreasing uncertainties and risks to the existing and potential international investors. Turkey, which stands out among from the countries in the region due to the economic uncertainties and the aging population in Europe, its more stable environment and sophisticated infrastructure comparing to the Middle East and African countries in the region, attracts investors' interest. It is extremely important to consider this situation as an opportunity for attracting investment.

2.2.3.4. Threats

Decreasing Profit Margins and Declining Investment Trend Due to Price-Oriented High Competition

Intense competition, inadequate perception of service value of consumers and high labor costs in the ICT sector put profitability of the companies under pressure, and this situation does not provide the companies with an opportunity to re-invest in the sector as well as discouraging financial and strategic investors that want to enter into the sector.

Figure 25. Threats in the ICT sector in Turkey



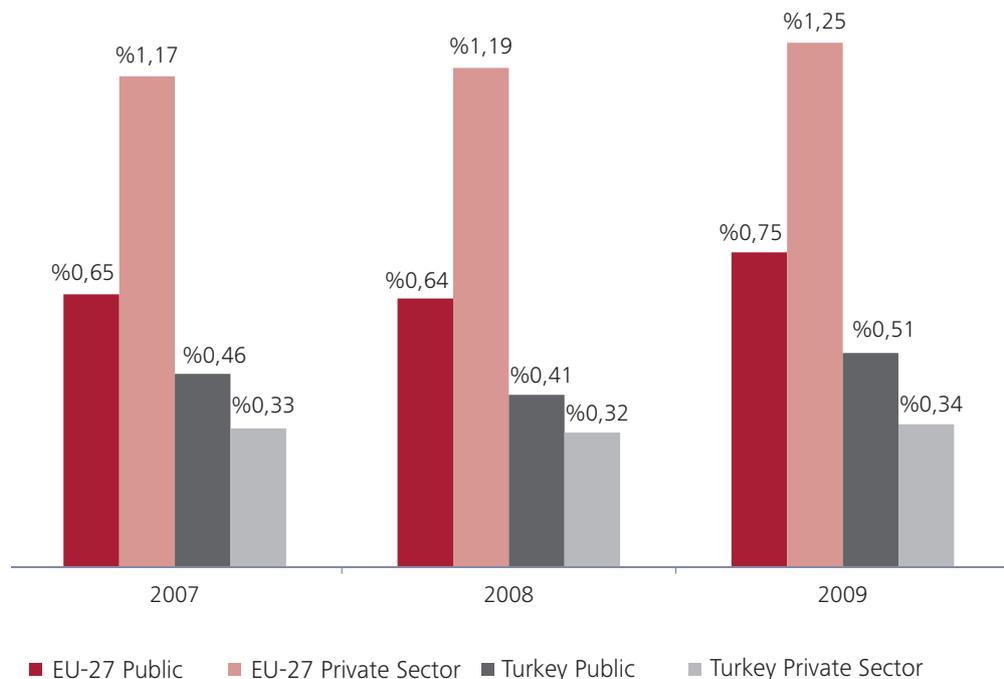
Source: Research of the Information and Communication Technologies Sector Deloitte, February 2012

Another way of effective use of R&D budgets is establishment of a synergy with the sectoral collaborations. However, co-operations for innovation between the companies in the ICT sector is scarcely any like in other sectors

Lack of Sufficiently Developed Collaboration Culture in R&D and Innovation

Budgets that the ICT sector companies in Turkey competing with global companies allocate are very small comparing to global companies. Another way of effective use of R&D budgets is establishment of a synergy with the sectoral collaborations. However, co-operations for innovation between the companies in the ICT sector is scarcely any like in other sectors. This situation comes to the fore as a threat for the sectors to improve the competitiveness.

Figure 26. Share of R&D expenditures in GDP



Source: SPO Information Society Statistics, 2011

Macroeconomic Uncertainties

Macro-economic uncertainties such as the inflation reached two-digit numbers again as of 2011 and high current account deficit, threaten the growth of the ICT sector as well as other sectors. The recent global economic crisis, whose effects still continue, and the serious economic restructuring in Europe, which has an important share in Turkey's exports, are considered as an element of risk.

Lack of a Broad Vision in Product and Brandization

Failure of especially software and IT services sectors in reaching a sufficient depth is one of the main reasons for the small number of products and brands that have emerged in this area. In Turkey, where R&D expenditures are relatively low, the ratio of conversion of academic studies and R&D activities into patents and commercial products remains low. For example, although the number of academic articles in Turkey is at the same level as South Korea, Turkey falls behind this country in patenting and creating commercial products and brands. Supporting co-operations between universities as well as the private sector is of critical importance for conversion of the researches performed into products. Research activities not commercializing do not provide economic benefit and added value.

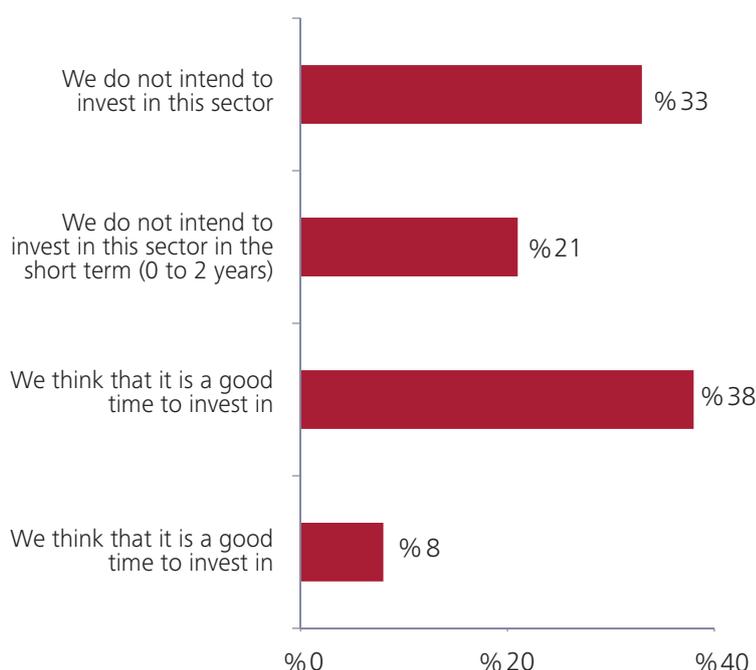
Although the number of academic articles in Turkey is at the same level as South Korea, Turkey falls behind this country in patenting and creating commercial products and brands

Lack of a Training Policy Required for Qualified Workforce and Research

Although Turkey is a country with a capacity to train skilled labor force for the ICT sector, it does not have an education policy that could meet to the needs of the business world and will support R&D, innovation and entrepreneurship. Given the fact that reflection of investments in education policies on the labor force takes a long time, planning of issues in educational policy in the long-term as soon as possible becomes crucial.

Interest of the private equity companies in the ICT sector in Turkey

Figure 27. Interest of the private equity companies in the ICT sector



Source: Deloitte Private Equity Confidence Survey, 2012

While 46% of the Private Equity Companies participating in "PE Confidence Survey", prepared by Deloitte to measure the interest and confidence of the Private Equity Companies in the market in Turkey, stated that it would be a right time to invest in the ICT sector in Turkey, 21% of them represented that they would not invest in the ICT sector in Turkey in short-term and 33% in long-term. It was discovered in the interviews with the investors that the reasons for this lack of interest were about the structure of the companies in the sector rather than the sector itself. The following factors come to the fore as the most common reasons:

- Fragmented Market Structure (Nonexistence of Medium-Sized Companies)
- Unpredictability of Regulations
- Lack of Business Plan Preparation Culture and Skill
- Lack of Sectoral Standard Regulations and Definitions

2.2.4 Strategies of Information and Communication Technologies Sector in Turkey

The importance of the ICT sector increases all over the world and the sector is adopted as a strategic sector by many countries. Initiatives towards the ICT sector in our country by the public bodies are extremely important for the development of the sector.

In recent years, there have been many important steps taken in the sector in order to bring the R&D innovation to the forefront and support the entrepreneurial environment, and studies in this regard continue. In this chapter of the report, strategies and decisions of the public institutions (Ministry of Science, Industry and Technology, Ministry of Transport and TUBITAK, etc.), which are closely related to the ICT sector, in this respect are examined.

2.2.4.1 Industrial Strategy of the Ministry of Science, Industry and Technology

In the strategic plan for 2010-2014, prepared by the Ministry of Science, Industry and Technology (formerly the Ministry of Industry and Trade) for Turkey, the goal of "being the production base of mid and high-technology products of Eurasia" is determined as the long-term vision. Three main strategies determined in order to achieve this goal are listed below.

To increase the weight of companies continuously improving their skills (strong) on the economy: The Industrial Strategy will contribute to the efforts of building a structure with high technological capability and skilled labor force, capacity of adapting to changing conditions, competitiveness in the national and international markets for enterprises. The emphasis on innovation in enterprises, the development of skilled labor force, the effective use of information and communication technologies will be supported within the scope of the strategy.

To increase the weight of the medium and high-technology sectors in production and export: The goal in the medium and high-technology sectors is transition to production with high added value. However, compared to global competitors, the small production scale of these sectors in Turkey makes achievement of this goal in the medium-term difficult. Motor land vehicles manufacturing, machine manufacturing, medical instruments, precision and optical instruments manufacturing, air and spacecraft manufacturing, investments in electronics, industry and drug production, which currently are included in this sector group and have a significant growth potential, and strategies for the development of these sectors will be paid a special attention, and Turkey will be supported in becoming an important production base in these sectors.

Turkey aims to produce and extend the advanced communication technologies with its national resources and create the information society infrastructure by building a R&D and innovation-based culture and be the leading country in satellite, mail, information and communication sector in the international area by contributing to the country's economic and social development

Transition to products with high added value in low-technology sectors: Our country has already acquired a significant scale of production and accumulation in traditional sectors. This accumulation is an important advantage in transition to products with high added value in the sub-sectors of these sectors. These sectors will be supported to increase the added value. Development of activities such as design, branding and logistics which increase the added value, in the value chains of these sectors in the global markets will be supported with the aim of increasing the effectiveness of Turkish companies.

In 2023: the sector's share in the GDP is aimed to be increased to 8% and the share of ICT in resources allocated to R&D is aimed to be at least 50%

Three main strategies, determined within the scope of the Industrial Strategy, are closely related to the Information and Communication Technology sector. The sector is seen as an important component to enhance competencies of the companies that will enable them to produce added value and as well as being in the field of advanced technology products that their exports are planned to increase.

On the other hand, "e-government" projects, targeted by the Ministry of Science, Industry and Technology, indicate the significant strategic opportunities and areas of improvement in the sector. Within the scope of e-government, the efforts for provision of public services in an effective, fast, high-quality, consistent, reliable, transparent and integrated way in accordance with the needs and expectations of citizens and the business world with the use of information and communication technologies are in progress.

The workload and cost charges on businesses in the sector arising out of the bureaucratic processes are aimed to reduce with the projects implemented and planned. Thus, businesses in the sector are also expected to increase their efficiency and competitiveness and expand the market with the integration of the information and communication technologies into their business processes.

2.2.4.2 2 The Ministry of Transport - Transport and Communication Strategy of Turkey

The other ministry developing strategies for the ICT sector is the Ministry of Transport, Maritime Affairs and Communications. The strategic aim of the sector within the Transport and Communication Strategy of Turkey, developed by the Ministry, is determined as producing and extending the advanced communication technologies with the national resources and creating the information society infrastructure by building a R&D and innovation-based culture and being the leading country in satellite, mail, information and communication sector in the international area by contributing to the country's economic and social development.

Objectives for the year 2023 in order to achieve this goal are determined as follows:

- ICT Sector size - U.S. \$ 160 billion
- Number of broadband subscribers - 30 million
- Number of mobile subscribers (120 million)
- Prevalence of fiber internet - Internet for 14 million houses at a speed of 1000 Mbps

There are proposals developed for the Information and Communication Sector as well in line with the strategic goal determined by Ministry of Transport, Maritime Affairs and Communications.

Proposals on corporate restructuring and legal regulations

- Simplification of Legislation and Regulation of Effective Inspection
- Projects and Regulations for Expanding the Information and Communication Infrastructure
- Project and Regulation for Wireless Broadband Access
- Information Society Project
- IPv6 Regulation
- Spectrum Management and Trade Regulation

Infrastructure Goals and Proposals

- Project for Development of Applications of Broadband Access and Information Exchange Centers
- Fiber-to-the-home Project
- Project for Community Antenna Plants
- Fiber Hub Project
- Telematics Project in Transport
- e-Life Project
- e-Government Regional Gate Project
- e-World Gate Project

The ratio of R&D expenditures in 2009, announced by the TSI, to the GDP is 0.85%; the number of researchers in the private sector is 39,000 and in total 135,000. The values must approximately grow three times more to achieve the objectives for the year 2023

R&D objectives and proposals

- Project and Regulation for Development of National Production and Design
 - Increase of the share of the sector in the GDP to the level of 8%
 - Increasing the ICT share in resources allocated to R&D to a minimum of 50%:
- Projects for Promoting R&D
 - Provision of venture capital awarding scholarship from R&D fund
 - Promoting centers such as innovation centers, science and technology parks, in which incentive opportunities are presented
 - Creating laboratories and platforms necessary for conversion of new ideas resulting from R&D activities into products and establishing technology transfer offices
 - Performing works for the establishment of R&D centers of international IT companies in Turkey and establishing the IT valley organized industrial zone

2.2.4.3 TUBITAK-23. Decisions of the Supreme Council of Science and Technology (SCST)

At the 23rd TUBITAK Science and High Technology Council, held at the end of 2011, important decisions on eight (8) subjects have been taken. These decisions touch on the points that are consistent with the decisions and objectives of other institutions and extremely critical for the development of the sector. It is extremely important and necessary to immediately put these decisions into practice and make their follow-up. The decision-headings are as follows:

1. Objectives of the national innovation system in 2023: It has been stated that the R&D and innovation activities will be intensified in order to rank among the world's largest 10 economies in 2023 with an emphasize on the need for R&D and innovation. Accordingly, determination of budget and resource with the relevant public institutions and continuously follow-up of the level achieved for the targets below by TUBITAK SCST have been decided.

- R&D Expenditures (%) %3
- Private Sector R&D Expenditures %2
- Number of researchers: 300,000
- Number of private sector researchers: 180,000

The ratio of R&D expenditures in 2009, announced by the TSI, to the GDP is 0.85%; the number of researchers in the private sector is 39,000 and in total 135,000. A growth target of approximately three-times more was set for all values.

2. Establishing a coordination committee to ensure integration, compliance and target orientation in R&D, innovation and entrepreneurship support mechanisms:

Despite the increase in the number of support provided by different institutions, creation of a certain synergy failed and the funds, allocated for the commercialization of the technology, declined. For this reason, establishing a coordination committee chaired by TUBITAK for achievement of the compliance and objectives was decided.

3. Development of policy instruments in order to enable and increase the number of R&D-intense initial companies:

In this direction, the necessity for establishing a support mechanisms for the parts by the process of reaching the market for initial companies with R&D activities and an ecosystem that will trigger increase of initiatives for R&D activities was emphasized. Performance of a legislative work with regard to enabling venture capital companies, allowing public partnership and commercialization of the activities performed were decided.

4. Development of policy instruments for the purpose of triggering innovation and entrepreneurship at universities:

The following points were put forward for the academy to play an active role by emphasizing the importance of the academic world for innovation and entrepreneurship.

- Promoting Technology Transfer Offices
- Promoting Incubation Centers
- Creating Entrepreneurial and Innovative University Indexes
- Redesigning the Criteria for Academic Promotion to Encourage Entrepreneurship and Innovation

5. Promoting entrepreneurship culture:

Lecturing entrepreneurship lessons to all students from primary school to doctorate by changing the educational system, organizing high-tech-oriented entrepreneurship competitions and certified entrepreneurship education programs were decided.

6. Improving public procurements and allocations of the right to use to promote innovation, localization and technology transfer:

Changing the public procurements, reaching serious quantities, to support R&D and innovation. In the Science, Technology and Innovation strategy for 2011 to 2016, it was stated that preference on domestic products would be ensured within the context of the macroeconomic policies regarding the balance of payments. However, while there is no provision on preferability of the domestic industry in Article 63 of the Law on Public Procurement with the exception of requirement of 15%, this provision also does not contain any content to support R&D and innovation. On the other hand, as the service-specific needs are prioritized in the public procurements unless there is a serious obligation arising from the legislation, it is observed that its impact beyond that on the domestic industry is not fully respected. For this reason, developing a legislation proposal related to public procurements by the working group that will be established with the participation of representatives of many public organizations is decided.

7. Generalization of science centers: With the science and research culture, which will be instilled at young ages, increasing the awareness and curiosity on scientific activities among young people is aimed.

8. Development of policy instruments to encourage licensing domestic patents:

The National Science, Technology and Innovation Strategy (2011 to 2016) contains a strategic goal headed "Promoting Conversion of Research Results into Products and Services" and the action "establishing a structure (Patent Evaluation Agency) that will ensure commercialization of locally produced industrial property rights (patents, trademarks, designs) and bringing them into the economy". However, it has been decided that the data with regard to licensing domestic patents will be monitored by the Turkish Patent Institute on a regular basis, mechanisms necessary to increase revenues will be established with an inter-institutional coordination and the related developments will be reported by the time the above-mentioned structure is established.

2.2.4.4 FATİH Project

The Fatih Project in Education is a project to provide 620,000 classrooms in all the schools at pre-school, primary and secondary education levels with laptops, Interactive LCD Panel Boards and an internet network infrastructure to be used effectively in lessons to appeal to more sense organs in the process of teaching and learning technology and information technology tools in order to ensure equality of opportunity in education and training and improve technology used at all the schools. While teachers are given in-service trainings in order to ensure the efficient use of IT equipment in teaching-learning during this process, curricula will be brought into conformity with IT-supported education and e-contents will be created. In this context, Fatih project in education consists of five major components:

- Building a Hardware and Software Infrastructure
 - One (1) multi-function printer, one (1) document camera for each school
 - One (1) interactive board, wired internet connection for each classroom
 - One (1) tablet PC for each teacher
 - One (1) e-book (Tablet PC) for each student

- Provision and management of educational e-content
- Effective use of IT in education programs
- In-service training of teachers
- Conscious, secure, manageable and scalable IT use

The Fatih Project in Education is being implemented by the Ministry of National Education and supported by the Ministry of Transport. Fulfillment of the requirements of the institutions for information technology hardware and software infrastructure, e-content requirement, updating teacher's guide books, in-service trainings for teachers and a conscious, secure, manageable information technology and internet use is planned by the end of 2013. The project is scheduled to be completed in 5 years. The Information Society Strategy (2006 to 2010), prepared by the State Planning Organization, contains the target of "information and communication technologies will be one of the main tools in the educational process and students, teachers will use these technologies effectively." for the use of Information Technologies in the education system. The Fatih Project, which is developed within this context, aims at completion of the information and communication technology infrastructure in the formal and non-formal educational institutions, enabling students to gain competency to use the information and communication technologies in these places and development of the information and communication technology-assisted education programs ⁽¹⁵⁾.

Although the estimated budget for the Fatih Project has not been yet disclosed, it is stated that the budget has been estimated to be about U.S. \$ 7-8 billion dollars by Mr. Ali Babacan, the Deputy Prime Minister ⁽¹⁶⁾. Nihat Ergun, the Minister of Science, Industry and Technology, has announced that tablet PCs to be distributed in the first 4 years are 15 million and in the following periods are 11.5 million for each year.

Turkey's targets for the year 2023

- **ICT Sector size - U.S. \$ 160 billion** The sector reached a size of U.S. \$ 30 billion as of 2011. The average annual growth (CAGR) should continue with a rate of 15% in order to achieve the size of U.S. \$ 160 billion in 2023.
- **Number of broadband subscribers - 30 million** Currently, the number of broadband subscribers including fixed and mobile all access methods is 14 million. With 3G mobile internet, the number of broadband subscribers grew with a compound annual growth rate of 32% between 2007 and 2011. A growth with a compound annual growth rate of 6.5% will be sufficient to achieve the number of broadband subscribers including mobile internet targeted for the year 2023. However, expressing broadband subscription objectives by fixed and mobile as well as type and speed of use individually would be more accurate.
- **Number of mobile subscribers (120 million)** The number of mobile subscribers reached 65.3 million with a compound annual growth rate of 1.3% between 2007 and 2011. The number of subscribers is required grow with a compound annual growth rate of 5.3% to reach the target. It is not clear whether or not data, modems and M2M devices are included in the target of mobile subscription growth. In the case where such subscriptions are included, the target can be considered reachable.
- **Increase of the share of the sector in the GDP to the level of 8%** The share of the sector in the GDP is estimated to be 3.9% as of the end of 2011.
- **Increasing the ICT share in resources allocated to R&D to a minimum of 50%:** This ratio is around 30% as of 2009.

2.2.5 Trends in the ICT sector

The ICT Sector stands out as one of the sectors with the highest innovation occurrence rate. This innovative structure of the sector leads change of trends in the sector rapidly. As a result of the position of the sector in our business and daily life, the trends in the sector way are known to closely affect the ways of doing business worldwide as well as life. With this perspective, trends that are expected to direct the sector in the near future are summarized below:

2.2.5.1 Cloud computing

Cloud Computing represents a new approach and usage model which does not correspond to a specific technology but where a variety of access and information technologies and infrastructures are gathered in a "cloud", its data and software is kept on a server instead of devices used and is processed on that server and access is provided via the internet; which is independent from technology and capacity of the device used. In the Strategy Report prepared by the U.S. CIO Council, Cloud Computing is defined as the key element that will allow and accelerate transformation provided by technological devices getting cheaper and improved and mobility and will create new employment opportunities which currently are unpredictable⁽¹⁸⁾. Cloud computing is expected to create major changes on business manner and usage models like the Internet has created on communication, socializing and our manners of work⁽¹⁹⁾. Today, many people already use a set of services through the Cloud Computing infrastructure. Products of companies such as Facebook, Google, Apple, and Yahoo!, are a kind of public cloud products, in fact, many internet users already benefit from the cloud computing. According to ABI Research, the number of users accessing to "cloud" based applications through mobile devices will reach 1 billion by 2014. In addition, a variety of researches, conducted on businesses using cloud computing technology, has revealed that an improvement of approximately 60% in terms of total ownership cost could be achieved. Thanks to such developments, adoption of large and small many businesses to IT will accelerate.

The most important benefits of Cloud Computing can be listed as follows:

- Mobility advantage brought by the freedom to use file and application independently from devices and technological features (processor, memory, etc.) of devices
- Due to the increasing rates of utilization with the common resource pools and common usage, cost advantage with business model "pay as you use" that allows purchasing and processing the same service with a cost lower than the total cost of ownership (TCO) of a similar resource.
- Advantage of accessing to current technology that allows purchasing IT resources up-to-date and renewed as a service easily from the common pools
- Advantage of scalability that allows purchasing the systems offering instant solutions according to the capacity needs arising from periodical and instantaneous changes in IT resources

Singapore offers incentives by developing structures promoting Cloud Computing through tax exemption and investment agency for expenditures of all kinds of businesses, including SMEs, such as Cloud Computing, Cloud Computing-related training, R&D activities. In addition the foregoing, some optional courses have been introduced to the universities for the purpose of training students that would adopt and develop cloud computing after graduation.

With the studies, improvements performed and the vision set forth, international companies such as Amazon, Fujitsu, Microsoft, OpSource, Salesforce.com, Tata, Canon, HP, IBM, Oracle and Parallels, have opened Cloud Computing service centers in Singapore. Singapore aims to be the center of Cloud Computing in Asia.

Project for server consolidation and data center outsourcing

Barilla, one of the world's leading food groups, combined a total of 18 physical servers in two different locations in Turkey with a server environment, on the operating system not updated for a long time, on a virtual server with eight more up to date operating system in a virtualization software environment installed on two physical servers in the service provider's system room by transferring these servers to an external resource at the beginning of 2011. Any software, which operates integrated with ERP and ERP solution, has also been made accessible to users from a central-single point by virtualizing through application sharing software. A short list of the project returns is as follows:

- Transition into a shared system room instead of operation with two system rooms, (Reducing the replacement and administrative costs of UPS, cooling, fire suppression / prevention systems)
- Consolidating the systems on eight virtual images on two physical servers instead of replacing with eighteen physical servers. (Reducing the server license, hardware and administrative costs)
- Benefiting from additional services / infrastructure which are brought by a shared room with all infrastructure criteria and not included in the structure before the transition. (24/7 monitoring system, a fully redundant power, cooling system)
- Use of shared and with the highest performance devices as backup units.
- Providing save on time about 25% by the standard server management services for Barilla IT team in many services such as outsourcing, patch management, Active Directory user management, back-up management, 24/7 monitoring and intervene in SLA-based problems, and preventing failure of the existing works during performance of the other IT projects or resource constraints for the projects.
- Centralizing several servers, providing regional services in two different system rooms, on a single server and enabling this server to render services independently from region and reducing operational and administrative costs.

Compatibility issues also in the existing applications arising due to the transition of the server operating systems to the new version were the main challenges experienced in the project transition. Applications with problems during this process in the test environment have been tested with the new versions and commissioned on the new environment after conditioning.

The effects of the project in general are reduced hardware and software investments, reduced operating and management costs due to the reduction in the number of servers, save on time due to decrease in the work load intensity of the IT support team, canalized implementation projects and reduced consultancy costs in this regard, reduced operating / management costs of system room and increased availability of the systems. The costs decreased by 20% given the last five-year period. In addition, those, which are found to be new among software not in use, are employed within the scope of the disaster recovery project and the systems such as ERP system, required for the company to continue its activity are backed up without making any additional software investment.

The number of NFC-enabled device (smart-phone, tablet computers, e-readers) shipments is expected to double and reach 200 million in 2012 and 300 million in 2013

2.2.5.2 M2M - Machine-to-Machine Communication

While the term electronic communication is used to express human-to-human or human-to-machine communications, the concepts such as non-involvement of humans or involvement only as audiences in some of the services become increasingly widespread, and machines establish communication directly between each other M2M (Machine to Machine Communication). Telemetry, GPS-driven devices (mobile vehicle tracking), remote maintenance and management of systems, smart meters, M2M applications can be listed as examples. As the number of devices that can be connected to each other is quite a lot, M2M is referred to as the internet of things and offers a wide variety of opportunities growing rapidly. The size of M2M market is expected ⁽²⁰⁾ to reach a magnitude of between U.S. \$ 600 billion and U.S. \$ 1.2 trillion in 2020 that the number of devices connected are foreseen to exceed 50 billion ⁽²¹⁾. Innovation and benefits brought by M2M can be summarized as follows ⁽²²⁾:

- Personal safety through monitoring and surveillance in everywhere
- Development of more efficient business models with optimized asset use
- Process and productivity improvement provided through direct communication between remote machines and central management systems
- Performance increase and reduction of costs with real-time information transfer

2.2.5.3 NFC - Near Field Communication

NFC (Near Field Communication) is technology standard that enables a communication with simple and safe radio frequencies in case of a short distance between two NFC-enabled devices or a NFC-enabled device and a chip without having to come into contact (usually max 4 cm). Contactless transactions such as cash or public transport payments, office access cards, calendar synchronization or electronic business cards, can be listed as examples to NFC. Although NFC has a less battery consumption and safer than credit and debit cards, the low renewal rate of the existing sales of point (POS) machines have delayed expansion of NFC for the purpose of mobile payment (mobile wallet) use. The number of NFC-enabled device (smart-phone, tablet computers, e-readers) shipments is expected to double and reach 200 million in 2012 and 300 million in 2013. In addition, the use of NFC-enabled devices, which generally have been used for payment purpose up to now, is expected to become widespread to be used for different purposes such as game, security, information and authentication ⁽²³⁾.

2.2.5.4 Mobility: Mobile internet, mobile applications, tablets and smart phones

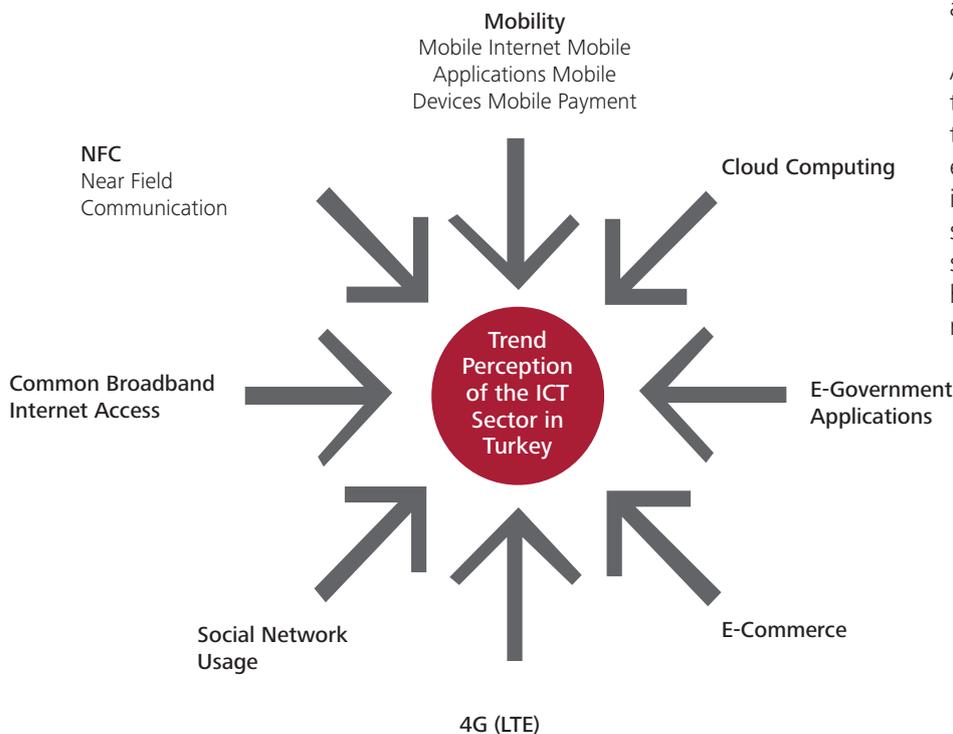
The use of mobile applications and smart phones and tablet computers supporting the daily life of today's world is expected to increase gradually and the number of mobile devices sold is expected to be higher than computer sales. The number of mobile devices per person is expected to be more than two due to the fall and diversity in mobile devices.

The number of mobile applications, which are indispensable contexts for mobile devices, doubled and exceeded 1 million in 2011 ⁽²⁴⁾. This number is expected to exceed 2 million in 2012. Applications that are more personalized such as the user's location, occupation, age and gender, and offer sophisticated solutions comparing to ordinary location-based applications are expected to become widespread with the increasing content awareness in these days where location-based applications become widespread. Location-based applications are expected to reach 1.4 billion users in 2014.

The mobile application market is also expected to have a heterogeneous structure with high-tech tablet computers and mobile phones for developed markets and low-tech tablet computers and mobile phones for developing markets. Therefore, a wide variety of mobile applications from the simplest to complex ones with a size of several GB are expected to take place in the market. The biggest supporter for the development of mobile applications and mobile device market is expected to be the mobile broadband internet access service. The reason for operators to start offering next-generation technologies is to meet the potential demand that will arise both on data package sizes and internet speed. While a user, using mobile broadband internet, consumes an average of 15 MB of data per day currently, this size is expected to reach 1 GB in 2020 ⁽²⁵⁾.

The application development for iOS, which is the operating system used in portable Apple devices, has offered more than 210,000 business opportunities only in the U.S.A with iPhone introduced in 2007. The number of registered application developers is 250,000, and there are more than 5000 application developer advertisements on indeed.com which is a job search engine. The application developers have generated a revenue of over U.S. \$ 4 billion through the App Store.

Figure 28. Trend Perception of the ICT Sector in Turkey



According to the survey data, which also included the sector-related expectations of the companies in the sector, the trends put forth are shown in Figure 28 below.

As a result of the survey carried out with the companies in the ICT sector in Turkey, topics such as e-government applications and e-commerce, have also come to the fore as importance trends. It is seen that these topics still survive in the agenda of Turkey although studies, carried out on this subject in the world, have reached a certain maturity and they are not considered as a trend.

Source: Research of the Information and Communication Technologies Sector Deloitte, February 2012

The introduction of obligatory use of electronic invoicing is expected to save up to 0.8% of the total GDP alone

2.2.5.5 E-Government Applications

The need for increased efficiency and productivity has led states to use more e-government platforms. In many countries, use of online channels become increasingly obligatory, and increased returns of the investments encourage the public sector to invest more in e-government platforms. E-government applications enable states to make significant savings also economically. According to the researches conducted, the introduction of obligatory use of electronic invoicing is expected to save up to 0.8% of the total GDP alone.

The major risk for the introduction of obligatory use of e-government applications in the past was limited IT capabilities of a certain portion of citizens and lack of computers and internet access. For this reason, states had been offering the online channel as a different alternative. However, currently, most of users and enterprises have become online in many countries, and e-government applications are positioned as a beginner level for those that are not online to increase the awareness of ICT. The increasing use of the Information and Communication Technologies with e-government applications and increased broadband internet penetration are particularly of critical importance for economic growth in developing countries. E-government applications save on time for users and public employees as well as reducing financial losses by increasing productivity ⁽²⁷⁾.

Vehicle & Driver Information System (VDIS)

The VDIS project, which was put into practice in 2010 with the support of the Information and Communication Technologies (ICT) with the objectives of simplification of the bureaucratic processes experienced during vehicle registration procedures and reducing the procedure-related costs, is an innovation that allows realization of vehicle registration and driver license transactions in the electronic environment. This service, offered by the State, considerably reduces the time and cost required to realize these procedures.

Procedures within the scope of VDIS are as follows:

- Registration procedures of new vehicles
- Sale, transfer and registration procedures of registered (second hand) vehicles
- Driver license issuance procedures

Obtaining a "clearance certificate", which indicates that the vehicle is free from any tax or traffic ticket liability, from Tax Offices was imposed as a condition to realize vehicle sales transaction before the VDIS, which removes many bureaucratic processes in the realization of these procedures, is put into practice. This inquiry is possible through an online notary with the VDIS so the necessity to visit Tax Offices to obtain this certificate is eliminated.

While inquiry of records (lien, pledge, precautionary measure) restricting sales or transfer transactions was possible only in traffic registration organizations, the VDIS also allows to carry out this inquiry online by enabling access to the computer records of the Police Department by notary public. On the other hand, the VDIS eliminates the necessity to apply to traffic registration organizations by vehicle owners after the sale procedure. These organizations are informed by notary public in electronic environment.

The VDIS also enables realization of document renewal procedures, which may be required due to reasons such as modification, color change, discard or disposal, in the traffic registration organization where a vehicle is registered as well as in any other traffic registration organization.

With the facilities brought by the VDIS, the cost of vehicle registration procedures per transaction is reduced from an average of 450 TRY to 25.5 TRY and the amount of time consumed for these procedures from three business days to five minutes. The loss of labor force and transportation costs caused are not included in this difference. On the other hand, the work-load of 4600 officers working with traffic registration organizations is reduced by 55%.

The number of citizens, benefited from this service from 05.01.2010, the date VDIS was put into practice for sales transactions of second-hand vehicles, until 04.30.2011 is 8309 million, and the amount of financial saving as a result of these transactions is approximately 1.8 billion TRY and the amount of saving on time and is 12.5 million days. While the number of second-hand vehicle sales realized before the VDIS was 2.35 million annually, this number exceeded 5 million as of the end of 2011.

In this direction, the VDIS project paving the way for savings on time and cost demonstrates a successful example of collaboration between the state and the ICT sector with a satisfaction rate of 96%.

3. Contributions of the Information and Communication Technologies sector to the economy and the competitiveness

The ICT sector provides positive contributions to economic growths of countries by strengthening their economic foundations as well as contributing to productivity and cost activities of sectors by triggering competition

3.1 The ICT sector is directly related to the development of countries.

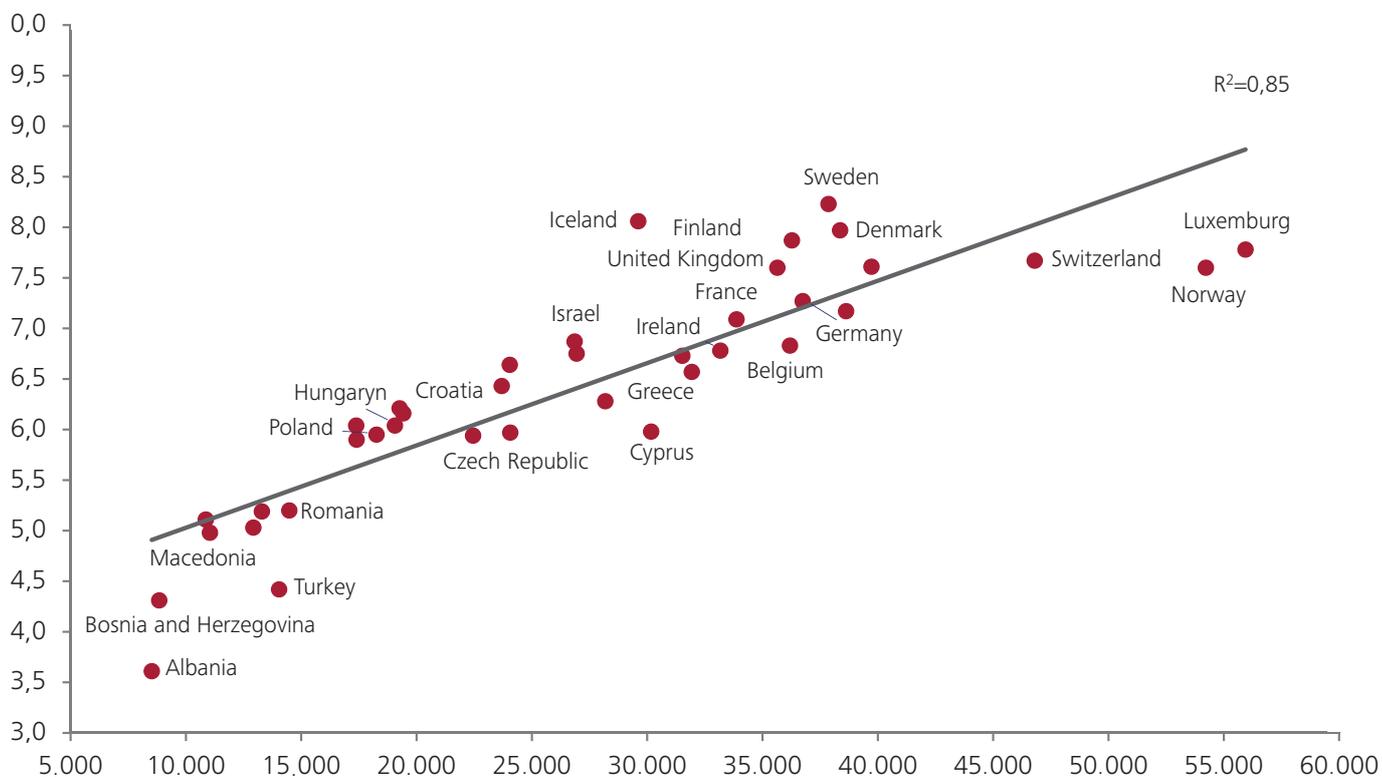
Today, various areas gaining rapid access and productivity with the effective use of the ICT sector products and services come to the fore given development levels of countries are analyzed socio-economically. The ICT sector provides positive contributions to economic growths of countries by strengthening their economic foundations such as innovation, productivity as well as contributing to productivity and cost activities of sectors by triggering competition.

On the other hand, it is observed that the ICT sector has a significant role in preventing poverty, extending health care services and increasing educational opportunities, in other words, in improving the living conditions of people and accordingly, making people efficient in economic growth. These conclusions suggest the connection between the ICT and development.

To demonstrate this connection, the IDI (ICT Development Index) Index, measuring development levels of countries in the field of ICT, is used by the International Telecommunications Union (ITU). According to the assessments based on this index, Turkey ranks fifty-ninth. Korea ranks the first with a score of 8.40 in the list while Turkey's score is 4.42.

When the IDI results are examined, it is observed that the highest ranking countries are developed countries. All countries except the United States and Canada ranking among the top 30 countries are either from Europe or East Asia / Pacific region. In summary, the countries ranking among top countries are the leading economies of the world.

Figure 29. GDP and IDI scores per capita (Europe)



Source: ITU

The relationship between ICT development levels of countries and per capita Gross National Product (GNP) values, which is one of the critical economic indicators, can also be seen clearly in the figure.

On the other hand, those ranking among top countries are countries considered to be developed countries also in the fields of health and education, while the average life expectancy in the top 10 countries is 80.4 years, this expectation is measured as 73.6 years in Turkey ⁽²⁸⁾.

While innovation is supposed to be a factor uprising Turkey's competitiveness, it currently functions on the contrary and stands out as a strategic factor that needs to be taken into account in achieving the goal of a competitive Turkey

When the rate of adult literacy, which is another development indicator, is examined, it is seen that this rate is 90.8% in Turkey while it is 99.0% in all countries except Hong-Kong ranking among the top 10 countries. This rate for Hong Kong is 94.6% ⁽²⁹⁾.

In summary, the critical indicators suggest the same conclusion: Development level in the field of ICT is in mutual interaction with and closely related to socio-economic development of a country. The Information and Communication Technologies are rather associated with innovation and sustainability in the course of development as well as the relationship between development and ICT. The following two sub-sections discuss the relationship between ICT innovation and sustainability.

3.1.1 The ICT Sector allows innovations.

Innovation is defined as transformation of information into economical and social benefits and the types of innovation are grouped as product, process, organization and marketing ⁽³⁰⁾. The empirical studies have suggested that all types of innovation affect the performance of manufacturing firms and financial performance of firms with a time phase ⁽³¹⁾, and innovation does not just have to be based on science and technology. For example, a large proportion of the innovations in the service sector are non-technological innovations.

It is observed that innovation, which is always an active element in the economic growth, has been becoming prominent much more markedly in the recent period, and innovation especially for developed countries is adopted as the main driving force of economic growth in today's world. For example, in the WEF Competitiveness Model ⁽³²⁾, the innovation-based economies are defined as the final stage with the highest income group countries.

It is seen that the rank and score of Turkey in the last 5 years in innovation, one of twelve basic components in the WEF Competitiveness Model, is way below than Turkey's overall rank and score. While innovation is supposed to be a factor uprising Turkey's competitiveness, it currently functions on the contrary and stands out as a strategic factor that needs to be taken into account in achieving the goal of a competitive Turkey. It is possible to say that our place in the global innovation is incompatible with Turkey's economic size ranking in the world.

The Information and Communication Technologies play a role enabling the formation of innovations and the global research collaboration networks steadily expanding and deepening constitute a typical example to this situation. Countries increasingly benefit from each others specializations and capabilities and enhance their resources in accessing to new information with collaborations. The global research collaboration networks with ICT-based infrastructure create an efficient synergy environment both for researchers and countries. Support of research institutions provided for global research collaborations gradually increase. Thus, an increase is observed in the rate of scientific and technological inventions, and innovation is maintained with a widespread collaboration through a global communication network by getting freed from the monopoly of the specific countries and expanding to a wide geography. For example, while R&D centers of multinational companies in countries outside of where their headquarters are located in 1975 was 45% of all the R&D centers, this ratio reached 66% in 2005 ⁽³³⁾. On the other hand, it is found out that 91% of the first 1000 companies with the world's largest R&D expenditure budgets engages in innovation activities also in countries outside of where their headquarters are located in ⁽³⁴⁾. Such collaborations and clusters pave the way for researches that are expected to be interdisciplinary, more complex and therefore, with higher added value and accelerates such researches.

Companies increasingly benefit from the ICT infrastructure more intensely in reaching capabilities and creating collaborations in various regions of the world. For example, Hyundai has established engine R&D centers and design centers in countries such as Germany, USA, Japan, India. These centers work in collaboration and this collaboration is based on the ICT infrastructure. Sharing designs, prototypes over a broadband infrastructure and the speed brought by this sharing significantly increase the effectiveness of new product development.

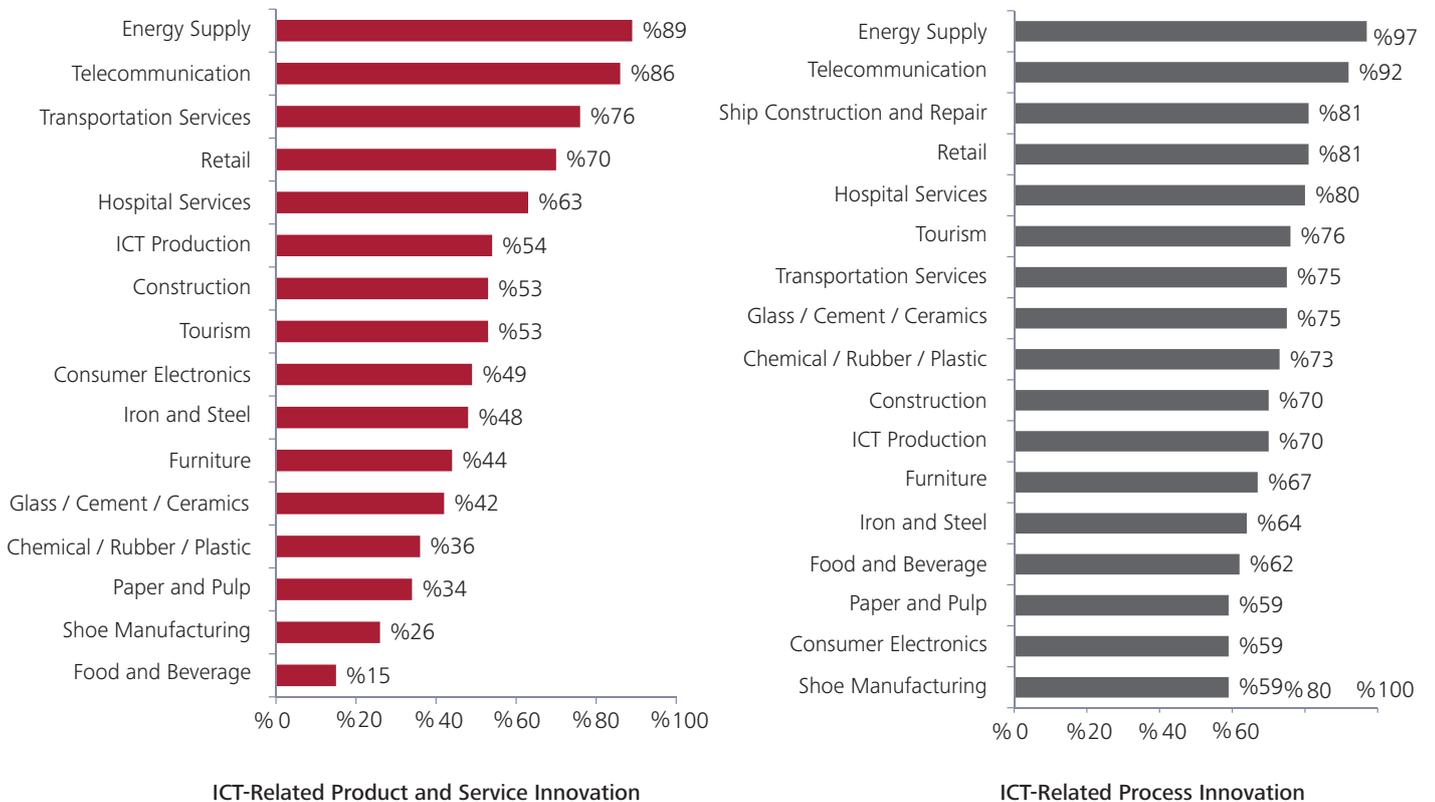
It is seen that the rank and score of Turkey in the last 5 years in innovation, one of twelve basic components in the WEF Competitiveness Model, is way below than Turkey's overall rank and score

Increases in speed and performance / cost rates in modeling and simulation software improve capabilities of companies in new product development and extend the time periods to release new products into the market which is one of the important determinants of competitiveness. Modeling and simulation software has a wide range of usage area from personal drug development researches to optimization of automated material flow system of a pharmacy warehouse. Rapid prototyping software should also be evaluated in this context. Use of such software provided significant savings on time in transition from design to production. Especially, developments such as increasing accessibility of SMEs to these resources are developments that support added value and productivity of SMEs and accordingly, their efforts to increase competitiveness.

ICT Technologies are included in many innovations and play a role paving the way for development of existing and emerging technology and business areas with innovations. For example, the results of field studies, conducted in EU countries in different periods, have revealed to what extent the Information and Communication Technologies play a role in facilitating product, service and process innovations. This research was carried out in a total of 17 different business areas including ICT manufacturing. The weight of ICT in product and service innovations and process innovations is determined. It is possible to observe that ICT-related innovations have reached a very high rates.

On the other hand, the relatively high rate of ICT-related innovations is observed in some sectors defined as mature (shipbuilding and repair, shoe manufacturing, etc.). Traditional sectors can only maintain their competitiveness by increasing their added values through innovations carried out especially using general-purpose technologies. Therefore, the use of ICT and ICT-related innovations are extremely important for also companies in traditional sectors.

Figure 30. Effect of ICT in products and services and process innovations



Source: e-Business Watch Surveys (2006, 2007, 2009)

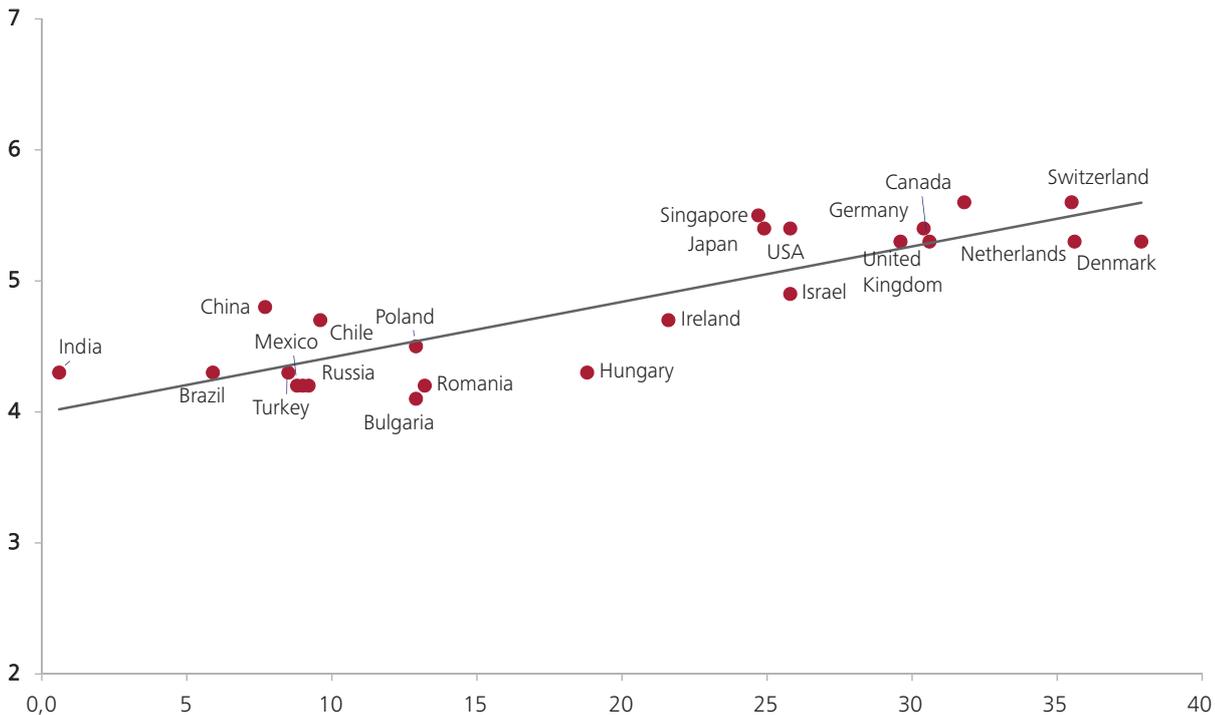
Another observation is that large companies stand out in ICT-related innovations. Considering this observation, the enabling role of ICT on innovation is expected to increase with the spread to small businesses. In countries that a large portion of economies is created by SMEs like in Turkey, the preference of such companies on heading towards innovative products and services is extremely critical for competitiveness and economic growth.

When the analyzes of ICT-related innovations are examined, the most prominent sector is the energy supply. The energy supply sector is of critical importance for our country as it constitutes a significant portion of the current account deficit of Turkey. Given the fact that innovations in the sector reduce energy consumption and enable delivery of energy produced to consumers more efficiently,

it is clear that innovations in the energy supply sector will also contribute to reduce Turkey's current account deficit.

The rapid spread of the ICT since the 1990s and its facilitating effect on innovations is substantially due to its integrated network structure brought by the ICT infrastructure. Development, spread, increase in effectiveness of researches, trade, finance, social media, production all depends on broadband network structures. For this reason, countries seeking to increase their competitiveness and prosperity levels treat extensification of broadband networks as a national priority. In fact, a linear relationship between the GCI, countries competitiveness index, and the intensity of number of broadband internet users. The study "from Silk Road to Broadband", carried out by the Prime Minister and Cisco, on the economic impact of broadband networks also confirms this relationship.

Figure 31. Number of GCI and Broadband Internet Users /100 Persons



Source: The Global Competitiveness Report 2011-2012.

What the use of broadband offers in Turkey?

In the report of "From Silk Road to Broadband", a joint study by the Prime Minister and Cisco, a vision in order to accelerate and support the economic growth and competitiveness of Turkey has been presented for Turkey 2023, and macro-economic and social impacts of policies based on broadband technologies have been introduced.

The OECD average of subscription-based broadband spread increased to 23.3% in 2009 from 2.9% in 2001. Spread of broadband in the world's population reached 7.5% in 2008 and 8.4% in 2010. The household-based spread in the world increased to 27.4% in 2008 and to 30.8% in 2010. The demand for bandwidth has been growing with a level of 50% - 60% annually. Although the level of spread in developing economies is low, the rates of spread in these economies are higher than developed countries. (India 62%, China 23%, Russia 39%, Brazil 23%, Mexico 54%, etc.) Turkey's performance is considered to be low, and it is emphasized that Turkey fails to reach the desired level in broadband. Indeed, the difference in spread between Turkey and developed countries has continued to remain around 20%. The rate of increase in broadband capacity remained way below the OECD average of 1.47% with the level of 0.90% in 2009. It is underlined that Turkey that is still in transition process from an efficiency-based economy into an innovation-based economy needs to close the gap of broadband, which is one of the basic infrastructure elements of the innovation ecosystem, with a strategy holistic and on the national basis in which the public sector is also included.

According to the analysis carried out, the prevalence ratio of broadband on the basis of household in Turkey, which was 31% in 2009, is expected to reach saturation at the level of 81% in 2023 with the assumptions of an average annual economic growth of 5%, entry-level broadband price of U.S. \$ 20 / month and a level of general price inflation of 5.3%.

According to the analysis results based on these assumptions, the macro-economic and social impacts of broadband technologies-based policies are expected to be as summarized below.

- Turkey's GDP growth, which is projected to be on annual average of 5% by 2023, can increase by 7.3%.
- The broadband ecosystem, which will be formed as a result of the economic growth due to broadband technology, will be able to create new employment opportunities of between 180000-380000 per year.
- With cost saving, access to new markets, attracting foreign capital and increase in labor productivity by broadband technology, Turkey may rapidly grow and rank among the first 20 countries in the Global Competitiveness Index (GCI).
- Broadband ecosystems will also have strong social consequences to exceed the scope and depth of such economic effects in long-term. Accordingly, the actual central social momentum that broadband will bring will be the increase in our country's human capital. Human capital can be improved by creating a more productive citizen profile with especially a better access to education and training and improved health services.

3.1.2 The ICT sector offers critical benefits in ensuring sustainability.

Sustainability is one of the major issues valued by all developed countries. Developed countries take measures in order to enable sectors to be sustainable and force sectors to be sustainable.

Today, the world's resources rapidly run out, and sustainability of the ICT sector as well as each sector stands out. Although the impact of the sector on sustainability can be described negative in general, it is possible to conclude that the overall sustainability impact of the ICT sector is positive with the improvement in applications in other sectors by the Information and Communication Technologies.

In this section, the impact of the ICT sector on sustainability and the impacts of the sector on sustainability of other sectors will be examined under two sub-headings.

3.1.2.1 Environmentally friendly ICT approaches

Environmentally Friendly Information and Communication Technologies (ICT) are a new approach that aims to reduce energy consumption of the ICT systems and improve environmental sustainability of organizations. According to a study by Gartner on the need for environmentally friendly ICT, global information and communication technology sector creates about 2% of global CO₂ emissions ⁽³⁵⁾.

The ICT sector is the 5th most energy-consuming sector. Carbon footprint of the ICT sector in 2007 was calculated as 0.83GtCO₂e (equivalent billion metric tons of CO₂). According to the estimates of the Global e-Sustainability Initiative (GeSI), carbon footprint of the ICT sector will reach 1.43 GtCO₂e by 2020 and average annual growth of carbon footprint will be 6%. At the same time, researches suggest that the energy consumption of the ICT solutions, which create 8% of the total electricity consumption, will reach about 15% by 2020.

Sustainability of the ICT sector is regarded as one of the trends in the sector. The environmentally friendly ICT approach is expected to lead to significant changes in the sector

The "Environmentally Friendly ICT Initiative", created in order to reduce the sustainability impact of the sector, is directed by the largest ICT manufacturers. The purpose of this initiative is to develop standards and new technologies that would improve performances of data centers to enable the sector to less use the world's resources; to support adoption of energy efficiency standards, processes, measurements and technologies and increase computing energy efficiency.

Sustainability of the ICT sector is regarded as one of the trends in the sector. The environmentally friendly ICT approach is expected to lead to significant changes in the sector.

Use of ICT in the Energy Sector - Smart Grid

Smart grid is a system that enables electronic data flow from production to consumption of electricity. With this data flow, many partners from consumer to manufacturer are provided convenience.

Smart grid systems provide consumers with many benefits. Consumers can see and set amount of consumption in real-time with this system. Consumers can learn about prices of dynamic electricity and accordingly, consume electricity when it is cheaper. In addition, frequency and duration of power outages will reduce and electricity supply will be more reliable with the system. According to a study, power outages bring a cost of about U.S. \$ 80 billion per year economy on the United States' economy.

The Intelligent Network System will bring many benefits to electricity generation and distribution companies. Today, the power distribution companies in our country send their employees to read electricity meters and detect leakages and malfunctions in meters. The need for such employment considerably reduces with the Intelligent Network System. Amounts of electricity consumption are easily measured through the data flow in the system. In addition, malfunctions or leakages are easily detected with the data flow. This allows a significant decrease in operational costs of distribution companies. At the same time, distribution companies will have the opportunity to make better demand planning, adjust supply more accurately with more precise data flow, and the system will operate more efficiently.

In addition, the system is expected to increase also alternative energy consumption. Thus, energy consumption and carbon emissions will reduce. According to a study by the General Electric company, a reduction of 3.7 million tons per year in CO₂ emission is provided in the case 10% of houses in the U.S.A has a smart-meter.

Intelligent Network System is already in use in many countries. The U.S. government spent U.S. \$ 435 million for spread of Intelligent Network System in 2009. The Chinese government also invest in this technology. According to the projections, investments in Intelligent Network Systems in China will reach U.S. \$ 96 billion by 2020.

It is observed that the current trends in the energy supply and use are not sustainable in economic, social and environmental aspects. The Intelligent Network System is expected to lead to a more sustainable future with its benefits such as managing power consumption of users and allowing distribution companies to understand and meet users' requests.

3.1.2.2 The ICT sector supports the sustainability of other sectors.

It is observed that the use of ICT helps to increase energy efficiency in many sectors. According to the researches by the Global e-Sustainability Initiative, the use of ICT in other sectors has the potential to provide a reduction of 15% in global emission by 2020 ⁽³⁶⁾. Advantages brought by the use of ICT in sectors are illustrated below.

Energy sector

According to the estimates, emissions arising from energy production and distribution is one-fourth of the world's total emission of greenhouse gases. The use of ICT in the energy sector can limit the emission of greenhouse gases.

For example, the ICT systems are mainly used in analysis, modeling and control with regard to renewable and standard energy production and distribution and increases process efficiencies. Smart meters and smart grid systems are two examples that provide the most benefit to sustainability among the ICT applications.

Energy Automation

The use of SCADA systems in order to ensure provision of quality energy input to and at the same time prevent defects that may exist in the power network in advance thrust to the forefront as an increasing necessity in today's competitive market conditions. With Energy Automation Systems, analysis of power networks is possible so that the necessary measures can be taken by performing various checks on the network and detecting problems that may be encountered in case of a failure much earlier. Different software modules that SCADA systems may have can also allow real-time follow-up of the power exchange that will come into existence in the very near future by enabling optimization of the network or energy production. While the distribution management system applications are developed in the Intelligent Networks R&D Center, established in Gebze which is one of the few Intelligent Network Application R&D centers opened by Siemens, the applications and solutions developed by the team members in Turkey working together with the R&D centers in Germany, USA and Brazil are used in nearly 200 countries where Siemens operates.

With the SCADA / DMS projects carried out for Enerjisa Baskent and Meram Dagitim Companies, distribution automation is being provided in Ankara and Konya, and provision of the following benefits is targeted.

- Detection of defective zone very quickly (from 4 + hours to below 2 sec.)
- Shortening response time (with detection of defective zone, from 4 to 48 hours to 2 to 3 minutes after arrival of the team by directing the team closest)
- Isolating defective zone as soon as possible and re-feeding customers through alternative supply points (from 6 + hours to below 5 sec.)

While customer satisfaction is increased thanks with a better quality of service with the SCADA / DMS project, the investment returns in a short period of time with benefits provided by minimization of downtime.

- Reduction in the amount of energy unsold and optimum use of the network (additional income up to 10%)
- Proper maintenance and investment plans with data obtained from the power network
- Prolonging equipment life (2 + years)

In addition, the system offers benefits such as efficient use of transformers and power lines with monitoring the power network, prevention of overloading along the feeder.

Use of ICT in the Transport Sector

The European Commission supports electric vehicles and aims to promote their use in order to, reduce greenhouse gas emissions by 20% and increase the energy efficiency by 20% by 2020. The Green Cars Initiative, created in this context, supports the R&D activities that may allow significant improvements in renewable energy sources, safety and intensity of traffic with the support of the ICT sector.

In this context, the ECOGEM project that Temsa is one of the project partners and is funded by the European Commission also aims to increase the ratio of use of electric vehicles by increasing the energy efficiency of electric vehicles in line with these goals.

The Advanced Driver Assistance System (ADAS-Advanced Driver Assistance), developed to work in compatible with a standard navigation system under the ECOGEM project, aims to recover users from range anxiety by continuously monitoring current energy consumptions and battery status of electric vehicles. The Advanced Driver Assistance System allows selection of the route that will provide the most efficient energy management by integrating information on traffic status and electric charging stations collected through mobile communications from the main platform with the machine learning feature in addition to the roads followed previously by the vehicle. Accordingly, the electric vehicles provide using the Advanced Driver Assistance System are expected to provide energy savings 15% compared to the standard electric vehicles.

Improvement at a rate of 15% can be achieved in distance estimates in vehicles with the Advanced Driver Assistance System comparing to the standard electric vehicles taking traffic situations on the roads followed and previous energy consumptions in those roads into account.

Transport Sector

The transport sector is the second industry with the highest carbon emissions following the energy sector. Some of the activities, created differences with the use of ICT in the sector, are preference on conference technologies with digital information transfer, optimization of transportation models, improvement of driving styles (such as minimizing changes in speed, etc.), increase in productivity of individual vehicles, optimization of energy use in roads and railway networks and integration and optimization of logistics ⁽³⁷⁾. According to the estimates, logistics systems and intelligent traffic management systems, optimized using ICT, can increase the efficiency of transport by 17% ⁽³⁸⁾. ICT is also used in the maritime and air transportation sectors; for example, with the optimization of flight operations, fuel use in air transports can be reduced around 10% ⁽³⁹⁾.

Manufacturing Sector

Today, the ICT applications in the manufacturing sector is quite widespread. There are many gains that can be achieved with intelligent use of ICT as energy use and efficiency in this sector is of great importance. According to the results of the studies carried out by "U.S. President's Advisers, the Federal Energy Technology R&D", the industrial wireless technologies have the potential to increase production efficiency by 10% and reduce actual emission by 25% ⁽⁴⁰⁾.

Some of the ICT applications in this field are energy monitoring systems, production monitoring systems, equipment management systems, corporate resource planning systems, computer-aided simulation and design (CAD) tools, software-supported energy efficiency functions and RFID systems.

Effect of the ICT sector on other sectors is not only limited to these sectors. The ICT-supported applications in many sectors including education, health, construction and retail, support sectors to be more sustainable. As a result, the ICT sector provides energy savings more than it consumes and definitely reduces carbon emissions.

The ICT-supported applications in many sectors support sectors to be more sustainable. The ICT sector provides energy savings more than it consumes and definitely reduces carbon emissions

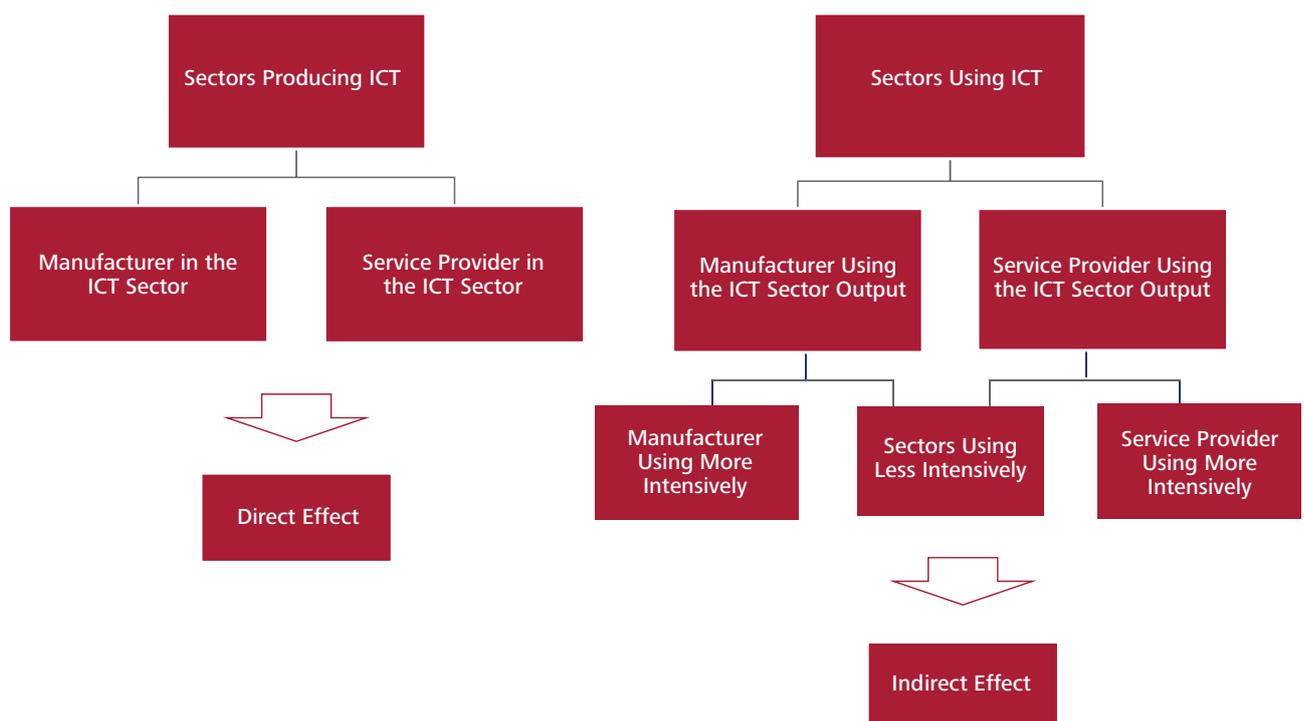
Sectors producing and using the ICT intensively have an important place in our economy with their high investment and profitability rates.

3.2 The ICT accelerates the economic growth

The Information and Communication sector is not just the Information and Communication sector...

One of the most important findings that the academic studies and sectoral analyzes about the Information and Communication Technologies (ICT) sector have reached a consensus on is that the importance the sector for the economy will not be only limited to the investments and added values created within the sector. Productions of companies, producing goods and services in the sector, have the potential to affect profitability and investment rates of the companies using these products and services intensively. Therefore, it is necessary to perform an analysis over the entire economy with a macro perspective when assessing the investments in the ICT sector and profitability in this sector and to examine their effects both direct and indirect.

Figure 32. Grouping of companies producing and using the ICT

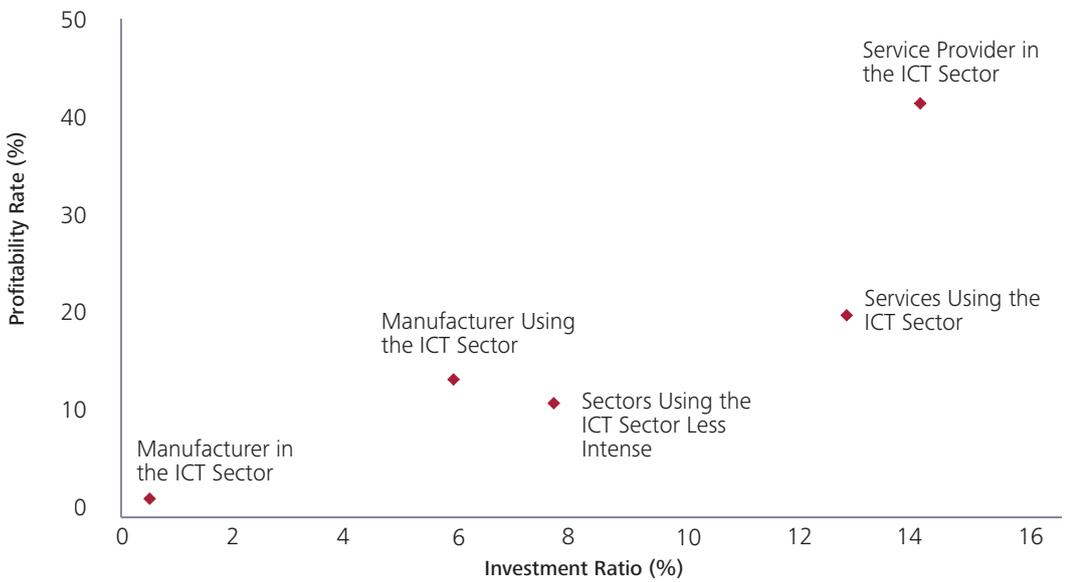


Sectors producing and using the ICT intensively have an important place in our economy with their high investment and profitability rates.

It is seen that service sectors producing and using ICT make significant contributions to the economy when the investment and profitability ratios are examined. Especially, the service providers in the ICT sector, creating a larger portion of the ICT sector in Turkey, appear to be much higher than other groups both in terms of profitability and investment rates. This situation indicates that the service providers in the ICT sector have high profits and they invest a significant portion of these profits in the economy.

On the other hand, when the manufacturers in the ICT sector are examined, it is seen that these companies remain at the lowest level in Turkey in terms of profitability and investment rates. An important reason for these companies to remain at low levels in terms of profitability and investment rates is imports of high-value-added parts from abroad. Formation of a clustering and environment that will allow production of ICT inputs in Turkey is important for the companies producing ICT to achieve profitability and to make investment.

Figure 33. Profitability and investment rates of sectors in 2008



Source: TUIK, Deloitte Analysis

The companies using ICT intensively appear to be more profitable than others

When the sectors using ICT are examined, the companies using ICT intensively appear to be more profitable than others. This indicates that sectors using ICT more intensively are more attractive in terms of attracting investments. Those especially in the service sector among from the sectors that produce or use ICT appear to rank in the first place in terms of investment rates.

Considering that high investment rates is one of the basic criteria for sustainable economic growth, the importance of the ICT sector for the economy comes in sight. These results, which are obtained in an environment where the support to the sector provided by the government is limited and the high tax rates affect domestic and international investors negatively, indicates that the sector has a potential to make much more significant contributions to Turkey's economy with right policies.

When the results are analyzed in terms of the ICT sector, it can be seen that the ICT-producing service sector, led by the communication and telecommunication sector, is the driven force for the economy in terms of investment and profitability. This sector, invested much higher than the national average, plays a key role for high growth. However, growth only depending on the service sector is not sustainable. A negative picture stands out in the manufacturing sector producing ICT in terms of investment and profitability. One of the reasons for this negativity can be explained as the low investment and profitability rates of the manufacturing sector in Turkey in the industry comparing to the service sector. However, as will be shown in the next section, investment and profitability rates of the manufacturing sector producing ICT is not only critical for the sector but the country's economy because a strong ICT-producing industry will make significant contributions to both the manufacturing and service sectors global competitive advantages of Turkey. Lack of sufficient investment in the sector is one of the reasons for the growth in our foreign trade deficit and current account deficit in this sector in which we are already foreign-dependent due to the high added values and prices of the products. For this reason, it is extremely important to improve and promote the investment environment of the manufacturers in the ICT sector for a sustainable economy.

Although the manufacturing sector producing ICT does not reach high values in terms of investment and profitability like the service sector, this sector includes many business lines with global competition advantage.

The ICT sector provides significant supports to the sectors in Turkey with the competition advantage on a global scale...

It is clear that it is very difficult to achieve to the targets of Gross Domestic Product of U.S. \$ 2.064 billion and export level of U.S. \$ 500 billion set forth for the year 2023 with the existing production technology and skills capacity. Further intensification of the competition in the post-crisis environment on a global scale forces countries to produce new foreign trade and technology policies. Two main concepts "intensity" and "similarity" are taken into consideration during production of foreign trade policies.

The concept "intensity" indicates development of sectors that use outputs of any sector and interact with this sector. A high intensity value for a sector suggests that sectors in the ecosystem of that sector are developed and the country includes sectors with a foreign trade advantage. "Similarity", another concept used in foreign trade, is used to identify products that are similar in terms of factors such as existing infrastructure and technology in the production process, and a high similarity between two sectors means that the factors necessary for manufacturing in the sector resemble each other more. Studies, performed on these two concepts, help to understand the potential offered by the ICT sector in Turkey.

The ICT sector provides significant supports to the sectors in Turkey with the competition advantage on a global scale...

ICT sector and intensity - Where the sector is in the competition?

A review on the basis of the sectoral codes (Harmonized System 6-code-HS6) creating the ICT sector was carried out with the aim of examining the intensity of the ICT sector in Turkey. Densities for biggest 50 exporter countries in Turkey and the world were calculated. The position of Turkey in the global competition was assessed with the rankings for each HS6 code creating the ICT sector.

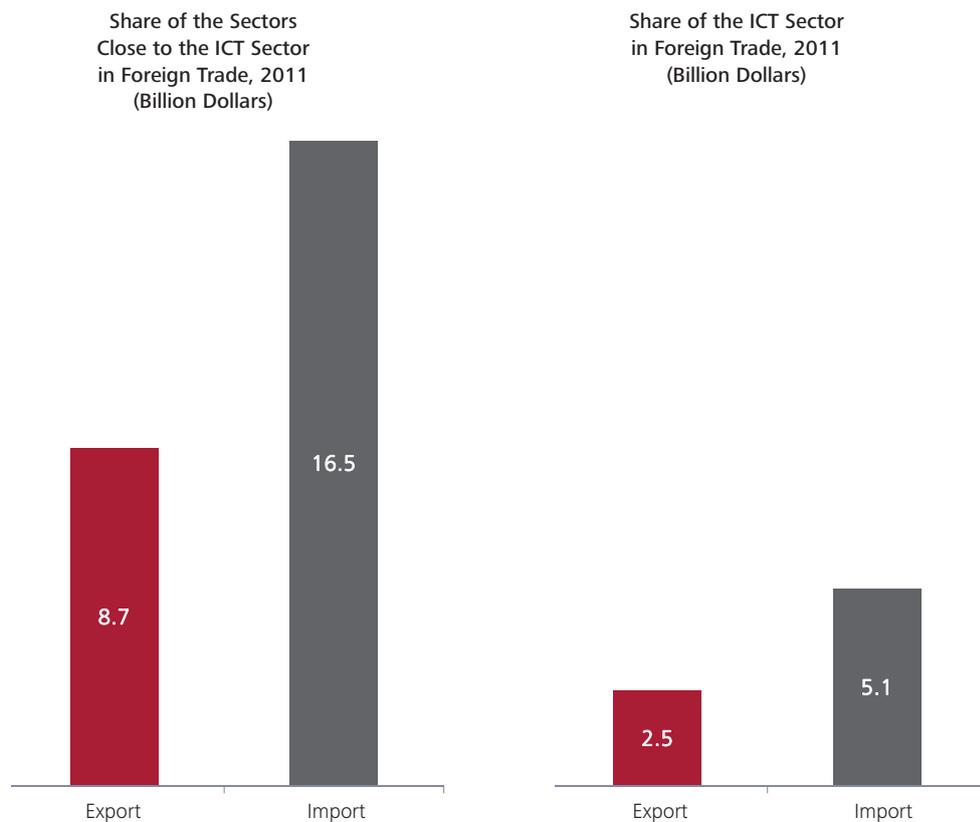
A high intensity value for the ICT sectors indicates that indirect effect of the ICT sector on the economy would be higher by promoting competitive sectors, and Turkey ranks among the top ten countries in the world in nearly 25% of approximately 200 ICT sector codes examined and among the first 25 countries in all the sub-sectors. In other words, there are developed, specialized sectors around the ICT sector in Turkey that Turkey is competitive in the foreign trade. This result shows that investments in the ICT sector have the potential to significantly increase the competitiveness of Turkey in foreign trade and make a positive contribution to the current account balance way beyond developing the sector.

ICT sector and its similarity - What is the effect in foreign trade?

A review on the basis of the sectoral codes (Harmonized System 6-code-HS6) was carried out with the aim of calculating the similarity of the ICT sector in Turkey to other sectors. Similarity of the ICT sector with all HS6 codes was calculated and the lines of business similar to the sector were determined. 400 codes out of 5000 codes examined were determined to be similar to the ICT sector.

The high similarity between the two sectors means that the factors necessary for manufacturing in these two sectors resemble each other more. Investment in one of these sectors with a high similarity and experience, which will be gained in that sector, suggest that it will be easy to produce goods and services in the other sector. In this context, analysis of foreign trade is important for HS6 codes that the ICT sector is similar.

Figure 34. Foreign Trade Figures of the ICT Sector and Sectors Close to the ICT Sector



Source: TSI, Deloitte Analysis

After determination of the ICT sector products and products similar to the ICT sector products using HS6 codes, the foreign trade sizes of the sector and those similar to the sector were calculated according to the import and export values announced by TURKSTAT for the year 2011.

When the foreign trade values for 2011 of 400 HS6 codes of the ICT sector and the sectors similar to the ICT sector are examined, the table obtained is not favorable. Both imports of the sector and imports the sectors similar to the ICT sector are nearly two times of the exports. This indicates an current account deficit exceeding U.S. \$ 10 billion.

When the amount of exports of the ICT sector and the sectors similar to the ICT sector are examined, the total exports appear to be U.S. \$ 11.2 billion. Only U.S. \$ 2.5 billion of this figure is carried out by the ICT sector. The amount of exports of the sectors that can be considered similar to the ICT sector is around U.S. \$ 8.7 billion. In the light of this assessment, it is seen that investments in the ICT sector will support about 8% of Turkey's exports.

When the relationship between the ICT sector and the sectors similar to the ICT sector and imports is examined, it is observed that the amount of imports in the ICT sector in 2011 is U.S. \$ 5.1 billion and in the sectors similar to the ICT sector in the same year is about U.S. \$ 16.5 billion. As a result, the level of total imports in the ICT sector and the sectors similar to the ICT sector around U.S. \$ 21.6 billion, and this value indicates a ratio of approximately 9%.

One of the policies that needs to be included in the main axis of the export targets set forth for the year 2023 and the strategy determined to achieve these targets must be removal of the barriers in the development of the ICT sector

The final result of the similarity analysis is to show that the ICT sector and the sectors similar to the ICT sector receive a share of about U.S. \$ 33 billion from Turkey's foreign trade. The current account deficit of the ICT sector and the sectors similar to the ICT sector exceeds U.S. \$ 10 billion. This result shows that supports to the sector will create significant gains to close the current account deficit gap.

This situation highlights the potential of the ICT sector for the national economy

Remarkable economic effects of innovation: What Facebook brought to the European economy?⁴¹

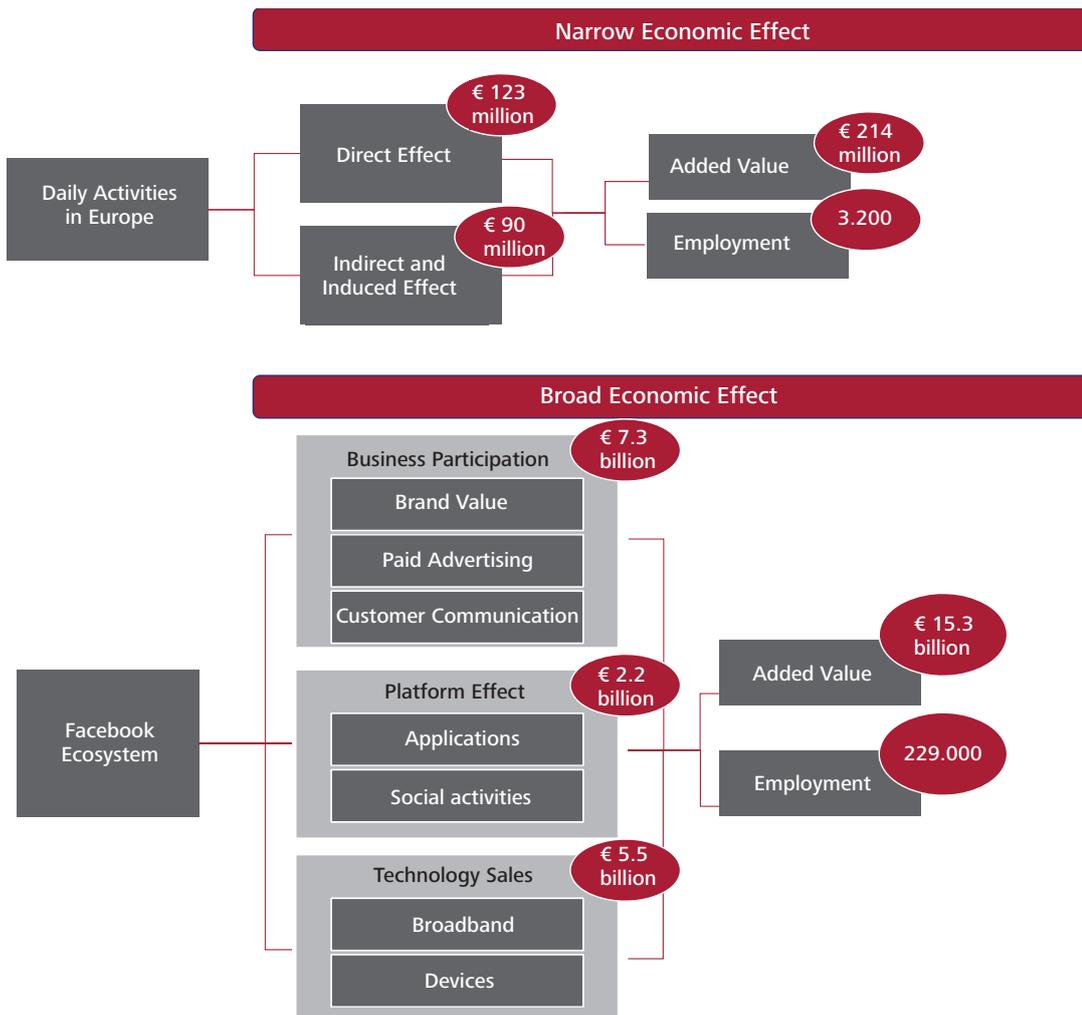
The Information and Communication Technologies Sector allows many developments and innovations both in and outside the sector. Innovative software (application, platform, program, etc ...), developed in the sector, can create great impacts both economically and socially in a short time. One of the most beautiful examples to this situation is undoubtedly Facebook with 30 million users in Turkey and over 800 million users in the world.

Deloitte prepared a report examining the narrow and wide economic effects of Facebook on the European countries in 2012. The economic effects of Facebook, which can be assessed in a narrow framework, are examined in three groups in the report as follows; direct effects arising as a result of the activities such as taxes, employee salaries and other expenditures, purchases, carried out on a daily basis by Facebook, indirect effects such as employment, productivity, increase in the income levels of suppliers, and induced effects in spending level of households as a result of these effects.

The broad effects are examined under three headings: (1) Business participation, (2) Platform effect, and (3) Sales for technology. Business participation contains the added value that includes creation of brand value and communication with customers through advertising, fan pages. It is defined as the platform effect resulting from the use of Facebook as a platform by application developers and social event planners such as for fund-raising, organizational arrangement and job seeking, crowd-sourcing works. The effect of the use of smart phones and mobile broadband by users to connect to Facebook is defined as technology sales.

Although the direct effect of Facebook in this research, conducted for European countries, is € 123 million, Facebook creates an effect of € 32 billion in total with its added value and ecosystem effects, and reflection of this effect in the economy is € 15.3 billion. While the employment that Facebook has created directly in Europe is 620, this figure reaches 3200 when analyzed in a narrow frame and 229,000 when analyzed in a broad frame.

Figure 35. Facebook's Effect on the European Economy



Source: Deloitte Measuring Facebook's Economic Effect in Europe

Increase of 1% in the share of the ICT sector in the economy is concluded to increase the total factor productivity by 1.44% and the economic growth by 0.84% with its positive effect on productivity

Investments in the Information and Communication Technologies sector provides significant contributions to the economic growth by increasing the total factor productivity.

The common finding of the studies investigating the effect of investments in the ICT sector on the economic growth is that investments in this sector contribute to the economic growth by increasing total factor productivity of the country. Studies conducted in developed countries clearly set out that the ICT sector provides significant contributions to economic growth with the increase in productivity.

Economy continues to grow as the ICT sector grows...

In this study, the effect of the ICT sector on economic growth is determined by evaluating the studies conducted in the sample countries and researches carried out for Turkey. While examining the effect of the growth of the sector on the economic growth, the effect of the size of the ICT sector on the total factor productivity (increase in productivity) was examined first. Then, the effect of the total factor productivity on the economic growth was compiled from the existing studies conducted for Turkey.

The total effect of the ICT sector on the economic growth was found with combination of the effect on the total factor productivity and the effect of the total factor productivity on the economic growth. As a result, the amount of the growth in economy as the share of the ICT sector in GDP growth increases is calculated.

The relationship between the size and productivity of the ICT sector is estimated performing a regression analysis after creating a sample from the data obtained from the EU member states. Thus, the relationship between the size and productivity of the ICT sector is calculated. According to the analysis results, an increase of 1% in the share of the ICT sector in the economy increases the total factor productivity by 1.44%. Similarly, with the realization of the Information Society Strategy for the years 2006 and 2010, contribution of the ICT sector on our economy for the next 30 years is stated to be an annual increase of 1.4% in the labor productivity and a growth about 2% in the GDP ⁽⁴²⁾.

This result draws is a table in parallel with the conclusion that economies using the ICT at a higher rate are more efficient.

On the other hand, studies conducted on the total factor productivity examine what constitutes the basis for economic growth. Except for the total factor productivity, these studies measure also the effects of changes in capital and labor force on the economic growth. Basically, they show how much the economic growth is influenced by capital, labor and total factor productivity. When the studies in Turkey are examined, the effect of the total factor productivity on the growth is provided to be 58% (the period between 2002 and 2007).

The following table summarizes the effect of the ICT sector on the economy. According to the results obtained, it is concluded that even an increase of 1% in the ratio of the ICT sector to the GDP may increase the economic growth by 0.84% only through the total factor productivity. Considering that Turkey's long-term potential growth rate is around 5%, it can be understood that one of the most efficient ways to rise this potential up is to increase the weight of the ICT sector in the economy.

Table 2: Effect of Increase in ICT / GDP Ratio on Economic Growth

Effect of 1% Increase in ICT / GDP Ratio on Economic Growth	Effect of TFP Growth on Economy (2002-2007)	Effect of ICT / GDP Increase on Economy
%1.44	x %58	= %0.84

The econometric findings, obtained above, show clearly that increase in the share of the ICT sector in the GDP has a significant and positive effect on the economic growth.

Two scenarios were created with the purpose of examining the gains to be obtained as a result of the increase in the weight of the ICT sector in the GDP gains to be obtained within the framework of the scenario analysis. These scenarios examine the possible effects on the economy in the case the ICT sector in Turkey "(1) reaches the level of developed and competitor countries" and "(2) meets the targets for the year 2023".

Scenario 1: What if Turkey has achieved the averages...

First, the increase in production to be provided in the event the ICT sector with a ratio of 3.9% to the GDP as of 2011 reaches 5.7% in proportion to the average of developed countries and the BRIC is calculated.

An increase of approximately 2% (from 3.9% to 5.7%) in the share of the ICT Sector in Turkey in the GDP in 2011 is expected to increase the GDP by 1.5% through productivity growth except for the growth in the sector.

To achieve this increase, the ICT sector is required to grow at a level of approximately U.S. \$ 15.2 billion. On the other hand, this kind of increase will bring an additional contribution of approximately U.S. \$ 12.2 billion to the economy and support the economic growth by increasing the productivity in the economy. When these values are taken into account, it is seen that a growth of a unit in the ICT sector brings a growth of 1.8 units in the economy.

Scenario 2: Contribution of the ICT sector in reaching the targets for the year 2023...

The share of the ICT Sector in Turkey in the GDP of U.S. \$ 2.064 trillion, targeted for 2023, is expected to be 8%. If the ICT sector reaches the size targeted for the economy of 2023, the contribution that the ICT sector will provide through the productivity growth is estimated to be U.S. \$ 71.1 billion.

It is seen that a growth of a unit in the ICT sector brings a growth of 1.8 units in the economy

Clustering of call centers

One of the most significant contributions of the Information and Communication sector to the economy is through call centers. It is observed that call centers, opened in the provinces remained behind in terms of employment opportunities in the recent years, contribute to the development of the regional economy as well as to the solution of employment issue of the regions.

According to the data released by TUBISAD, the size of the call centers sector was 1.8 billion TRY as of the end of 2011, the number of employees employed reached about 55,000 ⁽⁴³⁾. About 38% of this employment is provided by telecommunication companies. While another sector playing an important role in the employment of call centers was the finance sector, the public institutions also achieved a significant growth in 2011 ⁽⁴⁴⁾. Start of responding to 35% of incoming calls from customers by the operations center, opened by a mobile operator in Elazig, and the call centers, opened by another operator in Erzincan, Duzce, Bingol, Yozgat and Ordu, was an important opportunity for young and qualified staff with a university degree in the region. The effect of call centers should not be considered only in terms of employment as with the other ICT sub-sectors. For example, in an economic effect analysis study prepared by TEPAV in which the socio-economic changes in Erzurum due to the opening of a call center were examined, the effect of call centers on the geography are much more value-added as shown in the economic effect analysis ⁽⁴⁵⁾.

- **Effects on Employment and Participation of Women in Labor Force:**

Employment created by the call center, which also allows reducing migration in the city, is equal to 10% of the business services sector in the city. The fact that almost half of the employees of the call center in Erzurum with problems such as low female employment, low agricultural and high informal economy rates, was women had a positive effect on the development of employment.

- **Effects on Income and Expenditure:**

Call centers make a substantial portion of their expenditures locally in the city they are established. For example, considering the multiplier effect of the expenditure of about 10 million TRY in Erzurum in 2010, the economic effect is estimated to have reached 76 million TRY corresponding to around 8% of the annual deposit in the city. The effect of the call center on the city's economy for the period between 2006, the establishment date, and 2010 was calculated as 309 million TRY in total impact.

- **Effects on Call Center Clustering:**

Following the establishment of the first call center in 2005, a bank opened a call center in 2008 and then call centers of the Ministry of Health were opened in 2010. The total employment in the call centers in Erzurum is expected to reach 10,000 employees with increasing existing investments and possible investments.

- **Effects on Human Resource Development:**

In a survey conducted among the employees of the call center in the city, almost all of the employees stated that they needed to develop themselves and in this context, they engaged in a variety of activities such as continuing university education, foreign language learning, developing computer skills, and the company provided supports to these activities. The call center has also been supporting to the development of qualified labor force which is an important input in the development of the ICT sector.

- **Effects on Revival of the City Life:**

An increase in the number of social and cultural activities and the rate for participation in these activities and in consumption items such as car, clothing, was observed due to the changes in demands and expectations of the call center employees as well as development of the city's economy.

- **Effects on Culture:**

Call centers have changed the perception of the business environment and private sector in Erzurum where the industry is not well developed.

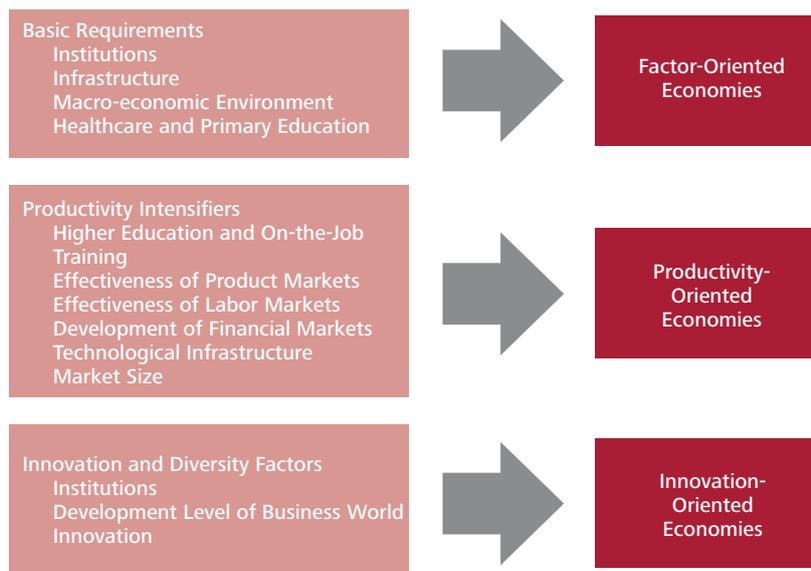
3.3 Information and communication technologies increase the competitiveness.

Competitiveness is defined in different ways on the basis of countries, organizations and individuals. Evaluations and rankings for country-based competitiveness have been based upon more accurate data bases over the years and have started to attract attention of politicians and administrators more. One of the two studies, standing out in assessment of a country's competitiveness only on the basis of manufacturing sector, is the report prepared by the United Nations Industrial Development Organization ⁽⁴⁶⁾ and the other is the one prepared by Deloitte Touche Tohmatsu and the U.S. Council on Competitiveness ⁽⁴⁷⁾. Two institutions, assessing a country's competitiveness in overall economy and being continuous, are World Economic Forum (WEF) ⁽⁴⁸⁾ and IMD Lausanne ⁽⁴⁹⁾. However, studies of the WEF will be used as the resource in this report because the WEF's report includes more countries and of its well-recognizability and activity in the world.

The WEF defines the country-based competitiveness as follows: The country-based competitiveness is the whole of institutions, policies and factors which determines the level of productivity in a country. The level of productivity determines the level of prosperity to be offered by an economy. At the same time, the level of productivity is one of the determinants of a country's potential to attract investment as it is one of the main factors of the return rates of investments and thus, of a country's growth rate.

In the WEF Competitiveness Model, countries are divided into three groups according to their increasing GDP per capita and classified as factor-based, productivity-based and innovation-based economies, respectively. As it can be seen, the WEF Competitiveness Model directly correlates high income per capita with innovation.

Figure 36. World Economic Forum (WEF) competitiveness model



Source: WEF The Global Competitiveness Report 2011-2012

The ranking of Turkey, which is in the transition group between the second and third group of countries, among 142 countries according to twelve main components of the WEF Competitiveness Model and three sub-segments of these components and the scores of Turkey are presented in Table 3. Effectiveness of Labor Markets, Corporate Structure, Healthcare and Primary and Higher Education and On-the-Job Trainings stand out as the weakest points.

Table 3: Scores of Turkey in the main indicators of WEF Competitiveness Model (2011-2012)

	Rank (142 countries)	Score (1-7)
General Assessment	59	4,28
Basic Needs	64	4,61
Organizational Structure	80	3,69
Infrastructure	51	4,39
Macro-economic Stability	69	4,76
Healthcare and Primary Education	75	5,62
Productivity	52	4,22
Higher Education and On-the-Job Training	74	4,02
Effectiveness of Product Markets	47	4,38
Effectiveness of Labor Markets	133	3,51
Development of Financial Markets	55	4,26
Technological Infrastructure	55	3,95
Market Size	17	5,19
Innovation and Business Development	58	3,62
Development Level of Business World	58	4,09
Innovation	69	3,15

Source: WEF The Global Competitiveness Report 2011-2012

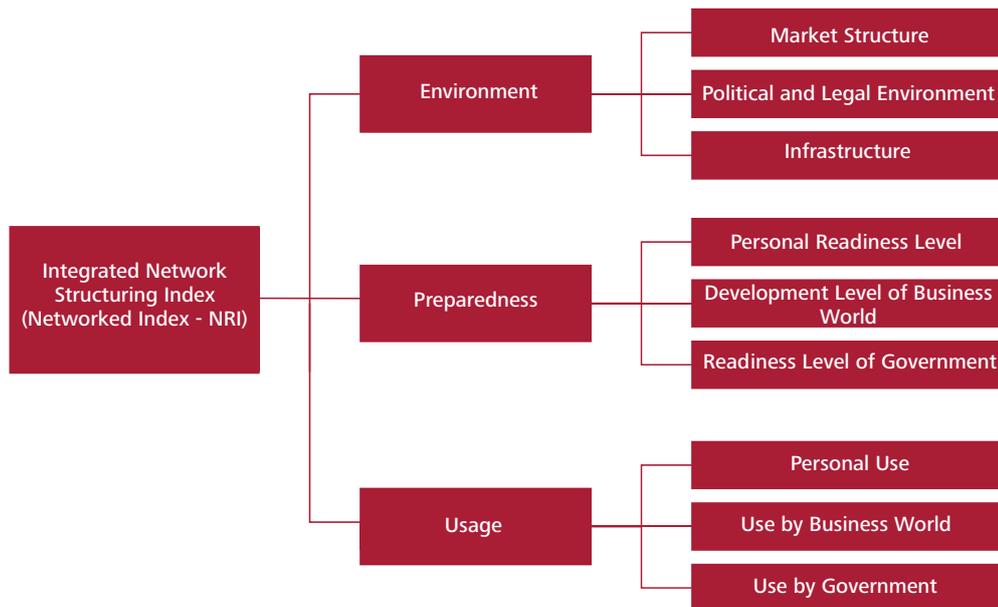
3.3.1 Information and communication technologies increase the competitiveness.

The Integrated Network Structure Index (Networked Readiness Index - NRI), which has been prepared every year since ten years on the global scale, provides important clues about the effects of extensification and use of the ICT sector in the world on long-term competitiveness and social welfare⁽⁵⁰⁾.

The NRI is composed of three main components which each of them has an equal importance: Environment, Preparedness and Use. Environment analyzes openness of countries to innovation and developments in the ICT sector by 31 indicators compiled under the headings of market structure, political and legal environment and infrastructure. Preparedness measures to what extent the three partners - person, business and government - are ready and disposed to use technology in their daily activities and procedures and the information and communication technologies in their private lives by a total of 20 indicators. Use, the last main component, evaluates the actual ICT use of these partners by 20 indicators.

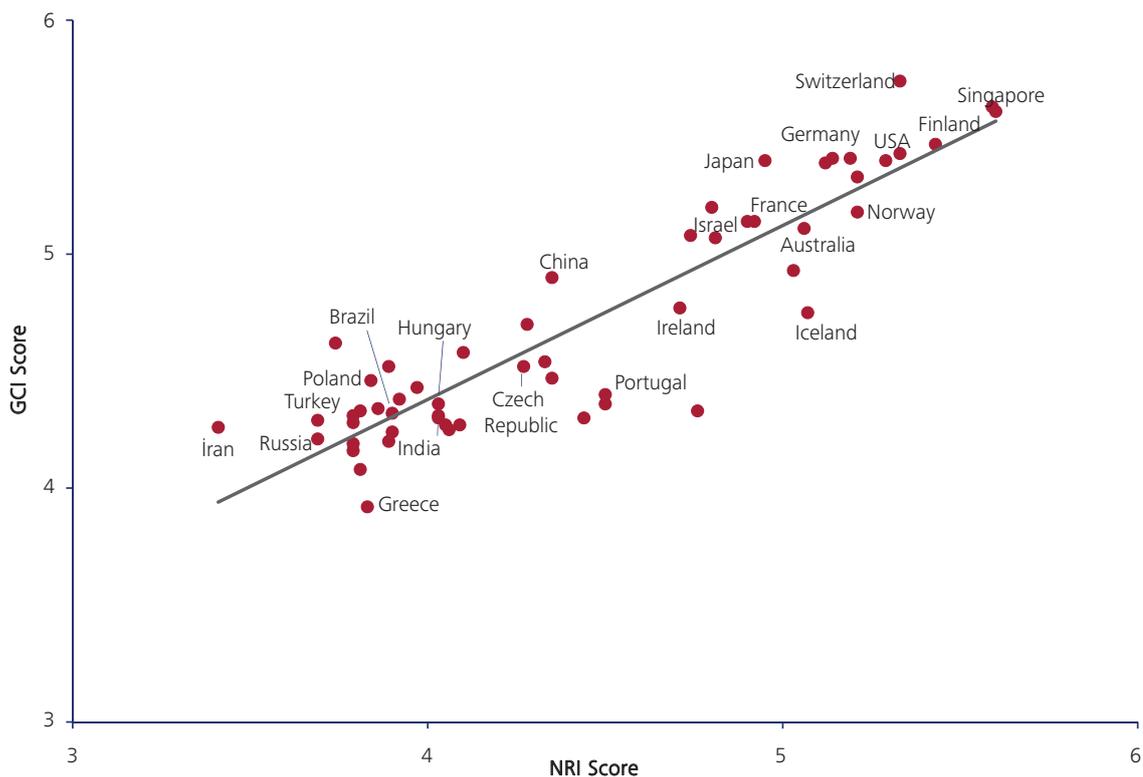
When the relationship between the Global Competitiveness Index (GCI) and the NRI is examined, it is seen that there is a close relationship between them. The countries with a higher value of NRI have also relatively a high value of GCI, and these countries are classified as countries more competitive and producing higher added value. These results reveal once again how the contribution of ICT is important in terms of a country's competitiveness and prosperity.

Figure 37: NRI integrated network structuring index model



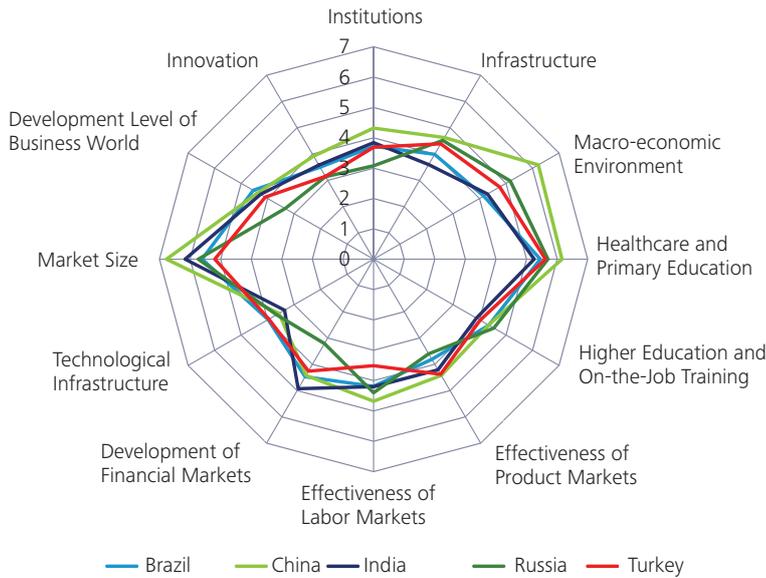
Source: Networked Readiness Index, 2011

Figure 38: Relationship between the GCI score (2010 to 2011) and NRI score [1-7] (2010 to 2011)



Source: The Global Innovation Index 2011

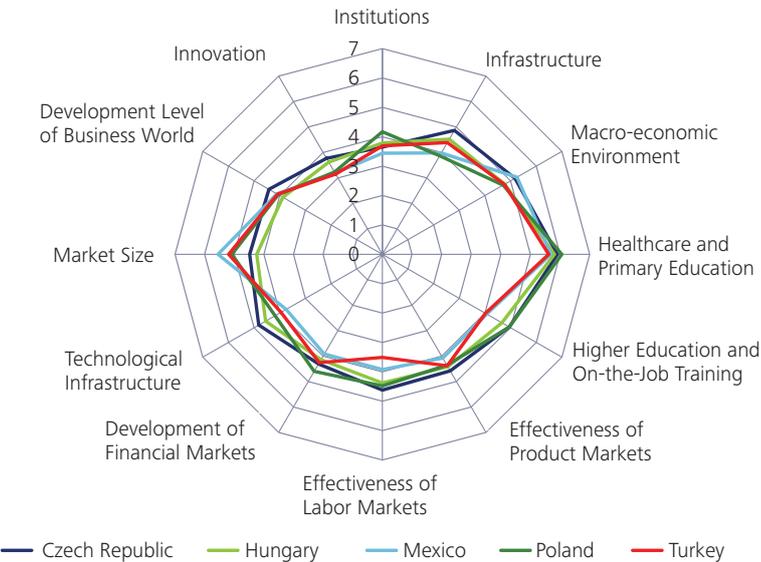
Figure 39. Values of twelve main components of Turkey, the BRIC countries and the closest competitor countries



Comparison with other countries

In this section, Turkey is compared to two country groups according to the GCI scores. The countries in one of these groups are the BRIC countries and the others are the Czech Republic, Hungary, Mexico and Poland which we define as the closest competitor countries.

Twelve main components of the WEF Competitiveness Model are shown for Turkey and the BRIC countries and Turkey and the closest competitor countries. One of the weak points of Turkey against the BRIC countries stands out as lack of efficiency in the labor market. The fact that Turkey relatively remains behind in the main components of the level of development of the business world, innovation and higher education and on-the-job trainings comparing to the BRIC countries raises doubts not only against these countries but also about its sustainable competitiveness in the global context.

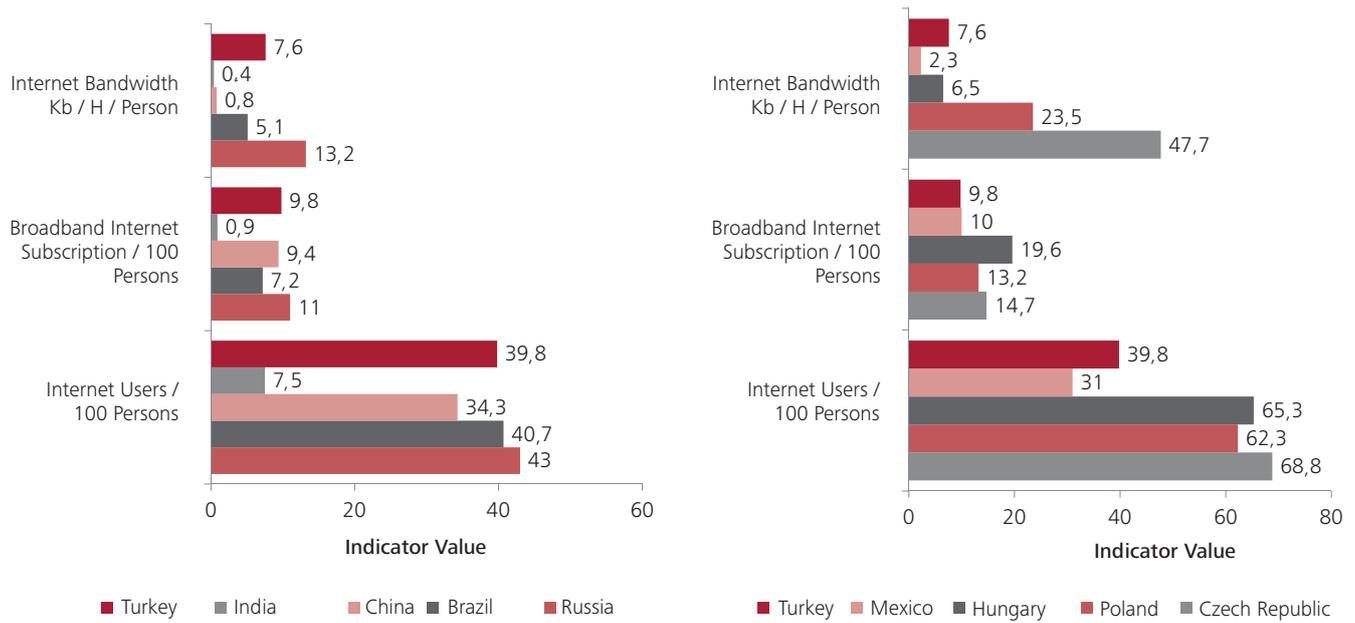


Although Turkey is on the first rank in none of the indicators in the comparisons with the BRIC countries within the framework of various indicators regarding the ICT, Turkey is in a relatively good position. However, it is observed that Turkey generally falls way behind the EU member countries when compared to the closest competitor countries.

It is seen that Turkey falls behind both the BRIC countries and the closest competitor countries in terms of indicators of for e-participation and e-government online services. It is also observed that the public sector should strive more to fill this gap.

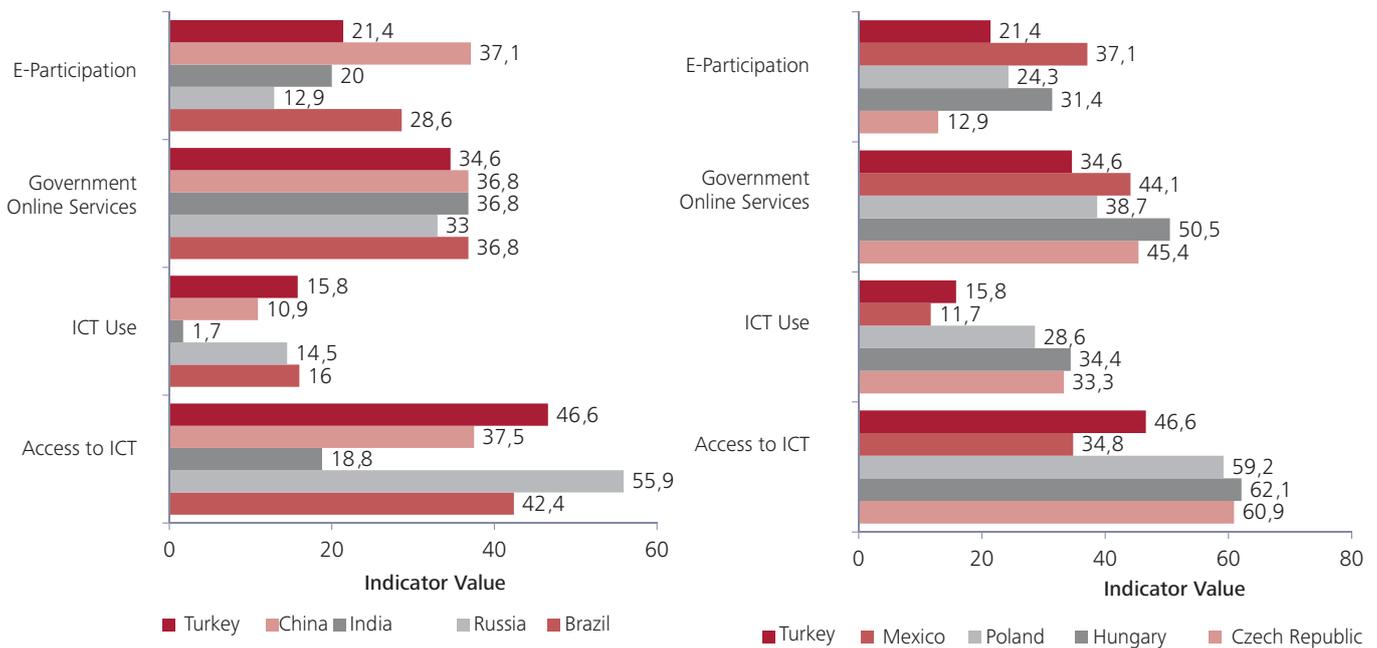
Source: The Global Competitiveness Report 2011-2012

Figure 40. Internet indicators in Turkey, the BRIC countries and the closest competitor countries



Source: The Global Competitiveness Report 2011-2012

Figure 41. Use of and access to ICT in Turkey, the BRIC countries and the closest competitor countries

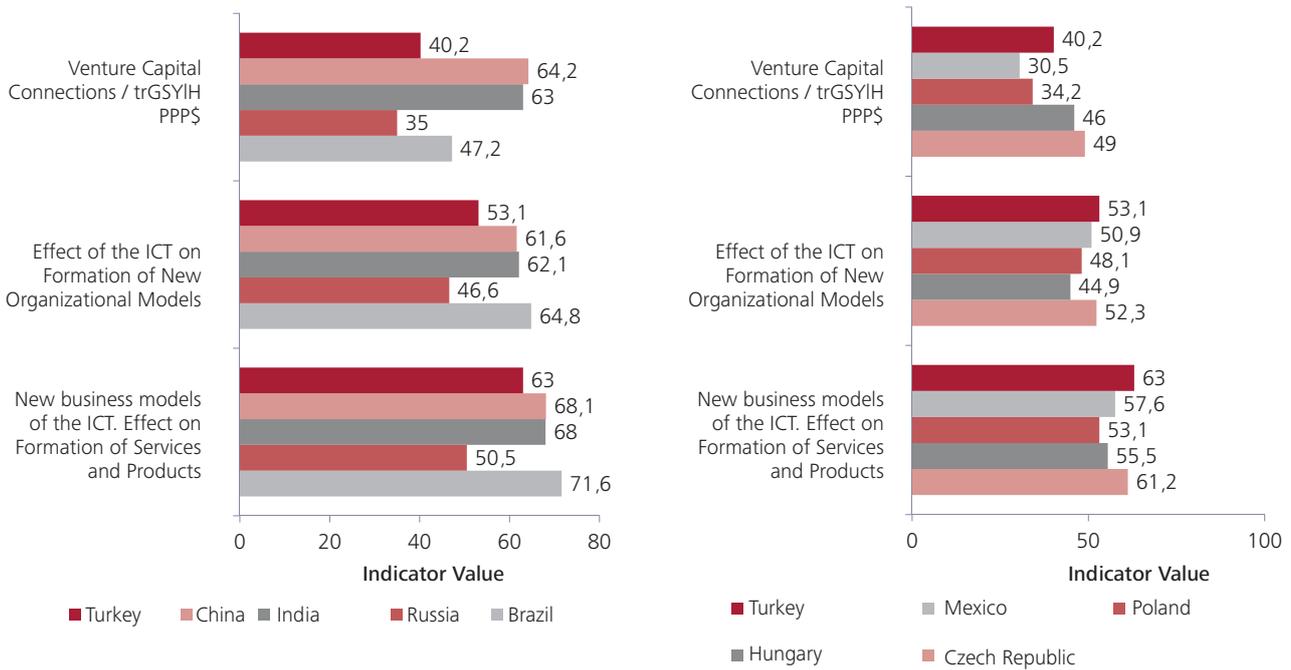


Source: The Global Competitiveness Report 2011-2012

Turkey exhibits relatively weakness against the countries compared in the venture capital indicator, and this situation, as mentioned before, also has frequently been expressed by the sector. The insufficient level of the venture capital in Turkey has a negative effect on the development of the ICT sector.

The case that to what extent the ICT is efficiently used in creation of new business models, products and services and creation of new organizational models such as remote working, tele-commuting, is important in terms of the contribution of the ICT to the economy. The performance of Turkey in these fields appears to be better than the closest competitor countries although is not found successful against the BRIC countries.

Figure 42. ICT-related commercial applications in Turkey, the BRIC and the closest competitor countries



Source: The Global Competitiveness Report 2011-2012

3.3.2 Effects of the ICT on the competitiveness index

A significant portion of the indicators, used in calculation of the GCI values in the WEF Competitiveness Model, is either directly or indirectly associated with the ICT sector. As a result of the examination of all indicators of the Model, indicators either directly or indirectly associated with the ICT sector are determined. The regression analysis was used for determination of the factors affecting the ICT during the analyzes conducted.

As a result of the regression analysis, the indicators (eg, internet bandwidth) that the Information and Communication Technologies directly effect were determined as well as the factors (eg, presence of venture capital) interacting with the Information and Communication Technologies. The indicators that the Information and Communication Technologies directly effect are discussed in the competitiveness analysis. Factors affecting the ICT also are discussed in the solution proposals section within the scope of our report.

The effect of changes in the ICT indicators on the changes of the GCI values for the years 2011 to 2012 and 2007 to 2008 in the WEF Competitiveness Model is calculated.

Figure 43. Competitiveness Analysis model

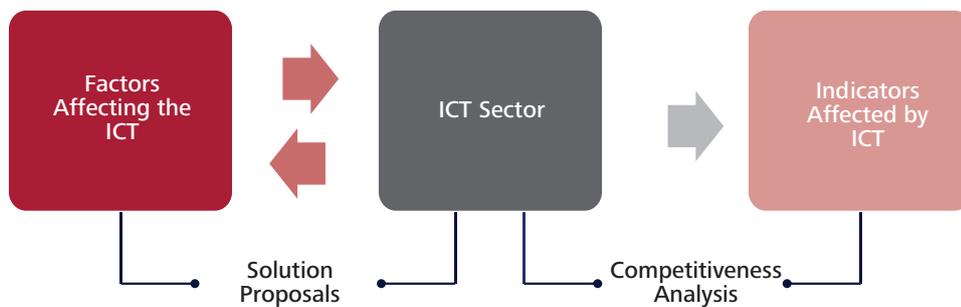


Table 4: ICT indicators

Existence of the Latest Technologies	Quality of Mathematics and Science Education
Technology Internalization at Company Level	Internet Access in Schools
Direct Foreign Capital and Technology Transfer	Local Research and On-the-Job Training Services
Internet Users / 100 Persons	R&D Expenditures of Companies
Broadband Internet Subscription / 100 Persons	R&D Cooperation between Universities and Industry
Internet Bandwidth Kb / H / Person	Public Procurements for Advanced Technology Products
Fixed Telephone Lines / 100 Persons	Existence of Scientists and Researchers
Mobile Phone Subscription / 100 Persons	Patent / Million people
Quality of Education System	

When the effect of change of the ICT indicators on the GCI value is examined, for example, it was observed that while 26.74% of the increase of 0.18 in the GCI in Poland was due to the change in the ICT indicators, 8.13% of the decrease of 0.03 in India was due to the change in the ICT indicators.

It is observed that 17.70% of the increase of 0.03 in the GCI value in Turkey is due to the change in the ICT indicators. Given that the weight of the ICT indicators is 0.145 for Turkey, it is clearly seen that the ICT indicators have a greater effect on the increase in the GCI than their weights in the WEF Competitiveness Model. These results show that the ICT indicators have a positive effect on carrying Turkey to top-levels.

Table 5: Effect of the ICT indicators on changes in the GCI value

Countries	GCI Difference 2007 to 2011	Range of ICT indicators	Exchange of ICT indicators	Effect of ICT indicators (%)
Poland	0,180	0,145	0,060	26,74
Mexico	0,030	0,145	0,059	46,33
Indonesia	0,140	0,154	-0,008	4,54
Uruguay	0,290	0,145	0,098	29,19
Saudi Arabia	0,620	0,123	0,136	21,27
India	-0,030	0,100	-0,010	8,13
China	0,330	0,154	0,095	27,95
Korea	-0,380	0,225	-0,041	9,20
Turkey	0,030	0,145	0,031	17,70

Source: WEF & Deloitte Analysis

3.3.3 ICT indicators and effects on competition ranking: Scenario analyzes

The possible effects of the changes in the ICT indicators on the WEF Competitiveness Model ranking were examined under different scenarios. The scenario analysis was based on the comparison of the years 2007-2008 and 2011-2012.

A scenario analysis is made by answering the following question: What would be Turkey's GCI score and ranking if the ICT indicator data of Turkey were the data desired to be achieved in the period between 2011 and 2012 rather than the data given for this period?

Scenario -1: BRIC targets

According to the first scenario, target values of the ICT indicators were provided to be equal with the values of the BRIC country at the top in that indicator.

The target values obtained in this way are presented in Table 6. The GCI score of Turkey will be 4,35 and Turkey will rank 49th / 50th with Panama in the event that the targets are achieved.

Table 6: Scenario-1 ICT indicators

Indicator	Score between 2011 and 2012	Scenario-1 score	The country targeted at the scenario
Quality of Education System	3,3	3,85	China
Quality of Mathematics and Science Education	3,4	3,73	China
Internet Access in Schools	4,3	4,65	China
Local Research and On-the-Job Training Services	4,1	4,4	Brazil
Existence of the Latest Technologies	5,4	5,45	India
Technology Internalization at Company Level	5,2	5,25	India
Direct Foreign Capital and Technology Transfer	4,7	4,9	Brazil
Internet Users / 100 Persons	39,8	41,4	Russia
Broadband Internet Subscription / 100 Persons	9,8	10,4	Russia
Internet Bandwidth Kb / H / Person	7,6	10,4	Russia
R&D Expenditures of Companies	3,1	3,4	China
R&D Cooperation between Universities and Industry	3,5	4,0	China
Public Procurements for Advanced Technology Products	3,8	4,1	China
Existence of Scientists and Researchers	4,5	4,7	China
Patent / Million people	0,4	2,0	China

Source: WEF & Deloitte Analysis

Scenario -2: Near targets

The target values of the ICT indicators in another scenario were provided to be equal with the values of the country at the top in that indicator among Poland, Brazil, Mexico, the Czech Republic.

The target values obtained in this way are presented in Table 7. The GCI score of Turkey will be 4.39 and Turkey will rank 46th among Portugal and Indonesia in the event that the targets are achieved.

Table 7: Scenario-2 ICT indicators

Indicator	Score between 2011 and 2012	Scenario-2 score	The country targeted at the scenario
Quality of Education System	3,3	4,1	Czech Republic
Quality of Mathematics and Science Education	3,4	4,3	Poland
Internet Access in Schools	4,3	5,8	Czech Republic
Local Research and On-the-Job Training Services	4,1	5,2	Czech Republic
Existence of the Latest Technologies	5,4	5,6	Czech Republic
Technology Internalization at Company Level	5,2	5,2	Czech Republic
Direct Foreign Capital and Technology Transfer	4,7	5,3	Czech Republic
Internet Users / 100 Persons	39,8	68,8	Czech Republic
Broadband Internet Subscription / 100 Persons	9,8	14,7	Czech Republic
Internet Bandwidth Kb / H / Person	7,6	47,7	Czech Republic
R&D Expenditures of Companies	3,1	3,9	Czech Republic
R&D Cooperation between Universities and Industry	3,5	4,5	Czech Republic
Public Procurements for Advanced Technology Products	3,8	3,9	Brazil
Existence of Scientists and Researchers	4,5	4,6	Czech Republic
Patent / Million people	0,4	7,1	Czech Republic

Source: WEF & Deloitte Analysis

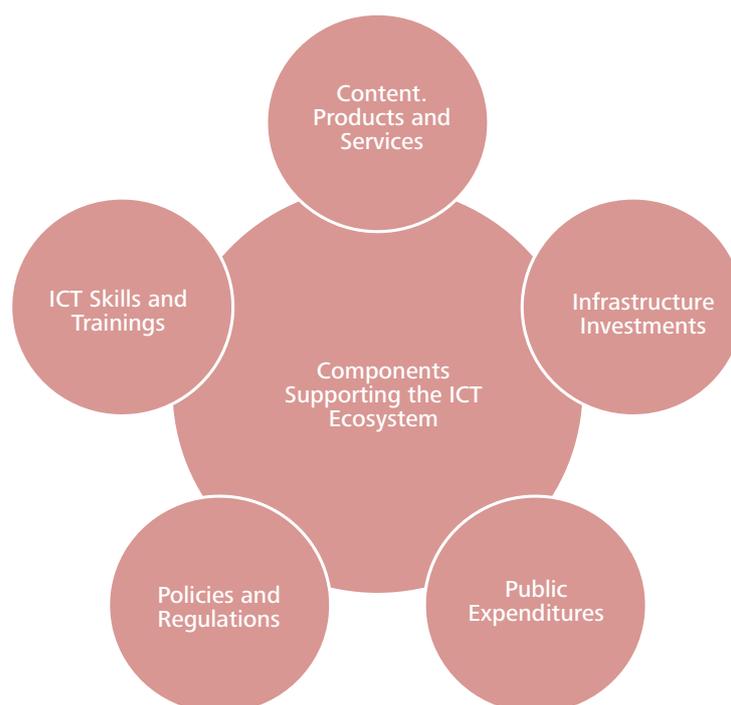
4. Solution recommendations for the development of Information and Communication Technologies sector

The ICT sector has a ecosystem structure that is complex and built with many interconnected technical, social and business relationship rather than being just a stand alone sector. Efficient functioning of each of the main elements in sector's ecosystem by taking strength from each other is important for a healthy and sustainable growth of the sector

The ICT sector has a ecosystem structure that is complex and built with many interconnected technical, social and business relationship rather than being just a simple sector. Efficient functioning of each of the main elements in sector's ecosystem by taking strength from each other is important for a healthy and sustainable growth of the sector. For this reason, the steps that need to be taken for supportive elements of the ecosystem should be assessed individually when solution recommendations necessary for the sector to grow faster are compiled.

The solution recommendations on areas open to improvement, discussed in Section 2, for the sector to grow and have the effect predicted on the economy and the competitiveness are grouped under five main headings as follows.

Figure 44. Components Supporting the ICT Ecosystem



Source: The World Economic Forum, The ICT for Economic Growth Report, 2009

4.1 Infrastructure investments

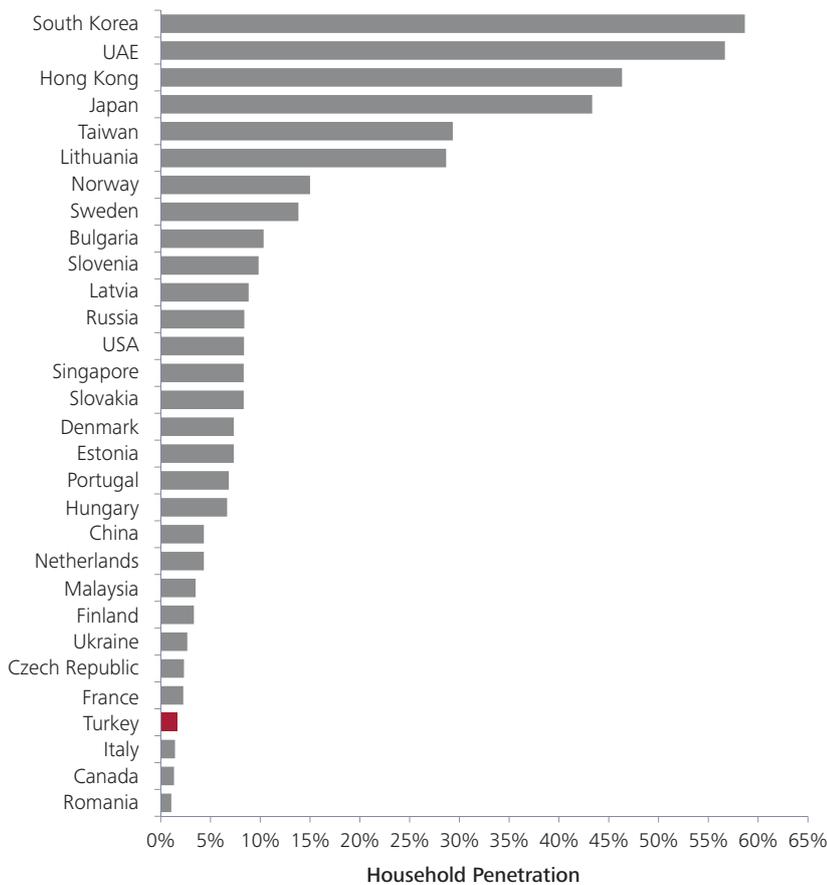
Turkey has a target of providing fiber internet access, cost effective, at a speed of 1000 Mbps for 14 million households by the year 2023 that could be considered "aggressive" compared to the targets for the European Union. To provide households with a fiber internet access at a speed of 1000 Mbps in line this target, an infrastructure investment that will enable fiber cabling to houses / buildings (FTTH / B) independent from the existing copper network and cover all over Turkey is needed.

Table 8: Broadband access objectives with the comparison between the European Union and Turkey

Digital Europe objectives of the EU for 2020	Turkey's targets for the year 2023
Coverage:	Coverage:
<ul style="list-style-type: none"> • Provision of general broadband access to every households in the EU by the end of 2013 	<ul style="list-style-type: none"> • Extending the fiber-to-the-home and broadband wireless access networks with an access rate of 100% for households
<ul style="list-style-type: none"> • Provision of general broadband access service at a minimum speed of 30 Mbps to every household by the end of 2020 	<ul style="list-style-type: none"> • Provision of fiber internet access at a speed of 1000 Mbps to 14 million households (approximately 80% of households)
Usage:	Usage:
<ul style="list-style-type: none"> • Subscription by at least 50% of households to broadband access service at a minimum speed of 100 Mbps by 2020 	<ul style="list-style-type: none"> • Increase in the number of broadband subscribers to 30 million by 2023 (fixed and so on mobile segments not specified)
<p>The European Commission provides for the necessity of an investment of € 219 billion to € 326 billion by the public and the private sector to achieve these goals.</p>	

Source: The European Commission, the Ministry of Transport, Maritime Affairs and Communications of the Republic of Turkey; From the Silk Road to Broadband - Policy Report of the Joint Project of the Prime Ministry and Cisco

Figure 45. Prevalence of fiber-to-the-home / building (FTTH / B) broadband user households



Source: FTTH Council, 2012

As of May 2012, there are 70 operators under notification with Infrastructure Management Service License in addition to Turk Telekom and 4 operator under the right to use and a total of approximately 190,000 km long fiber infrastructure in Turkey. Approximately 150,000 km of this infrastructure was built by Turk Telekom, and the remaining portion by the alternative operators. While Turk Telekom's fiber network is classified as 20% backbone and 80% access, the access network rate with the alternative operators is around 14%. The existing infrastructure provides approximately 1 million households with fiber (FTTH / B) access as of the end of 2011. This means that we only have achieved 7% of our goal towards 2023 yet.

2012 Given that 307,000 households are fiber (FTTH / B) subscribers as of the first quarter of 2012, the use of fiber access in households with access in Turkey appears to be at the level of 28%. From another perspective, it can be said that households using fiber access users has a share of 2% in all households.

Although the prevalence of fiber access rapidly grows, it is seen that there is a long way to go both to increase the number of households with fiber access and encourage users to ultra-speed broadband services compared to other countries and the targets for 2023

4.1.1 Completion of the infrastructure immediately necessary for spread of fiber access

Turk Telekom, an established operator in Turkey, was defined as the operator with Significant Market Power (SMP) in the Wholesale Broadband Access Market, which includes the Data Flow Access (DFA), within the scope of the market analysis studies conducted by the ICTA between 2006 and 2010 and subjected to certain obligations. The issue of access via optical fiber and cable TV networks was also discussed in this market analysis carried out by

the ICTA, however, it was not included in the broadband access market and subjected to any regulation expressing "cable internet and fiber internet services cannot be substituted to ADSL Internet service at retail level in terms of demand". Turk Telekom was defined as the operator with Significant Market Power (SMP) in the Market of Access to the Physical Network Infrastructure in 2010 by the ICTA and subjected to certain obligations in this market. Currently, a variety of arrangements on the issues such as interconnection, access to local loop, data flow access, co-location and facility sharing which are mandatory elements, has been prepared by the ICTA. The ICTA has not yet imposed any obligation on the local operators and Turk Telekom regarding manholes and physical infrastructure which are not mandatory elements, and determined commercial principles for the share of these infrastructure components by other operators.

On the other hand, the decision of "exclusion of the fiber access services (fiber-to-the-home / building) from the market analysis process for a period of five years or until the ratio of fiber internet subscribers in to broadband subscribers reaches to the level of 25% to promote the spread of fiber internet access services and ensure the development of infrastructure axis competition" was arrived with the resolution dated 10.03.2011 by the ICTA.

Alternative operators, investing or planning to invest to build their own fiber networks, show the fact that they cannot use the channel, eye and idle fiber within the local network in exchange for reasonable costs as one of the greatest barriers in Turkey in spreading fiber access. The local infrastructure owners are not obligated to share other than the conditions based on commercial principles as this physical infrastructure and the manholes are not mandatory elements according to the regulation of the ICTA. For this reason, alternative operators choose to build their own constant infrastructures, but these operators experience difficulties in obtaining the permits for necessary excavation and right of way from municipalities and local governments.

In addition, local operators also encounter the same problem in obtaining the permit for the right of way from Turk Telekom as well as the alternative operators.

Requests for the right of way, which conflict with each other most of the time and are difficult to co-ordinate, have negative consequences on the city life and public transportation as well as creating a security risk in areas of transport. Existence of more than one infrastructure networks on the same route have a negative effect on the urban layout as well as creating inefficiency in terms of the total investment needs and service costs.

States and local governments in many countries of the world have carried out the infrastructure spread issue directly through public resources, incentive supports or Public Private Partnership (PPP) model in accordance with their fiber expansion targets. These countries both have protected their urban layouts with open, transparent and non-discriminatory wholesale and retail access regulations and helped the spread of competitive fiber services to a large mass of institutions and households in a short time.

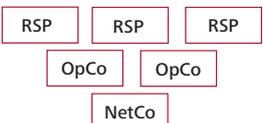
There are different fiber infrastructure models in different countries independently from funding source. In some countries, more than one operators compete with vertically integrated service structure over their own infrastructures, and in some countries, a local infrastructure built by a single operator is shared on the basis of service competition by all operators, and in some, more than one operators come together and invest in a common infrastructure.

It is observed that approaches of the regulatory bodies are also different among all of these models. While in some countries, regulatory bodies do not introduce any obligation for share of the existing fiber infrastructures, the cost-based infrastructure sharing is subjected to regulation in other countries.

The rapid and economical spread of fiber infrastructure in our country, providing end users with access to competitive and innovative services and increase in the rate of subscription to fiber broadband services are extremely important in terms of achieving the targets for the year 2023. Considering the time that the investments in all regions, including those where profitability is not high, will take, the necessity for the performance of regulations in this regard without delay, determination of the investment and / or incentive models and completion of the principles and procedures regarding the regulation on the right of way comes to the fore.

Accordingly, the draft regulation, which was prepared under the studies starting with the transfer of the duty and power to determine the principles and procedures relating to the right of way with the publication of Decree-Law No. 655 on the Organization and Duties of the Ministry of Transport, Maritime Affairs and Communications to the Ministry, was declared to the public in May. It is concluded that completion of the study on the right of way, conducted under the Ministry of Transport, Maritime Affairs and Communications in this regard, to provide solution to the problems experienced is of great importance and the preparation and implementation of the regulation on the right of way, which is one of the biggest challenges in entering into the market, and the inspection hereof to facilitate the entrance of the operators into the market and not to require high investment costs for the operators.

Figure 46. Broadband infrastructure model alternatives

Vertically Integrated Infrastructure Competition Model	Open Access Infrastructure Models	
<ul style="list-style-type: none"> Traditional model that is rather specific to the United States and the operators provide vertically integrated services from the channel infrastructure to the end-user services 	<ul style="list-style-type: none"> Model that the infrastructure is operated by the operator with a significant market power and local loop unbundling / data flow access is regulated 	<ul style="list-style-type: none"> Model that installation of fiber infrastructure is planned and put into practice by a single organization
		
<ul style="list-style-type: none"> NetCo: Passive network is the physical structure that contains fiber optic transmission and channel structure of access network and fiber lines. One or more than one company (NetCo) can have and operate this structure in a city. OpCo: Active network is a fiber-optic network that is made operational for communication with devices such as switches and routers, and management systems. One or more than one company (OpCo) can be an active infrastructure operator in a city; these companies also carry out their operations integrated with NetCo or independently. PSS: Retail Service Providers (PSS) are companies that offer value-added services of voice, data, video and other added value to end-users over an active fiber optic network. PSSs can be vertically integrated with OpCos as well as purchasing wholesale fiber broadband service from OpCos and marketing with added value. 		

Source: Deloitte Analysis

Examples for implementation of national broadband strategy

Sweden - Stokab

Provision of fiber-optic infrastructure services by the municipality in Stockholm to 90 + telecommunication operators

The broadband strategy, followed by Sweden, started with the "information society for all" plan under the Information Technology Act issued in 1999. This plan was based on the market economy, however, this plan also included the vision of spread of broadband networks throughout the country with a low population density in partnership with the public and private sector. In this context, the Swedish government established the Information and Communication Technologies Commission and adopted the policy to provide funds for the establishment of the fiber network. In addition to this kind of national-scaled projects, the government allocated resources also to local and regional broadband projects by releasing the operators to choose the access platform most suitable for the regions. Municipalities and regional operators have been included in the national broadband infrastructure program under the Law on Information Technologies.

Stokab was founded in 1994 by the Municipality of Stockholm to build, maintain and hire an independent idle fiber network. Stokab offers the idle fiber as cost-based and aims at competition at the level of the operator and service provider of the value chain. Stokab brings fiber to buildings and uses a multi fiber point-to-point structure. The network is expanded according to customer requirements. When the number of households provided service was 150,000 in 2010, it is planned to cover 90% of all the houses and businesses in the region and offer service to 400,000 households by the end of 2012 under the project. Although the company is owned by the municipality, it is managed commercial-based and funded by taxes. The establishment basis and strategy of Stokab network is not profit maximization but offering low-cost access for the operators. Considering all other cities where every operator is authorized to engage in excavations Stokab represents a very clean and professional wiring example.

In this context, Stokab carries out excavations only once instead of excavation by many operators and install the fiber network with a capacity taking the needs of other operators into account, thus the operators purchase capacity from Stokab instead of traditional telecommunications or cable companies. The responsibility for connection of electronic equipment to the fiber network lies with the lessor. The local government, which owns the network, has a monopoly only in making excavations in the city center, and in the regions outside the city center, all the operators have permission to engage in excavations and lay fiber. However, the operators excavate and lay fiber very rarely.

The benefits in Sweden by Stokab can be summarized as follows:

- A high percentage of network coverage area
- High competition at operator and service provider levels of the value chain (uses more than 90 telecommunication operators, system integrators and 16 ISP networks.)
- Open access (Stokab has 600 end-user corporate customers making contract with directly Stokab itself.)

Australia - National Broadband Network Company (NBN Co.) Hire of a local operator's infrastructure by the government for fiber optic network

- Telstra, a local telecommunication operator operating in Australia, made the announcement of conversion of its existing copper network and launch of fiber to the node or neighborhood (FTTN) project in 2005.
- Due to the fail in negotiations and disagreement on prices for opening of the new network to wholesale access between Telstra and the ACCC, the country's competition authority, Telstra announced revocation of the investment in FTTN network in 2006.
- In 2007, nine alternative telecommunication operators in the country established a consortium (G9 consortium) by coming together and announced that they planned to build a FTTN network. However, this proposal was examined and not accepted by the ACCC.
- After several failed attempts, the Australian Government announced the establishment of the National Broadband Network Company Limited (NBN Co Ltd) company in 2009. This new company launched the fiber-to-the-home (FTTH) project with the aim of bringing fiber-optic access to 93% of the Australian people with an investment of 40 billion Australian dollar.
- NBN is a company that only provides wholesale services and aims to provide all the operators with internet service at a speed up to 1000 Mbps on the basis of an open-access.

As a result of the government's repressions, an agreement between Telstra and NBN was signed in 2011, and according to the agreement, Telstra transferred its rights to use its existing infrastructure (channels, idle fiber, areas in switchboards, etc.) to NBN for a minimum of period of 35 years. In return, NBN subscriber agreed to pay a fee for every house with fiber subscription to Telstra.

France

Symmetrical and asymmetrical arrangements

The investments in fiber network in France accelerated with the preparation of the National Broadband Strategy in 2008, and on February 2010, France Telecom, a local operator, announced that the company would make an investment of € 2 billion to spread fiber access in densely populated areas by 2015. According to the plan of France Telecom, it is aimed to provide 15 million households (60% of households in France) with the FTTH access by 2020.

Today, the local governments and municipalities as well as the local and alternative operators also make investments in the infrastructure. As of the third quarter of 2011, 1.4 million households have the FTTH access; approximately 10% of this figure is through the networks developed by the public initiative. Approximately 30% of the households with the FTTH access is provided services at least by two different operators.

ARCEP, the regulatory body, has taken certain measures to ensure sustainability of the investments in fiber with high costs and also to maintain and increase the competition. Accordingly, France Telecom, the legal operator, is obligated to share its existing channel and eye infrastructure with the other operators on a cost basis (asymmetric regulation). In this context, Bouygues Telecom, one of the alternative service providers, has signed an agreement to share the portions to home/building of the fiber networks of the local operators in France's 148 largest cities. Free and SFR, other alternative operators in France, have similar agreements with France Telecom.

On the other hand, all the operators are imposed symmetric obligations in the sharing of in-building fiber network at the point the fiber network terminates regardless of their significant market powers. According to the regulation by the ARCEP, an operator that is the first installing in-building fiber network in regions with dense population is obligated to install network provided that costs of such installations are shared with other operators.

Singapore - OpenNet and Nucleus Connect Dual-level PPP: NetCo and OpCo

- Singapore opened its infrastructure market into competition in January 2000. Although this initiative was largely successful, it was not enough to continue to distribute the fiber network to customer premises. Accordingly, the government created a dual-level PPP to build and operate a FTTH network as an initiative to increase the network capacity. The companies established accordingly:
 - OpenNet is a joint venture with four partners - Axia Netmedia (30%), SingTel (30%), Singapore Press Holdings (25%) and Singapore Power Telecommunications (15%). It is responsible for the establishment, management and operation of the fiber network in Singapore. (NetCo)
 - Nucleus Connect is a subsidiary of StarHub Ltd. It is responsible for the design, creation and operation of the active infrastructure of the Next Generation National Broadband Network. Nucleus Connect received a grant of 250 million Singapore Dollars from the government for the support of infrastructure distributions. (OpCo)
- OpenNet uses SingTel's existing passive infrastructure assets (such as infrastructure channels, holes and switchboards). SingTel transferred these assets to a neutral company ("AssetCo") in April 2011 and reduced its unit assets in AssetCo to less than 25% in a five-year period.
- Nucleus Connect is limited to wholesale services and is operationally separated from the parent company. The company determined the prices for regulatory, wholesale home connection for a speed of 100 Mbps as 21 Singapore Dollars and of 1000 Mbps as 121 Singapore Dollars. Opco's license will continue for 5 years or exclusively until reaching a share of 25% in the local broadband market. However, this is not applied to Nucleus Connect as StarHub, the parent company, has already a strong position in the Internet service providers market.
- The fiber expansion has progressed as planned. It is planned to bring the fiber access to 95% of households as of mid-year of 2012.

South Korea

In South Korea, the National Information Society Agency was established in 1987 with the purposes of the construction of high-speed networks, widespread use of information technologies by the public institutions, increase in digital literacy and support of the broadband access. In 1994, the Agency launched the Korean Information Infrastructure - KII program for the construction of fiber networks across the country. The 5-year KII program was followed by the Cyber Korea in 1999, e-Korea Vision 2006 in 2002, e-Korea Vision 2007 in 2003 and the Broadband Convergence Network-BcN and the IT 839 programs in 2004. The State provided the private sector with the supportive regulations and incentives for the network creation as well as the investments from the public funds during this period. Bringing fiber access to all the houses was the target of the last two initiatives of the state ⁽⁵¹⁾.

The Facility Sharing Directive, put into practice by the Ministry of Information and Communication (MIC) in 2003, obligated "Korea Telecom" (KT) to open the fiber optic cables laid before 2004 to access to the alternative operators at the wholesale prices determined by the MIC. The MIC did not bring such an obligation for the fiber optic cables laid by KT after 2004. After this decision, many operators began to expand their own fiber optic networks. The MIC adopted an open access arrangement for all copper and cable-based broadband networks. The provision to bring a minimum of 1 Mbit broadband service to all houses and villages was included in the specification for the privatization of KT, and in addition, a credit in the amount of U.S. \$ 926 million was provided in order to meet the cost for connecting 144 telecommunication service zones to the national broadband backbone between 2001 and 2005 with the "Digital Gap Closure Plan" ⁽⁵²⁾.

The penetration and privatization of LG Powercom into the retail sector in 2005 are important milestones for Korea during transition into fiber access. KT, while its competitors continued to invest in the existing infrastructure, responded with the world's first VVDM-PON-based fiber-to-the-home internet service with a speed of 20 Mbps to the Powercom's internet service with a speed up to 100 Mbps under the brand name XPEED. The number of fiber subscribers in Korea reached 0.8 billion in 2007 and 1.7 million in 2008. The State provided many supports such as tax incentives to investors, low-interest loans for the spread of the network in rural areas and loan guarantor-ship, to encourage investments by the private sector ⁽⁵³⁾.

The Government of Korea conducted projects for providing trainings for various segments of the society to increase and support the demand for broadband as well as the incentives granted to the service providers, and developed programs like the Cyber Construction Certificate to be given to buildings with a certain internet speeds ⁽⁵⁴⁾.

4.1.2. Encouragement of infrastructure sharing in the mobile telecommunication sector

For delivery of the next generation mobile access services to a greater number of consumers in a shorter period of time with efficient investments and ensuring sustainable development, infrastructure sharing gains importance as with the fixed communication industry. The increase in coverage with less investment will be possible with the infrastructure sharing against a usage fee within the scope of the commercial principles and the joint infrastructure investment projects; thus, the efficiency of the investments as well as the effective use of the natural resources of our country will be provided.

4.1.3 Realization of the necessary arrangements for the spread of femtocell technology

It is important to put the necessary arrangement into practice for the spread of Femtocell technology, which considerably reduces the need for mobile infrastructure investment, in Turkey. Devices, called Femtocell, with a broadband modem view provide a solution for indoor mobile access and communication quality problems functioning as a small household type base station.

However, the use of these devices is charged approximately 500 TRY as Femtocell devices are considered in a base station class instead of as a consumer device. The matters changing the classification of these devices and conceptualization as a 'consumer device' are on the agenda of the ICTA. Completion of this arrangement as soon as possible (output powers can be classified in order for a device to be considered a base station) and revocation of the annual fee collected from Femtocell devices will provide a solution to the problem of indoor coverage and both increase the call quality and reduce the need for investment in base stations.

4.1.4 Clarification of the national mobile broadband targets and road maps

Turkey is required to assess the distinction between fixed and mobile communications separately when putting the targets of broadband coverage, number of users and speed for the year 2023 forward. Considering the current growth trends, it is seen that a large part of the target of 30 million broadband users will consist of mobile broadband users.

While provision of fixed internet access with a speed of 1000 Mbps for 14 million households is projected, no target for the speed of mobile broadband internet access has been set. It is required to determinate the road map on 4G/ LTE frequency allocation and make arrangements in the national frequency plan accordingly in order to make a healthy planning for the long-term infrastructure investments by determining mobile broadband targets per person within the framework of the strategy for 2023. Effective and efficient use of the spectrum when performing the arrangements is important for the development of the sector.

Despite the fact that the number of 3G subscribers is high in the total number of mobile subscribers, the number of subscribers using 3G internet service through mobile computers and phones is 6.5 million as of the end of 2011 and around the level of 21% in subscribers with total 3G with access. This reveals that there are encouragements that need to be taken into account such as increasing the prevalence of smart-phones and reducing the mobile taxes to increase the use of 3G access although it is accessible.

4.2 Public expenditures

More effective use of the potential of the purchasing power of the public

Although ICT purchases in Turkey create a significant portion of the government expenditures, it is observed that there are opportunities in the development of the potential of the purchasing power of the public compared to other countries. One of the best practice examples on the use of the public purchasing capacity is the ICT procurements planned within the scope of the Fatih Project. However, the expenditures under this project should not be limited only to hardware, and high-quality content and software necessary for effective delivery and management of this content must also be evaluated within this scope. The technological infrastructure that will be introduced to our educational system with the Fatih Project is expected to provide a significant contribution to the software and service ecosystem.

On the other hand, the rapid changes and developments in the ICT sector make the determination of the needs in the public ICT procurements accurately and realization of the procurements not only price-oriented but also to observe the total cost of ownership is important.

Model country practices in public procurements

The ICT procurements create a substantial portion of government expenditures all over the world. However, the efficiency in the public procurements is not at the desired level in many countries as with Turkey. The European Union has been conducting a standardization study that will come into force this year in order to solve the problems and improve the efficiency in the ICT procurements. The rapid changes and developments in the ICT sector raise the necessity that the public sector is required to be careful during determination of needs and writing tender specifications in the ICT procurements. However, in the public procurements;

- Decision for procurement is taken with the effect of the current situation without considering the actual need or future costs.
- Selection of suppliers in assessing new procurements is not made a very conscious, and suppliers chosen are often former suppliers.
- Limits arising from the technical and institutional constraints emerge.

Standards to be established for procurements will allow;

- Clarification between different products purchased from various suppliers and interoperability,
- Draw up specifications independently of technology,
- Definition of the conditions of license preferred ⁽⁵⁵⁾.

The EU aims determination of the related standards and to be adopted by the civil servants involved in the ICT procurements in 2012 ⁽⁵⁶⁾.

Inclusion of SMEs in the process, calculation of the total cost of ownership and sharing the risk of failure inherent in the innovation in newly developed and developing products is important in the public procurements ⁽⁵⁷⁾.

There are different samples on the ICT procurements in Ireland. The National Center for Technology in Education ⁽⁵⁸⁾ is the state agency established in 1998 for the use and for funding of ICT in education. The ICT Purchasing Department of the Public Expenditures and Reform Department of the Ministry of Economy ⁽⁵⁹⁾ is responsible for observation and approval of the civil and public service expenditures, telecommunications policy and infrastructure, e-government policies and infrastructure, technology research and policies and the central ICT procurements.

In Australia, the AGIMO (Australian Government Information Management Office) is a department of the Ministry of Economy that consists of the ICT sector consultants and carries out consultancy, representation and activities with regard to the ICT applications to encourage the efficient and effective use of the ICT in the public.

China established certain standards in the public procurement despite the transparency problems in some areas especially in information in practice. The "eco-label", certificate of energy saving, certificate of domestic products (the rate of domestic products can increase to 70% in some tenders), certificate of local innovation are the examples to these standards. In addition, there are some certain standards for companies that will participate in tenders other than those for the products ⁽⁶⁰⁾.

The public procurements played an important role in the development of the microprocessor industry in the U.S.A at end of 1960 and beginning of 1970. In the 1960s, the American defense industry was almost the only customer of the microprocessor sector not commercialized for end users and high-priced. The public sector created a strong demand for innovation for meeting the high technological requirements in order to ensure the specifications required by the army and readiness of the Department of Defense to pay the price asked for the light electronic products necessary for the missile program stimulated and activated the sector developing. These pioneering and cost-intensive procurements brought the companies to a leading position in technology by pulling the learning curve down and reduced the prices by a level that end users could also afford. The advanced technology capacity of the public sector, which was a buyer in the 1960s, and the efficiency in orders enough to create demand is seen as one of the major success factors for the development of the microprocessor sector. The lack of such a large demand and rational moves that would support innovation of the consumers in Europe and other countries are the reasons for the non-development of the sector. The defense-related procurements in the U.S.A still play an important role on the information systems and power technologies, and the Ministry of Defense creates application areas suitable for the development of the high-tech sectors such as ICT, nanotechnology, and supports the development of these areas ⁽⁶¹⁾.

Although the intensity of the current incentives and support programs are found positive by the ICT sector companies, some improvement opportunities in the programs stand out

4.3 Policies and regulations

4.3.1 Improvement in incentive and support programs

The governmental incentive and support mechanisms have been used as a strategic tool since the 1970s in many countries achieved growth with the IT sector such as Ireland, Israel and India. The support and incentive mechanism, implemented successfully in these countries, was developed and put into practice in Turkey especially after 2007. Today, there are many incentive and support programs prepared and carried out by many agencies and organizations in Turkey such as the Undersecretary of Treasury, the Ministry of Science, Industry and Technology, the Ministry of Economy, TUBITAK, TTGV and KOSGEB.

The establishment of Technology Development Zones (TDZ), and

- Exemption from the income and corporate taxes for earnings obtained from production software and R&D-based activities for a certain period of time, and
- Covering R&D operating expenses, and
- VAT exemptions,
- Low-interest loans for projects and various grant programs are the examples to the practices implemented.

As of the end of 2011, there are 32 operational and in a total of 43 Technology Development Zones in Turkey. 1800 companies, which 66 of them are foreign-owned companies, in these zones have employed 15,822 employees within the year and achieved an export level of U.S. \$ 544 million. Approximately 60% of these companies operates in software, IT and telecommunication sectors.

Similarly, in order to accelerate the entry of technology-intensive production, entrepreneurship and investments in these areas and direct international capital investments in R&D and innovation into the country within the scope of the R&D Centers established with the Law No. 5746 on Support of Research and Development Centers, tax deductions, support for insurance premium of R&D staff, income tax withholding incentive, technology venture capital supports are provided. On the other hand, a spending amounted to 465 million TRY was included in the scope within the framework of the support programs of TUBITAK Technology and Innovation Funding Programs Directorate (TEYDEB) in 2010 and a grant support amounted to 288 million TRY was provided. The total contract value on the projects supported by TTGV was U.S. \$ 33.1 million in 2009.

Although the intensity of the current incentives and support programs are found positive by the ICT sector companies, some improvement opportunities in the programs stand out. These opportunities can be grouped under three main headings:

A. Optimization

Working outside the technology development zone:

Employees of the companies in the TDZs under the Law No. 4691 on Technology Development Zones, benefited from the income tax exemption for the time only they were in the zones physically and worked in the R&D projects. Yet, those employees were often required to spend time outside the zone to follow-up the issues under the R&D activities or to execute negotiations between the customers and suppliers, however, such time periods spent outside the zone excluded from the tax exemption although directly related to the R&D activities. As a result of the amendment made with the Law No. 6170 in 2011 to improve this situation, exclusion of a portion of wages of employees for time periods that will be spent outside these zones subject to the TDZ operator management's permission from the scope of the income tax was agreed. Determination of the amount of wages to be excluded from the scope with the regulation that would be prepared with the opinion of the Ministry of Finance was deemed appropriate.

Even though this is a positive step regardless of the amount to be determined with a new regulation, the companies and investors in the sector expect that the amount of time to be spent inside and outside of the zones should not be subjected to any discrimination and location of R&D activities should have any importance. This will enable simplification of the compliance and audit processes and reduction in time and costs spent.

The companies and investors in the sector expect that the amount of time to be spent inside and outside of TDZs should not be subjected to any discrimination and location of R&D activities should have any importance. This will enable simplification of the compliance and audit processes and reduction in time and costs spent

The same also applies to the R&D centers benefiting from the incentives provided under the Law No. 5746. The case that whether or not a R&D employee carries out any R&D activity during the time spent outside the zone due to a R&D project is not clearly expressed in that regulation. However, enterprises, especially operating in software and communication sectors, cannot perform their R&D activities independently from internal customers in other departments and R&D business partners of the organization. For this reason, clarification of the ambiguous issues in the regulation by investigating the matter of going outside R&D centers for projects carried out in R&D centers and elimination of the differences in interpretation in this regard between the relevant ministries (the Ministry of Science, Industry and Technology and Ministry of Finance) is necessary.

South Korea made a number of attempts such as issuing an act supporting the commercialization of different technologies for the commercialization of technology products, programs for SMEs and software development supports as well as the establishment of Korean Technology Transfer Center

Conditions for becoming a R&D Center:

With the Law No. 5746 on Support of Research and Development Activities, R&D activities carried out outside TDZs are provided with a number of tax incentives. If R&D activities are not already supported by the public or international funds and pre-competitive cooperation projects or technopreneurship capital supports are not used, the R&D activities should be organized as a separate unit within the organizational structures of equity firms with registered offices or headquarters located in Turkey and carried out within the units that exclusively engages in research and development activities in the country and employ a minimum of 50 full-time equivalent R&D employees in order to take advantage of the incentives provided by the Law No 5746. In other words, there is the condition of being a large sized company to take advantage of these incentives.

Given the fact that only 3% of the enterprises, operating in the ICT sector in Turkey, employ more than 50 employees in total ⁽⁶²⁾, it is seen that the number of companies that may obtain a "R&D Center" certificate is very low. The ICT research and development budgets of the R&D centers in Turkey also indicates that the ICT sector cannot benefit from these centers enough. The share of ICT R&D expenditures in the private-sector R&D expenditures in 2009 was 34% ⁽⁶³⁾. However, it is seen that only 13% of the total R&D budget within the scope of the R&D centers is allocated to the ICT sector companies ⁽⁶⁴⁾. Based on this difference, it can be concluded that the ICT companies do not use the R&D centers enough or do not prefer these centers.

Reducing the requirement of 50 full-time equivalent in a considerable extent as well as treating the time that employees working in R&D projects spend outside the R&D Centers full-time is required for small and medium-sized companies engaged in R&D activities to benefit from these incentives.

Incubation centers:

Although the Technology Development Zone Management Companies, not directly engage in R&D activities, are given the opportunity to establish incubation centers and encourage entrepreneurs with Law No. 4691 on Technology Development Zones, it is not possible to support the incubation centers that are created by companies, which provide employment as much as the technology development zones and develop products and services, including software, within their bodies. Inclusion of the establishing costs of incubation centers that will be founded by enterprises, universities, entrepreneurs and micro-scale SMEs with R&D Centers within their bodies benefiting from the Law No. 5746 on Support for Research and Development Activities into the scope of the incentive and availing entrepreneurs, producing R&D projects for software together with their employees in these R&D centers, and employees in these SMEs of the tax incentives provided under the Law No. 5746 will contribute to the development of the software sector in particular.

Improving Commercialization Process of R&D Activities:

Commercial product potential of researches must be examined and followed up more when providing incentives and supports in our country where the rate of conversion of academic researches and R&D activities into patents and commercial products is low. In this context, the role and effect of venture capital comes into prominence more comparing to the incentives and support programs.

A number of attempts have been made for the commercialization of technology products in South Korea with a low ratio of commercialization as well as success for commercialized products by the beginning of the 2000s. The establishment of Korea Technology Transfer Center as well as the law that supports commercialization of different technologies, SME programs and software development supports can be given as examples of these initiatives. Korea provided technology providers with many supports under the Technology Commercialization Program by the scale of their initiatives for the products to be commercialized within 1 or 3 years.

The Innovation Network Cooperation of Japan with the aim to provide capital and management support to increase the competitiveness of Japanese firms was established through a public-private partnership in 2009 with a power of U.S. \$ 25 billion of investment. The company, which invests in the newly established and medium-sized companies in Japan and other countries, has a two phased strategy for the utilization of the Japanese intellectual property and patent portfolio: 1) To invest in organizations and institutions, which own any Japanese intellectual property and patent, and to support in commercialization of R & G centers of such organizations and institutions, 2) to invest in businesses that have the potential to use these patents and transform into products inside or outside of Japan to these patents and to improve opportunities for co-operation between patent owners with these investments.

A large number of TDZs in the ICT sector in which information transfer is extremely important does not mean that clustering in the ICT sector is at the desired scale and scope. It is considered that a small number of technology development centers that will be established around Turkey's leading universities and provide a clustering effect instead of a larger number of TDZs consisting of a small number of partners will be more effective

Utilization from TDZs by small-scale companies:

Incentives, provided through tax exemptions in the Technology Development Zones, allow large-scale companies with a high profit rate to cover high rental costs more easily to involve in TDZs. On the other hand, small enterprises yet without an income have a difficulty in covering such high rent costs and cannot benefit from TDZs as desired. Arrangements towards the need for support on rent and site allocation should be taken into account to enable enterprises especially those that are in an incubation to benefit from TDZs more.

Creation of clustering environment:

One of the most environments where university-industry collaboration are intensely observed is the Technology Development Regions. However, the challenges, experienced in TDZs, is often expressed by both the public and private sector partners and the lack of a clustering environment that is efficient enough is discussed. A large number of TDZs in the ICT sector in which information transfer is extremely important does not mean that clustering in the ICT sector is at the desired scale and scope. It is considered that a small number of technology development centers that will be established around Turkey's leading universities and provide a clustering effect instead of a larger number of TDZs consisting of a small number of partners will be more effective. In this context, the target of the Ministry of Science, Industry and Information Technology of establishing an IT valley is an appropriate step. When planning the valley, important factors such as university-industry collaboration, international cooperation, support by the sector, should be taken into account and successful practices in other countries should also be followed.

Russia: Silicon Valley of Russia in Skolkovo

The law draft on "Skolkovo Innovation Center" of Russia, announced at the end of 2009, was signed by Dmitry Medvedev, Russian President, in October 2010. The basis of the idea for an Innovation Center is to create a R&D Center that will especially attract international investors. The financial benefits offered under the program are VAT exemption for R&D products for a period of ten years, exemption from income tax of 20% for R&D products, exemption from property tax of 2.2% and social insurance premium reductions ⁽⁶⁵⁾. In addition, Skolkovo offers the following opportunities to investors:

- Support on customs privileges through Customs and Finance Companies;
- Opportunity to participate in important projects across the country;
- Better communication with state officials, shorter decision chains and reduced bureaucracy;
- Off-shore investment and occupancy opportunities with an advanced infrastructure access;
- Ease of access to finance with the support of Venture Capital Companies;
- Encouraged university-industry collaboration opportunity,
- A visionary team with a worldwide experienced management team.

Skolkovo provides with venture capital-aided companies with co-financing support, simplified arrangements and business development support as well as tax advantages. In addition, the Venture Capital Funds, indicating the willingness to invest in companies in Skolkovo, are offered a special accreditation opportunity and these companies are provided with the right of priority access to high-tech start-up companies' deal pipeline in Skolkovo ⁽⁶⁶⁾.

In addition, the Innovation Center also involved in the establishment of a research-oriented university, called the Skolkovo Institute of Science and Technology supported by MIT and many international companies. The academics of MIT will work in identification of the university's organizational structure and innovation and entrepreneurship-oriented education and research programs ⁽⁶⁷⁾. In addition, a number of joint research programs with Stanford University are being developed ⁽⁶⁸⁾.

The Skolkovo Foundation responsible for the establishment of the Innovation Center is a state-funded non-profit organization. The Chairman of the Board of Trustees is Dmitry Medvedev, Russian President, the President of the Executive Board is Viktor Vekselberg, owner of Renova Group, and Craig Barrett, former Intel CEO. The Board of Directors consists of many big names such as Esko Aho, former Finnish Prime Minister and Vice President of Nokia, John Chambers, Cisco Systems CEO, Alexander Galitsky, Chairman of Almaz Capital Partners, one of the largest financial investment companies of Russia, Eric Schmidt, Google CEO, Ratan Tata, Chairman of Tata Sons (the Tata Group) ⁽⁶⁹⁾. The Skolkovo Innovation Center hosts the R&D centers of the world's leading companies in the field of ICT such as Cisco, Ericsson, IBM, Intel, Microsoft, Nokia, Nokia Siemens Networks, Siemens.

While the Skolkovo Foundation provides support up to 300 million rubles (about 9.5 million U.S. dollars) by the size and maturity levels of the projects, the tax advantages provided can be summarized as follows ⁽⁷⁰⁾:

- Exemption from the obligation to pay income tax
- Exemption from the obligation to pay value added tax (excluding the VAT paid to the Russian Federation for imports of goods)
- Exemption from corporate property tax
- Reduced rate over insurance premiums (14%)
- Refund of customs duties and VAT on goods imported for research activities or constructions for equipping the real estate facilities in Skolkovo

Incentives for participants do not depend on the areas of activity in the project.

Costa Rica:

Clustering around foreign direct investment and industry-leader

Intel, the world's largest microprocessor manufacturing company, has led to major changes in Costa Rica with the investment in the country in 1996, . The country with a population of 3.6 million utilized the opportunities well in order to provide the most favorable conditions for investments that would follow Intel. Although the campus, which was founded by Intel in Costa Rica and where Intel operated its activities as a free zone, was established in a region independently of other companies due to its large space, Intel benefited from the facilities such as 100% import tax exemptions for raw materials, capital goods imports, income tax exemptions, privileges in returning income, authorization of sale to the domestic market by 40%, on-site clearance, which also were benefited by the other investors. Intel's investments in the country made significant contributions as follows:

- Mobility of direct international investment,
- Creation of workplace standards,
- Adoption of a business doing culture,
- Direct and indirect employment growth,
- Increase in knowledge and training labor force.

The State has initiated efforts to improve the investment environment in the country by developing close relations with international investors and the Costa Rican Investment Agency (CINDE) for the creation of favorable conditions for other investment that will follow the decision of Intel on investing in the country. At the same time, studies in order to determine the strategies towards clustering in cooperation with the Harvard Business School, Costa Rica Business School (INCAE), CINDE and the government have been carried out.

Conclusions to attract international investors from Intel's investment in Costa Rica can be summarized as follows ⁽⁷¹⁾:

- Positioning the flagship of strategic projects as an investment
- Maintaining the same level with the investor requirements and keeping the investment climate adapted and up to date continuously
- Supporting and coordinating the communication between the existing investors and senior government officials in order to improve the investment environment
- Developing a strategy for the establishment of a service and supply network for sectors as priority

A similar investment in Turkey was opening of HP / Foxconn factory in February 2011. This factory, opened for production purpose, should be positioned in accordance with domestic and international investors that will invest in the R&D and service sectors in Turkey. For example, after Foxconn, engaged in manufacturing for many technology companies such as Acer, Amazon, Apple, Cisco, Dell, Intel, IBM, Lenovo, Nintendo, Sony, opened a factory in Corlu European Free Trade Zone for the production of HP products, Flextronics Global Services, a company from Singapore and serving in post-production supply chain and logistics management, came to Turkey in October ⁽⁷²⁾. However, the state is required to take strategic steps to improve the investment environment and attract investments in order to increase the number and quality of similar investments after this investment.

Tax incentives applied to Intel's campus and companies in the free zone by Costa Rica are as follows ⁽⁷³⁾.

- 100% exemption from import duties on raw materials, ingredients and capital goods.
- 100% exemption from corporate income tax.
- 100% exemption from export taxes, local sales and excise taxes.
- 100% exemption from capital tax.
- No limitation for return of capital / profit into the country or management of foreign currency.
- Accelerated-site customs clearance

Timing of funding for TEYDEB project supports:

The long application assessment process for TEYDEB supports (arbitrator assignments, arbitrator assessments and decision-making process of the Assessment Committee, etc.), high costs for collateral and a long duration in providing supports for projects entitled up to 1 year put SME companies that are dependent on these incentives especially to maintain their projects in a difficult position. Covering the project costs in TEYDEB TUBITAK supports periodically and assessing financing alternatives before commencement of the related projects and costs will be useful. Interest-free and flexible repayment loans to be provided before the projects are launched will encourage R&D activities more and accelerate applications to TEYDEB projects which have been showing a falling tendency recently.

Updating the new draft law on incentives:

Scope of the new incentive system, which created a great expectation in 2012, has been expanded to include the purpose of "to support technology investments" not included in the previous incentive system purposes. The new system places differentiation in the implementation of incentives to forefront on a regional and sectoral basis and projects additional incentives for large investments as well as investments in strategic OIZs.

The areas that will cover the service sector, which is one of the sectors in which the ICT sector is effective, appear to be limited under the scope when the new law draft on incentives is examined.

Scope of the new incentive system, which created a great expectation in 2012, has been expanded to include the purpose of "to support technology investments" not included in the previous incentive system purposes

Incentives that are included directly in the draft may be related to the sector:

- Subjecting 50% of the income derived from design, software, call center and data storage services abroad to reduction over the tax return,
- Support for employers by Social Security Institution (SSI) and Discounted Corporate Tax (however, these are considered to be a limited incentive for the ICT sector due to the relatively low and short-term ratio in 1st and 2nd regions.)
- Utilizing a sub-region's incentives in investments for the production of a product developed as a result of R&D projects supported by TUBITAK (in terms of tax deductions and SSI premium employer share supports),
- Availing large-scale technology investments (electronics industry) and investments that will increase the R&D capacity and enable competitive advantages of normal incentives at a higher rate,
- Strategic investments (for producing intermediate goods with high dependency on imports, with a minimum amount of investment of 50 million TRY, more than 50% is covered by imports and for sectors producing added value minimum of 40%)
- Priority investments (test centers, etc.) 2. Benefiting from 5th region incentives if in 2nd or a lower region

Considering the fact that the importance of the sector in the national economy and the share of the sector in the economy is still low compared to developed countries, it is important to include sector-specific additional incentives also in the new incentive system for the development of the sector and providing the expected contribution to the economy

Such incentives rather cover investments for manufacture of regional, strategic and "finished - intermediate goods". For this reason, no incentive (such as supporting technology investments) that is direct and significant is defined even literally for the ICT sector, which is of great importance for the national economy, or the number of companies that can benefit from these incentives is limited by including investments in the sector into large-scale and strategic investments. This condition is regarded as a failure by the sector, and revision of the draft taking the demands from the sector also into account and clarification of the secondary legislation (notification, circulars, etc.) without causing hesitation will be useful in achieving results fit for the purpose.

On the other hand, it would be a more appropriate assessment to take into account the possibility of inclusion of the incentives in the employment package expected by investors to reduce the employment costs and prepare the draft accordingly would be a more appropriate by considering the fact that it is expressed that there is a separate study especially related to the promotion of employment other than the incentive law.

The reason for this failure concerning the ICT sector may be considered to be the Law No. 5746 on Promotion of R&D activities, which already is in force and offers significant incentives and supports, and the Law No. 4691 on Technology Development Zones. In addition, when it comes to the supports provided by TUBITAK and other institutions, the ICT sector may seem to be of secondary importance as the sector already benefit from many incentives under the new incentive program because these laws provide, regardless of regional differences, incentives such as R&D deduction, withholding tax incentives, employer support for PPP, stamp duty exemptions, in areas of new technology, process development and so on.

Considering the fact that the importance of the sector in the national economy and the share of the sector in the economy is still low compared to developed countries, it is important to include sector-specific additional incentives also in the new incentive system for the development of the sector and providing the expected contribution to the economy. In addition, implementation of some of the incentive elements (customs exemption, interest support, VAT reduction), provided for by the new incentive system, especially for companies that engage in R&D activities without regional limitation will provide a significant benefit in terms of increasing the share of R&D expenditures in share in the GDP.

The following recommendations can be considered as complementary elements under the new incentive system taking the best practices in the world also into account:

- Including the investments in this area into the "strategic investments" category and availing these investments of the incentives (exemption from VAT, exemption from customs duty, tax deductions, employer support for PPP, allocation for investment zone, interest support, etc.) offered to the 5th region regardless of regional differences given the high rate of added value and imports in the ICT sector,
- Creation of a good private sector - government cooperation which will resolve the lack of trained and qualified personnel solve the industry needed by the sector most. (Development of programs such as organization and / or financing of trainings for call center employees, which are employed / will be employed by the private sector in the investment priority regions, 4th-5th-6th regions, within the framework of the incentive system, by the state, organization of courses in universities that will train qualified staff for the sector, support for the private sector in recruitment processes, etc.).
- Implementation of tax exemption for any type of software and equipment in the sector-specific free zones
- Provision of basic computer, English and so on trainings comprehensive and publicly-funded, across the country or regional, in order to develop on the employee profile that ICT investors will need.
- Incentives such as reducing the bureaucratic formalities in recruiting foreign staff and managers in terms of provision of the knowledge and transfer that the sector will need; exemption of wages to be paid to such staff and managers from income tax and social security premium ,

Continuation of the use of the Universal Service Fund is important for investments in the sector

Bringing the funds allocated to the sector into use:

A variety of resources of revenue is allocated with the laws and regulations in order to achieve a more competitive level in the Information and Communication Technology sector and provide all citizens with the opportunity to use the services in the sector. Bringing these funds, allocated to the sector, into use by the sector is important.

For example, Article 5 of the Law No. 5809 on Electronic Communications includes the provision of "to promote domestic production and design of electronic communication systems and accordingly, research, development and training activities, including technical and financial supports, for the sector, and to determine the resource to be allocated for these activities not exceeding 20% of revenues of the Agency, and to make such resource available by carrying out the necessary arrangements regarding the use of this resource". In order to clarify the scope in this regard, the secondary arrangements that will be carried out by the Ministry of Transport, Maritime Affairs and Communications are expected. Introduction of the secondary arrangements as soon as possible and bringing this R&D funding with a significant amount of resource into the sector is important.

Another fund that is created with the contributions of the sector companies and has a significant amount of resource accumulated is the Universal Service Fund. Allocation of a resource from this funding, which is estimated that only 15 of the resource accumulated has been used for the Universal Service as of the end of 2009, in order to meet operators' non-economic investments in recent period is agreed, and in this direction, the necessary agreements are executed with the operators providing universal services:

- Installation of fixed and broadband internet access infrastructures with "WiMAX" technology for villages and fields without a telephone and communication infrastructure and covering the costs of both infrastructures and antenna, telephone and modem devices to be installed to country houses by Turk Telekom,
- Delivery of Internet service by Turksat A.S. through the satellite to village schools without terrestrial connection due to geographical reasons,
- Establishment and operation of mobile infrastructures by Avea, Turkcell and Vodafone in order to ensure communication of settlements without a GSM communication infrastructure, located in rural areas, with high cost and a population of 1-500,

Continuing to use a significant portion of their revenues a) 10% of treasury shares paid by mobile service operators that are obliged to pay treasury share, and b) the Universal Service Fund, generated by mobile service operators that are not obliged to pay treasury share and 1% of annual net sales revenue of Turk Telekom, for investments in the sector is important. In the case of accumulation more than the investment needs under the Universal Service Fund, reconsideration of the transfer rates for the fund is proposed.

On the other hand, organization of informative and awareness-raising programs and providing support during the application process by the public sector in order to enable the sector to benefit from the EU funds to the greatest extent is of vital importance.

B. Coordination

Measuring the effect of support programs:

Concrete objectives for all incentive and support programs towards R&D, innovation and entrepreneurial activities should be identified and efficiency and effectiveness of these programs should be measured with periodical assessments. Solutions to recover deficiencies found to be ineffective in the programs as a result of the periodic assessments should be developed, the programs that are not successful should be removed and these programs should be replaced with new programs or different support programs should be used with pilot practices.

Harmony between the support mechanisms:

The organizations, organizing and carrying out the implementation of the incentive and support programs, must reach an agreement on definitions of R&D activities and functioning of the processes. However, positioning the incentive and support programs growing to complement each other is of importance. Establishing and activating the Coordination Committee, which pursues the goal of increasing the harmony between different support mechanisms and providing more added value from the R&D and innovation programs for our country and planned to be established with the decision no. 2011 / 102 at the 23rd Meeting of the High Council of Science and Technology, as soon as possible is of importance.

The following are the examples for arrangements that require harmony between the existing incentive systems and cause confusion and hesitations from time to time:

- Both the operators and potential investors become confused due to the fact that the current R&D incentives are included in different legislation (Law No. 5520, 5746, 4691) . For this reason, it would be appropriate to bring all these legislation together under a single roof.
- Accordingly, the differences in definitions with respect to R&D incentives in the tax laws need to be resolved. (The status of financing costs in the Law No. 5746 and No. 5520 on R&D Incentives can be considered as an example: while financial expenses are not included in the R&D expenditure in the Law No. 5746, these expenses are under the R&D expenditure in Law No. 5520.)
- Issues related to the R&D activities in the VAT Law need to be resolved (clarification of whether or not a R&D activities for a customer abroad will be considered under the service export, elimination of ambiguous issues in the VAT exemption applied to technoparks and revision of the partial VAT exemption applied to technoparks as a complete exemption, etc.)
- Doubts about the R&D expenditures failed in resolving some problems concerning cash supports will be excluded from the scope of the cash support; benefiting from R&D deduction and cash support for domestic R&D expenditures for a customer abroad must be cleared.

Ireland: Foreign direct investment and ICT-oriented strategies

Today, Ireland is the most active country in the ICT sector among the OECD countries. Ireland's ICT sector exports in 2008 was € 50 billion. The ICT sector in the country operates in many fields from production to supply chain management, from software development to technical support and employees more than 74,000 employees. IBM, Microsoft, Intel, Google are the companies that operate in Ireland on a global scale. The ICT was first placed by the Irish government among the priority sectors and favorable conditions were established, and the largest contribution to the creation of the sector was the direct international investments. The country's investment environment conditions much increased international direct investment inflows, and the proportion of the international direct investment inflows to the GDP between 1997 and 1999 reached 47.5%. The country's qualified and cheap labor force, geographical proximity to Europe, financial incentives and ease of procedures enabled entry of a large amount of international investment into the country.

The activities for attracting international investors from the 1980 were launched by the Industrial Development Authority-IDA, a public institution responsible for direct international investments, especially by attracting hardware and software manufacturers. With the policies applied to IBM, which already was operating in the country before the restructuring, Intel and Microsoft were attracted as well. The first steps of clustering started with software production operations with Lotus and Microsoft, respectively, between 1984 and 1985. Clustering in the software sector increased towards 2000s, and Google established the European headquarters in the country in 2003. With the entry of Google into the country, major software companies decided to establish their administrative units in Ireland. Existence of more than 5200 companies in the IT clustering and the fact that more than 5100 companies have been operating in the field of software and IT services provides information about the level of clustering in the ICT sector in the country as of 2006. As a result, the fact that the country achieved the highest export rate in software sector in the world in 2006 should not be regarded as surprise ⁽⁷⁴⁾.

The co-operation between the public institutions and the companies operating in the sector is of great importance in the development of the ICT clustering in Ireland. While the institution responsible for the conduct of relations was the IDA, the institutions such as economic development initiatives, units responsible for sectoral development, universities, responsible for education supported the sectoral clustering. The Irish Science Foundation made investments to increase the number of research activities in increasing the clustering and competitiveness as well working to ensure industry-university cooperation.

Ireland has been currently engaging in various initiatives in Cloud Computing, defined as a new revolution, in order to protect its competitiveness in the sector both as an early service provider and a consumer. The examples of these initiatives are Cloud Cluster (Cluster Cloud Program), training labor force, incentives, leading position of the public sector as a leader in consumption and improvement of infrastructure.

The reasons for Ireland is a center of attraction for international direct investments and development of investment in the ICT sector in particular can be summarized as follows:

- Existence of a qualified, English-speaking with technical knowledge labor force,
- Relatively low qualified labor costs,
- Continuous improvement as a result of training expenditures
- Ease of bureaucratic procedures,
- Access to funds with EU membership and infrastructure improvements with funds obtained,
- Richness in opportunities to access financing and existence of an improved risk - venture capital sector
- Effective protection of property rights
- Tax privileges

C. Scope

Encouraging demand:

In addition to the various incentives and supports for research, development and investment activities extended to the ICT companies, the incentives to be extended also to companies using the ICT is important for the development of the sector.

The examples of such small-scale incentives in this regard are Computer Software Support, e-Commerce Support, Support for Electronic Signature and e-SME IT Support Loan provided by KOSGEB. Despite these incentives, however, the share of SMEs' IT spending remains low compared to other countries. The share of SMEs' IT spending in Turkey is around 15%. This rate is 30% in Poland, 38% in South Africa, 45% in Romania. Given the fact that the share of the software sector in the total Information Technology market in Turkey is 9%, it is possible to say that the SMEs that are expected to be the driving force of the country do not use software products at the desired level or they have these products free of charge. The Research on the ICT Usage in SMEs by TUBISAD indicates that the SMEs in the country do not have an awareness on the use of technology.

90% of businesses, examined within the scope of the research, stated that they did not benefit from the SME supports provided by KOSGEB and the European Union. It is important and to focus on awareness-raising activities to increase the rate of SMEs to benefit from these supports, enrich the content of the supports and improve the application / use processes. On the other hand, solutions under the structure of cloud computing are a great opportunity for making software usage of SMEs more accessible and affordable.

Considering large-scale companies, it is observed that these companies prefer to develop their software solutions within their bodies due to strategic (need for producing quick solutions tailored to needs) as well as financial reasons. This mainly is seen in the public, communications and banking sectors. Especially, these three sectors that are expected to be the largest consumers of the software and IT services sector should be encouraged to use their purchase potentials and collaboration with their eco-systems.

The tax burden on the mobile communication services makes Turkey the country with the highest tax rate imposed on mobile communication services as well as preventing the areas with a growth potential such as mobile application, to develop

Technology Transfer Supports:

It should be noted that technology transfer is the other way to obtain technology despite the fact that technology production is supported with the R&D supports. There are two main routes for the effective transfer of technology: 1) Development of informing, coordination, cooperation between research and development companies and R&D organizations and technology users industry / technology companies, and technology transfer through protection, marketing and commercialization of intellectual property rights. For this purpose, the Technology Transfer Offices (TTO) are defined in Turkey with Law No. 6170.

Establishment and support of high quality service TTOs with a specialized staff structure based on the best examples in the world is important. 2) Technology transfer is the contribution not only by university / R&D organizations to the industry but also to the quality of the labor force albeit indirectly by the technology producing companies. Although capital and intellectual property rights are under the control of foreign companies, the country's labor force gains experience with the production of the value-added technology and software development activities, and the increasing number of qualified labor force paves the way for more technology transfer as well as extending and accelerating technology production. For this reason, encouraging international investment and international partnerships in the ICT sector is of vital importance.

Branding supports:

A strategic study on the importance of branding should be carried out for the ICT sector which is one of a few sectors identified as being of strategic importance for the growth of Turkey's economy. The importance of brand value subject should be investigated within the scope of increasing the ICT foreign trade and inclusion of the ICT sector in the existing brand incentive programs should be considered if it is found of importance.

4.3.2 Balancing of the communication tax burden

The high tax rates in the communication sector constitute an impediment for investments in the sector. The existing tax burden makes Turkey the country with the highest tax rate imposed on mobile communication services and the disproportionate tax arrangements prevent the development of the areas with a growth potential such as M2M, MVNO, mobile application, as well as gaining new subscribers. On the other hand, the taxes in fixed communications industry seem to be above the world average as well as disproportionate for taxpayers.

Major suggestions for improvement on tax arrangements are as follows:

- **Reducing the excessive tax burden on the mobile communications:** Elimination of the barriers on the mobile communication sector, which is one of the sectors making the largest contribution to the growth and development of Turkey, is expected to create an important market in mobile broadband, machine-to-machine communication (M2M) and mobile payment applications and rise the mobile penetration by increasing the acquisition of new subscriptions. The device manufacturers and solution partners as well as operators and mobile operators in the software sector will also derive a profit from the value chain to be created. In this context, removal of the initial taxes received during mobile data line allocation will help the spread of services with a growth potential, such as especially M2M, and continuation of the acceleration of our country in the information technology.

It is estimated that the mobile penetration, which is expected to reach 98% in 2016 with the current taxation, will reach 104% with improvements in the taxation policy, 3G penetration will increase from 68% to 72% the tax revenues will increase to a level higher than revenues to be derived from the baseline scenario from 2015

The potential effects in the event of improvement in the following taxes are revealed in the report in which the mobile communication sector in Turkey and taxation are examined by Deloitte for the GSMA:

- Removal of the Special Communication Tax of 37 TRY that is received from SIM cards used only for data and the Wireless License Fee of 14.56 TRY
- Reduction of the Special Communication Tax of 37 TRY received from all other SIM cards and the Wireless License Fee of 14.56 TRY
- Reduction of the Special Communication Tax of 25% for voice and SMS mobile communication services to 15%

Despite the fact that a tax arrangement in the SIM card market in Turkey would create a large volume due to the small size of this SIM card market used only for data, effect of such an arrangement on the state's current tax revenues is expected to be limited.

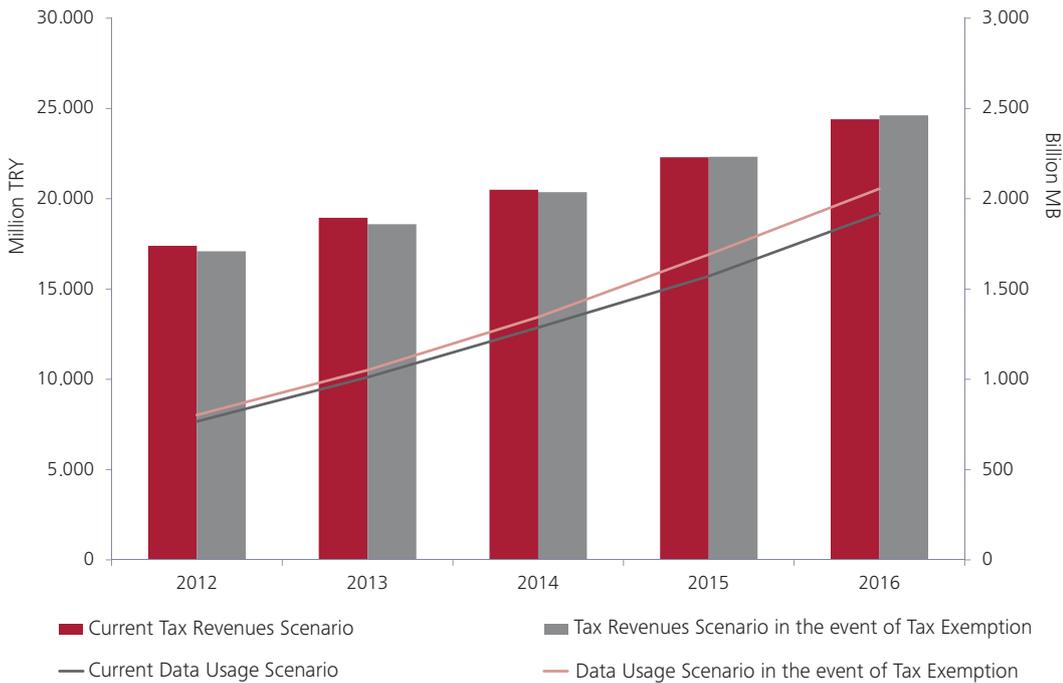
Currently, the new draft law announced by the Ministry of Finance includes the provision of "the start-up special communication tax of 37 TRY in machine-to-machine communication for remote monitoring and carrying out business and services by a central server will not be received". This is an important step for the development of M2M market, and M2M market and the steps in this direction will undoubtedly have positive effects on the economic growth and productivity growth considering the potential benefits for the country's economy. However, continuation of the start-up tax for (data) SIM cards, only used for data communication, constitute a barrier in the development of mobile broadband access. Although revision of the new law draft to include the SIM cards for data use causes a tax loss in the short-term, it is an important step that will ensure a growth in the economy and tax revenues in the long term as it will support the use as well as the economic growth.

Reduction of the start-up tax from all SIM cards will increase the number of mobile users opening the pave for new subscribers; and reduction of the Special Communication Tax will increase the per capita consumption. For example, removal of the start-up taxes, received only from data SIM cards, and reduction of the start-up taxes from other SIM cards is expected to increase the level of mobile penetration by 5% per year. It is estimated that the mobile penetration, which is expected to reach 98% in 2016 with the current taxation, will reach 104% with improvements in the taxation policy, 3G penetration will increase from 68% to 72% the tax revenues will increase to a level higher than revenues to be derived from the baseline scenario from 2015.

• **Removal of the communication tax in the fixed communication:** In accordance with Article 32 and subsequent Articles of the Law No. 2464 on Municipal Revenues, tax-payer of the communication tax is only Turk Telekom, and other operators of STH does not have such an obligation. The base of this tax that Turk Telekom charges is telephone, telex, facsimile and data fees.

Türk Telekom sabit telefon ve data tahsilatlarından bu vergiyi ödemekle mükellef olmakla birlikte Türk Telekom'dan sabit telefon ve data altyapı hizmeti alan ve üzerinden son kullanıcılara sabit telefon ve internet hizmeti veren diğer işletmeciler, verdikleri sabit telefon ve internet hizmetlerinden yaptıkları tahsilatlardan, faturalamayı ve tahsilatı kendileri gerçekleştirdikleri durumlarda, haberleşme vergisi ödememektedirler (Türk Telekom'dan faturalama ve tahsilat hizmeti alan sabit telefon işletmecileri işbu vergi yüküne katlanmaktadırlar). Özel İletişim Vergisi'nin hali hazırda yüksek olduğu sektörde sadece yerleşik sabit işletmecinin ödemekle yükümlü olduğu bu vergi kaleminin, zaten karmaşık olan vergi yapısını basitleştirmek ve hafifletmek adına kaldırılması değerlendirilmelidir.

Figure 47. Possible effects of rearrangement of mobile communication taxes



Source: Deloitte GSMA, Mobile Telephony and Taxation in Turkey, 2012

- **Prevention of subjecting distribution of mobile applications over the network to additional deduction:** If GSM operators deliver a software, developed by themselves or third parties, by means of electronic communication, in other words, if users download an application, offered by GSM operators, to their phones or computers using GSM/3G networks, a "treasury share" amounting to 15% and a "contribution share to the authority's expenses" amounting to 35 per ten thousand over the price of that software is accrued. Accordingly, if an application developer delivers its product to an end user via GSM/3G network, this application developer is subjected to a financial obligation in a total of 61.5%, directly and through reflection, (18% VAT, SCT 25%, 15% Treasury Share and 3.5% Contribution Share to the Authority's Expenses). However, when the product purchased by the subscriber is not a software but for example, a movie ticket, such amounts are not accrued. This situation keeps the field, in which the software industry can grow rapidly and efficiently under an extremely additional tax burden. This tax burden considerably limits the tendencies of software / application developers to use the electronic communications networks that is the media that users can be delivered the products in the easiest, fastest and most effective way. For these reasons, the fact that the exemption from financial liabilities applied to the products other than software should apply to software / applications to be delivered by means of electronic communications networks as well and such a change would contribute to the growth of the software sector should be taken account.
- **Exemption from double treasury share for MVNO services:** Virtual mobile operators (MVNO) that manage to offer different service models and customer experiences through different channels play an important role in the continuation of the growth trend in the mobile communication sector in the world's most developed markets. Although not considered as an additional tax burden, the share of treasury of 15% received both from the mobile network operators and MVNO in our country creates a very large barrier for the development of this sector.

Effect of VAT reduction on computer sales: Case Turkey

In order to reinvigorate the computer market which had been downsizing from the end of 2008, TUBISAD created a VAT reduction scenario and this scenario was put into practice during the crisis of 2009. According to the scenario's results, the following assumptions were made:

- Approximately 380,000 additional computers sales with the VAT reduction while the number of computer sales targeted was approximately 3.7 million,
- New employment in IT of 14,000 to 15,000 per year in the computer manufacturing and retail sector,
- Each computer system unit of 1000 pcs in Turkey creates an indirect employment in IT of 25-27 employees per year; so the first year, approximately 9,000 new indirect employment in IT,
- Employment of 20,000 employees in other sectors with the multiplier effect,
- 5. 117,000 business lines with the VAT Reduction effect of 10% as of the 5th year.

The effect of the tax reduction on the public revenues is also suggested in the scenario studies. It is expected that the possible VAT reduction will create a decrease in the public finance but this loss will be compensated with the additional public revenues generated with the consumption effect and the increase in employment in five years. The calculations revealed that every 1 TRY VAT revenue in the five-year period returned as a total tax revenue of 1.31 TRY.

This scenario has been implemented during the crisis, and the results are impressive. The VAT reduction, put into practice by the government to reduce the effects of the economic recession, has accelerated the growth of the market in computer sales as well as the other sectors. While computer sales had been declined by March in 2009, the sales started to rise again in April when the VAT deduction entered into force. As a result of reflection of the deduction on the prices, consumers made a saving of 10 million TRY, and it was observed that computers purchased were higher performance compared to other months. While the sales decreased by approximately 30% compared the first quarter of 2009 to the first quarter of 2008, this rate was 7% compared to the months April ⁽⁷⁶⁾.

The VAT reduction, put into practice also in the IT sector with the intensive efforts of TUBISAD, the Information Technology Industry Association, is an important step that is taken by the private sector and the government together for the growth and development of the sector and needs to be an example for continuity of IT sector.

4.3.3 VAT reduction on the ICT sector products and services

Applying a reduced VAT rate to the ICT sector products and services with high added-value sector by increasing the demand for these products and services to expand the sector or introducing a VAT exemption for these products and services must be taken into account under the new incentive program. This practice which enlarged the size of the computer market successfully in 2009, should be expanded to include all hardware, software, and services more comprehensively and should be put into practice after the completion of the necessary economic impact assessment. On the other hand, it is expected that the VAT reduction practice will have an effect also on the Financial Services Sector, which tends to consume the software and IT services most, and thus, the companies in the sector will choose the path of outsourcing easier.

4.3.4 Predictability of Regulations

The fact that the regulations issued by the Information and Communication Technologies Authority (ICTA) are not predictable and the Authority takes decisions without receiving opinions of the companies in the sector, granting a time period that will allow investors to make a healthy planning and sharing the grounds of such decisions is described as a concern for improvement by the companies in the communication sector. Predictability of the regulations especially on matters that affect investments of the operators and implementation of the regulations after completion of the necessary consultation processes is important in terms of the sustainability of the sector and the potential for attracting investment.

On the other hand, renewal of the market analysis periodically and revision of the market definitions constantly in the light of changing market and competitive conditions is a necessity because the trends and market conditions in the Information and Communication Technologies sector can change very quickly.

The long duration of legal proceedings and legal decision processes in company establishment, closure and merging leads many international investors to carry the legal personalities of their investments in Turkey to abroad

4.3.5 Reducing software piracy and violations of intellectual property rights

According to the Business Software Alliance (BSA) data, unlicensed software installed on personal computers in Turkey reached 62% in 2011 and the lost economic value rose to U.S. \$ 516 million with an increase of 24% compared to the previous year. The effect of the decline in the use of pirated software to the level of 52% with a decrease of 10 percent towards achieving the level of 42%, the world average, on the GDP of Turkey is calculated to be U.S. \$ 839 million.

Unawareness in Turkey on purchasing licensed software and installing to family members' or friends' computers or downloading such software from web-sites free of charge is not legal emerges as an important issue. The research conducted by BSA in 2011 shows that about 40% of software users in Turkey is not aware of that the pirated software they use are obtained illegally.

Given the fact that the related legislation and the laws in Turkey are compatible with the international examples to a great extent, it can be said that the main problem is not with the regulations but its enforcement and the level of awareness of the community (13). Increasing the number of specialized courts specializing in this regard, maintaining and improving trainings for judges and prosecutors, auditing software licenses inspections effectively during tax audits in organizations and increasing the social awareness explaining the importance of respect for intellectual property rights at schools are among the solutions proposals.

4.4 ICT Skills and Trainings

4.4.1 Promoting entrepreneurship culture:

It often is expressed that both there are certain challenges in the current commercial and legal processes and the approach of entrepreneurs is not at the level of international norms and expectations because venture capital investments in the ICT sector in our country is new. For example, the venture capital investment companies in Turkey cannot receive international funds due to the CMB regulations and thus, they experience difficulties in increasing their capitals. In addition, venture capital partnerships are obliged to go public within three years following the establishment. The long duration of legal proceedings and legal decision processes in company establishment, closure and merging leads many international investors to carry the legal personalities of their investments in Turkey to abroad. For these reasons, the legislation structure should be improved to increase the qualifications to encourage venture capital.

On the other hand, for creating and promoting an entrepreneurship culture, the following can be considered among the steps that need to be taken;

- Introduction of lessons in university curricula for creating business plans and developing new products or services;
- Ensuring both the academic world and small companies to meet with investors in technoparks where clustering is high;
- Creating platforms where success stories will be shared to raise the awareness of foreign venture capital companies about Turkish companies;
- Providing incentives for large domestic companies to establish venture capital companies;
- Creating a "minority holding" culture by providing individuals with the potential of angel investor with awareness.

Within the framework of a new draft law published by the Undersecretary of Treasury "for angel investors, defined as "Individual Participation Capital", the statement of "reduction of 75% of the capitals, which they have invested when taking the partnership by obtaining a license from the Treasury, from their earnings and revenues in their annual returns as a reduction of Individual Participation Investor to be applied by the end of 2017 is projected" is included. This ratio is planned to be 100% for those that have provided participation in organizations with projects approved within the last 5 years under the research, development and innovation programs prepared by the Ministry of Science, Industry and Technology and by TUBITAK ⁽⁷⁷⁾.

Supporting angel investors is an extremely important step for the development of the ICT sector and entrepreneurship in Turkey. Our country has a significant potential in developing business ideas considering our young population.

Therefore, encouraging angel investors with the faith to invest in this kind of business ideas and the risk-taking capacity especially in terms of taxes, expanding supports by academic circles, concretizing R&D and regional development incentives, promoting an entrepreneurial culture and developing innovative products and services are extremely important.

In addition, to support venture capital companies, it is stated in the same draft that "Reduction of the contributions, reserved as venture capital fund, over the tax return in assessment of the income and corporate tax base is allowed (not to exceed 10% of the declared income)". However, as mentioned earlier, such supports will not be enough as long as the challenges that the venture capital firms experienced are not eliminated.

Although protecting the rights of entrepreneurs, is critical to maintain the entrepreneur's motivation on its investment after the entry of the venture capital funds into investment and its aim to grow the investment and accordingly, to ensure the venture capital funds to achieve the investment objective, the fact that global practices such as preferred shares, right of redemption, share options (preferred stock, buybacks, stock options), cannot be implemented easily is one of the critical issues for entrepreneurs and venture capital firms. Although these and similar practices are implemented within the framework of specific agreements made with entrepreneurs in the existing structure, the prevalence of such practices is not high. The legal infrastructure of such practices are not know outside the professionally operating structures, and forward pricing in order to use these rights or options cannot be possible. In order to spread such practices, it would be appropriate to down-grade the practice-oriented educational activities and education to school level and to increase / expand the access to such consulting activities through private institutions / associations.

It is extremely important for venture capital funds to obtain funds from third party resources to overcome financing problems especially in growing in the companies they associate with by acquiring a certain amount of shares. Borrowing from financial institutions without the guarantee support of a venture capital fund by entrepreneurs usually with limited loan use capacity is not possible, and the cost of debt financing is extremely high. In addition, it is not possible to say that the phenomenon of Project Financing is not widespread in our financial system.

Venture capital investment trusts are organizations that are established under the Capital Markets Law and incomes derived from investments in venture capital are exempted from corporation tax. Therefore, the tax advantage in question is associated with the free float, and companies, structured as venture capital investment trusts, are obligated to go public within three years following establishment. Spreading the capacity of investing in venture companies are encouraged in this way. The implementation of venture capital fund with the new Capital Markets Law and the introduction of opportunity to leave the investment through the return of shares in certain terms is expected to be an alternative to investments unable to find enough liquidity in the secondary market. On the other hand, encouraging domestic and international corporate investors to invest in venture capital investment trusts that are constructed in a more transparent structure to support venture capital investments and bringing such investors in the Istanbul Stock Exchange is important.

Israel Yozma program and venture capital culture

The Government of Israel has managed to transform the research activities into the latest technology products by building incubator and venture capital programs as well as strengthening the human capital by investing in education and supporting the migration, offering investment incentives to attract especially international investors and making significant investments in R&D in order to occupy an important position in the ICT sector ⁽⁷⁸⁾. Today, Israel is listed in the Competitiveness Index of the World Economic Forum as the country with the highest Venture Capital intensity. Launch of the Venture Capital Programs in the 1990s is certainly one of the most basic reasons for this success.

One of the major Venture Capital support programs launched in Israel is the YOZMA Program that the government has allocated U.S. \$ 100 million. The portion of U.S. \$ 80 million of this program was spent for the establishment of 10 private sector venture capital funds, and the remaining portion of U.S. \$ 20 million was used for direct investment in high-tech companies. The YOZMA program imposed on these 10 funds the obligation to find partners one from the private sector, one from international sector and one from the domestic sector. The reason for this was to ensure the transfer of knowledge and experience foundation such as specialization and network. In addition, a strong reverse incentive mechanism was built within the framework of the program. In this context, the funds with a public capital of 40% were given the opportunity to buy out the options, owned by the state, after five years at a interest rate to be applied over the principal invested. 8 out of 10 funds benefited from this opportunity ⁽⁷⁹⁾. The program, continued for seven years, created a market-friendly environment and then was privatized. The amount of funds managed by more than 50 venture capital companies, operated in Israel, was over U.S. \$ 9.4 billion in 2000. This program attracted international investment companies such as Advent, MVP, CMS, Walden, Daimler-Benz, DEG, Van Leer Group, TVM, Oxton, AVX, Kyocera, Vertex, to Israel ⁽⁸⁰⁾.

The inclusion of the Article of "is vested with the authority to establish organizations, companies or become partner to or support companies established or will be established, ... to provide capital supports and make advance payments (transfer) as grants and / or loans without collateral, ... to establish venture capital investment partnerships home and abroad in order to support research, development and innovation-oriented initiatives, to create domestic and / or foreign-owned national and international venture capital investment partnerships or different structures in this field or participate in them, and in addition, to engage in all kinds of activities to realize the above-mentioned duties and to provide the necessary financial support" is on the agenda with an amendment planned to the Law on TUBITAK.

As mentioned earlier, supporting venture capital fund investments, which are critical for start-up companies, but unfortunately, limited in the number and size in our country, with investments by TUBITAK is an extremely important step. Supports and opinions of academics, businessmen and bureaucrats experienced in the sector should be asked in order to clarify this authority to support the private sector structures as well as initiatives in this area and prepare an action plan and determine the projects that will be participated in with sub-regulations.

4.4.2 Fulfillment of the need for qualified personnel

The Information and Communication Technologies Sector has been rapidly changing and evolving due to the sector dynamics. The university curricula are not updated at the same rate and this situation creates a difficulty in finding qualified personnel that can fulfill the needs of the sector. For this reason, the companies in the sector have a difficulty in finding qualified engineers in the newly graduated labor force that can fulfill the needs of the sector. Especially the programming languages used in the software industry and platforms, mobile and web applications, where programs written will be used in, rapidly change. For this reason, the collaboration between the universities and the industry the development should be improved for the development of curricula as well as enabling students to have long-term and effective internships.

On the other hand, companies provide both their newly graduated and experienced personnel with various internal and external trainings home and abroad in accordance with their needs and send them for trainings. It should be noted that provision of such trainings is an investment in human capital, which is the most important input of the software sector, and these trainings should be supported as much as other investments under the incentive as they will transform into potential products and services. The scope and upper limits of the existing supports should be updated, and the companies should be encouraged about trainings they their IT staff would attend to follow up and understand the developments in the sector.

India: Development with university – industry collaboration

India is one of the most competitive countries in the world in exports of the ICT software and services as a developing country. The success of India suggests provision of outsourcing services in the country and the potential of qualified labor force in developing firm-specific software. India has developed an expertise in low-level software design, coding and technical services, which is the lowest part of the value chain in the ICT sector, making use of its relative advantage in cheap and educated labor force well.

As a result of the privileges recognized and programs implemented from the 1950s, especially in the period after 1970, institutions trained qualified personnel in the ICT sector. However, India had great losses in the sector in terms of brain drain due to the lack of a sufficient number of companies or businesses where that talented labor force could use their skills.

Clustering was encouraged for a long-term development of the sector in India as a state policy. The government established publicly owned companies such as Bharat Electronics, Indian Aviation, Indian Telephone Industries, in Bangalore, known as the Silicon Valley of India today, in the 1940s. In 1970, the Indian government started to identify the strategies for the hardware and software sectors by establishing the Electronics Department. The reason for choosing the region of Bangalore was that the Indian Institute of Science, the best university in the field of science and technology in the country, was in the region. In addition, the country attempted to provide the companies with the infrastructure for software exports by establishing Software Technologies Parks. These parks included modern computer systems and communication networks with features that the individual companies in the country could not have. In addition, the adoption of transparent policy practices was ensured in these parks. With the establishment of the Indian Institute of Information Technology as well as the support of the private capital, training opportunities for the IT sector were initiated and even the companies operating in the sector supported for the development of the curriculum. The Indian School of Business was established in Hyderabad for international co-operations. The state also planned distance education systems to increase the diffusion of and training on the ICT.

Another interesting point about India is the lack of any company leading the sector. However, successful Indian entrepreneurs have moved their locally established companies abroad and gained great accomplishments. These companies engaged in the fields of maintenance and repair when established first, and then started to provide system integration services so that transformed into information management organizations. Following the economic liberalization program in 1991, multinational companies started to invest in the country. While India operated in the lower steps of the value chain in the ICT sector in the beginning, the country secured its position in the sector over time and succeeded to move to the higher levels. The ICT sector has provided significant contributions in transition to the innovation-based production with the investments in education, government incentives and knowledge in the sector.

Practices that contribute to the development of the ICT sector in India are as follows:

- Achievement of a relative competition by positioning the educated and cheap labor force in the right sub-sector.
- Encouragement of clustering for the development of the sector. Selection of regions with a large number of schools providing education in the ICT sector for clustering.
- Establishment of institutions to train the labor force and building the industry collaboration on solid basis with these educational institutions.
- International relations, established with personal initiatives of entrepreneurs, brain drain, and cultural histories of countries, have played an significant role in the development of the sector by finding potential customers as well as obtaining the knowledge of international partners.

Becoming an ICT Hub that can export its technology and services also with data, call, shared services centers and centers of excellence is extremely important for Turkey, getting ahead towards becoming a fiber intersection point between the countries in the region as well as the initiative turning Istanbul into a Finance Center, in terms of achieving the targets in the sector for the year 2023

4.5 Content, products and services

When the trends in the world, profitability of companies and resource of value-added products are examined, it is observed that content, software and services are prominent. It does not seem very much possible to compete with the Far East countries in the fields of hardware and equipment because of the advantage that these countries have achieved on the learning curve with the experience gained so far and the availability of a cheap labor force. On the other hand, the software and services sector is an area with a more equal potential with innovative contents to be produced and high quality and customized services to be supplied in our country. Therefore, the strategic importance of these sectors should be underlined and activities in this area should be supported at least as much as R&D and P & D activities.

4.5.1 Utilize the opportunities to meet the demands on hardware, software and services of foreign markets

It is extremely important to become a regional base in order to meet the demands of not only the domestic market but also foreign markets for Turkey achieve the targets of the ICT sector for the year 2023 and beyond that, to have a strong and competitive economy. It is very difficult for Turkey to achieve the target of ranking among the world's first largest 10 economies without having a strong ICT sector not only providing service for the domestic market but also the region in today's world where information becomes more and more valuable. Turkey has a potential to meet demands for technology, products and services of many countries with its geographical position as well as young population. In order to realize this potential without delay, a sector specific export strategy plan and road map is needed.

For example, the Fatih Project has a great potential in product and software export. Export of the hardware, content and software, which will be developed for this project, and the knowledge gained and to be gained during the project development and management to abroad will provide significant benefits for the sector as well as our economy.

On the other hand, the provision of services through outsourcing procurements has been becoming a preferable solution for companies due to both strategic and financial reasons and thus, this market continues to grow. For example, it is estimated that the number of employees only in IT departments of companies will decrease more than 75% in 2020 and these services will be procured through outsourcing⁽⁸¹⁾. In order to benefit from this trend in the world to the extent necessary and ensure the services such as shared services center, call center, data center and center of excellence, to be provided through Turkey, the initiatives required must be taken and the road map must be established as soon as possible.

In this context, special incentive mechanisms must be planned for service and product providers in the eco-system of this sector for the development of cloud computing services. Providing tax exemption for investments in data centers and subvention of the costs for power to be used in these centers are one of the steps that can be taken in this direction. On the other hand, the steps that are necessary for providing world-class services and meeting the global demand by implementing the arrangements on information security and data privacy issues as soon as possible must be taken

Poland - Shared services center

It is observed that companies have increased the use of outsourcing in order to reduce costs, improve and transform internal processes and improve service quality. Poland stands out as the leading country in the area of Business Process Outsourcing - BPO and Shared Services Center. The country, which has been one of the leading locations in the last 5 years, hosts more than 200 companies in this new area, and these companies employ approximately 40,000 people ⁽⁸²⁾.

The position of Poland that serves as a bridge between Eastern and Western Europe plays a significant role behind this success. While India offers 80% of the Business Process Outsourcing - BPO services to the companies in the American market, Poland offers 63% of the Business Process Outsourcing - BPO services to the Western European countries which creates the world's largest customer mass in total. In addition, Poland maintains its competitiveness with its educated and high efficiency population.

Companies, which will invest in Shared Service Centers, receive grants, tax exemptions and investment incentives in the investment stage as well as supports on matters such as employee training, product development and R&D activities, afterward.

Supports provided in investment stage:

- **EU grants:** Companies that will employ at least 100 new employees, establish an Business Process Outsourcing and Shared Service Center or improve the existing ones are eligible to benefit from this support. Costs such as tangible or intangible assets, two-year wages of new employees, are considered in this context. Up to 30% of the costs in conformity with the criteria for Shared Service Centers and up to 50% for R&D centers are supported. This ratio in SMEs is 70%.
- **Multi-Annual Support Program (Multi-Annual Support Program-MASP):** This program, which is implemented to support large investments, is granted to companies creating at least 250 working places (employment grant) and / or investing 160 million PLN (approximately € 36 million) (investment grants). The rates for supports vary depending on the investment, and the investment grant is 3.200 and 18.700 PLN; and the employment grant is between 1% and 10% of the investment.
- **Special economic zones (Special Economic Zones -SEZ):** 19% of the companies in these regions benefits from tax exemptions and reductions including the corporate income tax. Although the income tax depends on the location of the investment and the size of the company, tax exemptions by 70% of the investment or two-year labor cost are provided. (This rate is 50% for large companies.)
- **Local government support:** The governments that are aware of the importance of the investments to enhance attractiveness and development of their regions provide support on matters such as office space, employee training. There is variety of reductions and exemptions applied depending on investment size on matters such as real estate tax, that are under the authority of local governments.
- **Supports on Management Phase**
 - Employee Training: All companies in Poland receive a grant under the Human Capital Operating Program - HC OP. Employee Training: All companies in Poland receive a grant under the Human Capital Operating Program - HC OP. 80% to 25% of the costs of these companies are supported by € 2 million for general (accounting software, sales techniques etc.) and customized (customized for position) trainings not exceeding two years.
 - Product Development and R&D Activities
 - o Investments in R&D activities (support 30% to 70%)
 - o Creation and implementation of solutions for the industrial design (support 30% to 70%)
 - o Investments for implementation and purchase of new technologies (support 30% to 70%)

What are the criteria that international companies take into account in selection of location for data center?

International companies take many different elements into consideration in addition to the general criteria such as quality and cost of labor force, quality of infrastructure, political and economic stabilization, tax advantages, in selection of location for data centers ⁽⁸⁴⁾.

- **Energy costs:** The amount of energy, which is required both for operation of the servers and keeping the center at a certain temperature, stands out as the most important cost entry following the labor costs of data centers. It is calculated that the amount of power needed by a data center for a 20-year service period will be equivalent to U.S. \$ 100 million. On the other hand, the increasing efforts of the environmentalist associations and the level of awareness developing among the people encourage companies to use renewable energy resources. The use of renewable energy resources also provides the advantage of a long-term price forecasting ability as well as environmental awareness because these resources are not effected by the price volatility that may arise in fossil fuels. When the data center energy costs of Turkey compared to other countries, it is observed that Turkey has a significant disadvantage in becoming a data center network. While the average energy costs vary between 4 and 8 cents in the countries prominent in data centers, this figure reaches 15 cents in our country ⁽⁸⁵⁾.
- **Safety:** While establishing data centers in regions away from the risk of natural disasters and safe in order to ensure the physical security is important, ensuring information security and privacy is treated as another important criterion and approach of governments on this issue is taken into account prior to location selection. The satisfactoriness of the laws on the protection of the privacy and security of data stored in the countries with data center operations is important.
- **Regional incentives:** Incentives such as sales, real estate and property tax reductions, provided for servers that need to be renewed in a period 3 to years play a significant role in the selection of data center location.
- **Population density:** Regions with a low density of population are preferred by companies because of the cost effective prices of lands in such regions as well as unwillingness of people to live close to such data centers.
- **Latency:** In the case of distance in data centers, the latency rate on the fiber cable stands out as an important criterion. A distance of approximately every 200 km causes a latency of 1 millisecond in data flow rate. The acceptability of data latency rate varies depending on the business model. Given the location of Turkey, it is obvious that Turkey can provide many countries with low-latency services due to its proximity to developed European countries as well as Asian and African countries that are developing and access to the internet gradually increase.
- **Proximity to large cities:** As in other large infrastructure projects, proximity to facilities such as airport, accessible by employees easily as well as accessing to high-quality products and services appears to be an important factor also in the selection of data center location.
- **Clustering Effect:** The clustering effect plays a significant role in the selection of data center location as it is observed just as in other areas of the ICT sector. After investments by these two large companies, the other companies also focus on to invest in that region. North Carolina in the U.S.A and the Scandinavian countries in Europe stand out as countries that offer data center clustering along with their other characteristics.
- **Climate:** While a lower temperature is an important criterion for the companies, it is observed that the companies prefer the temperature and humidity to be high enough to not to prevent the operation of air conditioners when combined with other factor.

Although the information technologies market in Turkey is not sustainable, it has a fragmented structure with a large number of companies adopted the price-oriented competition as a strategy. The small number of large companies in the sector reached a certain scale has a negative effect on profitability ratios in the environment where the competition has shifted to the axis of the price and threatens the overall health of the sector

4.5.2 Focusing on value-added solutions instead of price in competition

Although the information technologies market in Turkey is not sustainable, it has a fragmented structure with a large number of companies adopted the price-oriented competition as a strategy. The small number of large companies in the sector reached a certain scale has a negative effect on profitability ratios in the environment where the competition has shifted to the axis of the price and threatens the overall health of the sector. The largest resource of the companies operating in the sector is human capital. The companies must emphasize on the added value-oriented competitiveness with their knowledge, experience and expertise in the sub-sectors in which problem and demand oriented solutions such as software and IT services in particular, are produced.

Expressing the benefits and added-value provided by the products and services in the sector to the user companies efficiently is of importance in order to prevent price-oriented competition in the sector. The ICT products and services should be considered only as an element of cost.

In addition, it is observed that the total costs of ownership of the ICT products and services cannot be calculated exactly by the companies. It is observed that the user companies, purchasing on the price-oriented basis, encounter with costs high above than the expected most of the time due to the problems and delays experienced. The total cost of ownership of most of the products and services found to be cheaper in the first step can be much more expensive than expected.

The fact that the companies in the sector need to train their customers for transformation of the sector from the price-oriented competition into the added value-oriented competition. The companies in the sector, which have adopted differentiation as a policy, must show their costumers how to calculate the value they add and the total cost of ownership of the ICT products / services. Such initiatives that appears to be difficult to implement in the short term will support the healthy development of the sector in the long term.

Another reason for price-oriented competition is the fragmented structure of the sector. For this reason, achievement of the companies in the sector, in particular information technology services providers, in reaching a certain size within the framework of their strategies or merging with similar or complementary companies will increase the strength of suppliers in the local market as well as international awareness of the IT sector in Turkey.

4.5.3 Encouraging the extent and use of devices with internet access

Turkey comes bottom of the list among the OECD countries in terms of the fixed broadband penetration as well. One of the barriers in the spread of fixed broadband access is the low computer ownership level of households. For this reason, consideration of new steps that will encourage the ownership and use of computers and devices with internet access is important. For example, provision of millions of tablet computers intended within the scope of the Fatih Project is considered an important opportunity in this area.

5. Conclusion and proposals for action

Turkey has great opportunities in achieving the ICT targets for the year 2023. It is provided that the sector will make significant progress towards reaching its actual potential and increasingly continue to contribute to the competitiveness and economic growth of our country if the areas of improvement and solution proposals developed for these areas mentioned in the previous chapters of our report are taken into account.

The sector is required to transform into an ICT hub base structure which also exports innovation to abroad as well as being an industry that meets the national demand in order to reach a size of U.S. \$ 160 billion in 2023. Turkey has a high potential to achieve this target with its manpower potential, favorable geographical position, advanced logistics infrastructure and relatively favorable cost structure.

The implementation of the order of precedence of the proposals for development and improvement identified in our report as soon as possible is of critical importance. Approaching to the improvements to be carried out in small stages and actions independently of each other will remain insufficient to achieve these big targets. For this reason, it is essential to declare a mass mobilization in the sector and focus on specific frame projects. In this context, the members of YASED Information and Communication Technologies Working Group have developed project proposals related to the priority areas of improvement with strategic importance of the sector towards Turkey's targets for the year 2023. In this section, the project developed and the action steps suggested will be examined.

New Generation Silk Road: Proposals for Turkey in becoming the region's communication and innovation meeting point

The geographical position of Turkey provides a great advantage in supporting the economic growth by taking advantage of strategic power of the ICT sector. The "Next Generation Silk Road Center" to be created in this context is an important and main step that needs to be taken in the path for Turkey in becoming a regional power. Action steps that we suggest in this regard are as follows:

1. The creation of the Board of Directors of a "Next Generation Silk Road Center" that CEOs of the relevant organizations and leading technology companies participate in,
2. The development of the "Next Generation Silk Road Forum" that is considered as an environment with the ability to work with other innovation centers in the world in prioritized sectors (IT, Electronics) as a platform connecting the techno-parks, universities and entrepreneurs in Turkey to the world and in which the companies, investors, R&D staff meet each other and create new solutions and products.
3. Development of the "Next Generation Silk Road Zones" compatible with the sector and solution priorities

- Cloud Services and Data Farms (Izmir, Antalya..)
- Virtual IT Valleys (Istanbul, Ankara, Izmir..)
- Intelligent City Infrastructures
- Tele-Health Services Centers
- Live City-Lab environments in which mobile solutions are tested

Partners that need to be involved in this project for planning the "New Generation Silk Road Center" effectively are as follows:

- Entrepreneurs - Start-up Companies
- Funds of Investment and Investors
- Universities, Technoparks and R&D employees
- Large Companies
- Innovation Cities / Global Locations

Proposals towards being a country exporting IT

Combining Turkey's geographical location with a strong infrastructure will also allow Turkey to export IT as well as being a regional IT center. Action steps that need to be taken for a Turkey exporting IT are as follows:

1. Developing the Cloud Computing

Eco-System: For the development of cloud computing services, special incentive mechanisms must be planned for service and product providers in the eco-system of this sector. On the other hand, the steps that are necessary for providing world-class services and meeting the global demand by implementing the arrangements on information security and data privacy issues as soon as possible must be taken

2. Promoting Outsourcing Service

Procurement: Given the large scale companies, it is observed that most of the companies choose to meet their needs for service and software within their own organizations. This mainly is seen in the public, communications and banking sectors. Especially, these three sectors that are expected to be the largest consumers of the software and IT services sector should be encouraged and promoted for outsourcing using their purchase potentials.

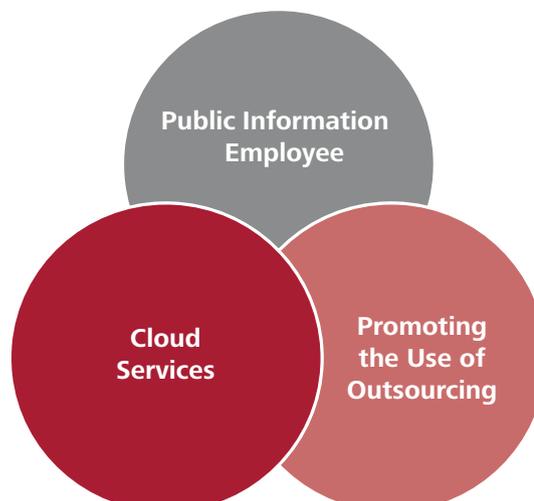
3. Creating Awareness on Outsourcing:

Various awareness programs should be organized to create the awareness necessary for determination of the needs in the ICT procurements accurately and realization of such procurements not only on the basis of price but also the total cost of ownership.

Suggestion towards creating "Public Information Employee"

Adoption of policies to promote innovation and specialization in the sector by the public sector, which is one of the major purchasers of the ICT sector products and services, is extremely important for the growth of the sector as well as increase in the productivity in the public sector. For this reason, the steps that need to be taken for realization of the public procurements more vigorously with the transformation in the public sector and transformation of the civil servants into "Public Information Employees" are as follows:

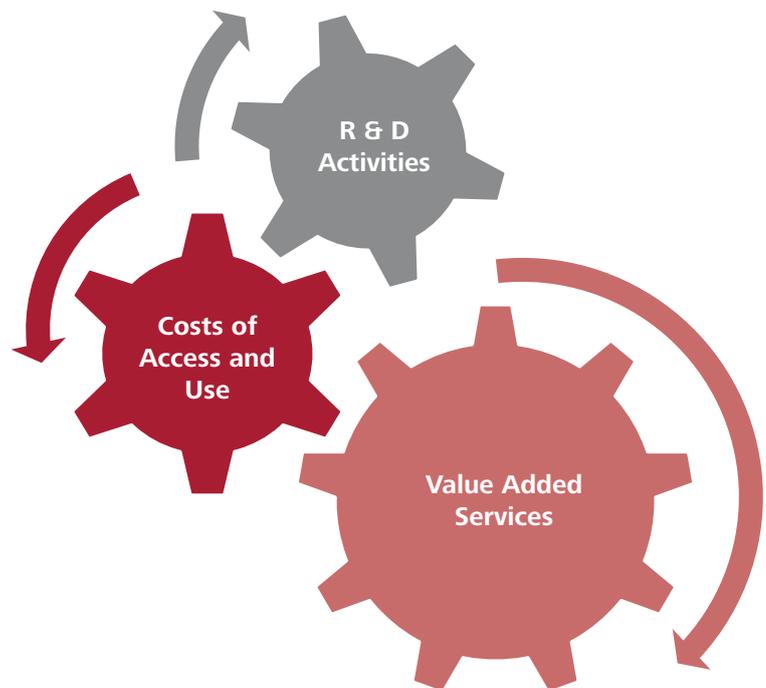
1. Creation of the Cloud Architecture for the public
2. Promoting the outsourced service model led under the leadership of the public
 - Establishment of Video, Web 2.0, Remote Working, Self-service and Smart Work Centers solutions
 - Expansion starting from health care, education and judicial staff first
3. Implementation of trainings and pilot solutions
4. Creation the required outsourcing use model and funding model, transition to non price-oriented procurement



Proposals to accelerate the wheels of informatics

1. Reduction in start-up taxes and Special Communication Tax collected during mobile line allocations and removal of the Communication Tax in the fixed communication
2. Financial liability exemption for products delivered mobile communication subscribers by means of electronic communication as well
3. Extending the coverage of the existing incentive and support programs
 - Promoting the demand: In addition to the various incentives and supports for research, development and investment activities extended to the ICT companies, the incentives to be extended also to companies using the ICT is important for the development of the sector.
 - Technology Transfer Supports: The technology transfer programs as well as R&D incentives should be managed effectively to promote technology production.
 - Branding incentives: A strategic study on the importance of branding should be carried out for the ICT sector which is one of a few sectors identified as being of strategic importance for the growth of Turkey's economy. The importance of brand value subject should be investigated within the scope of increasing the ICT foreign trade and inclusion of the ICT sector in the existing brand incentive programs should be considered if it is found of importance.
4. Strengthening the coordination between existing incentive mechanisms
 - **Harmony between the support mechanisms:** However, positioning the incentive and support programs growing to complement each other is of importance. Establishing the Coordination Committee, which pursues the goal of increasing the harmony between different support mechanisms and providing more added value from the R&D and innovation programs for our country, as soon as possible is of importance.
 - **Measuring the effect of supports:** Concrete objectives for all incentive and support programs towards R&D, innovation and entrepreneurial activities should be identified and efficiency and effectiveness of these programs should be measured with periodical assessments. Solutions to recover deficiencies found to be ineffective in the programs as a result of the periodic assessments should be developed, the programs that are not successful should be removed and these programs should be replaced with new programs or different support programs should be used with pilot practices.
5. Various improvements to increase efficiency of the existing incentive and support programs
 - **Improving Employment Opportunities Outside Technology Development Zones (TDZs):** The companies and investors in the sector expect that the amount of time to be spent inside and outside of TDZs should not be subjected to any discrimination and location of R&D activities should have any importance. This will enable simplification of the compliance and audit processes and reduction in time and costs spent.

- **Improving the Conditions to Become a R&D Center:** Reducing the requirement of 50 full-time equivalent in a considerable extent as well as treating the time that employees working in R&D projects spend outside the R&D Centers full-time is required for small and medium-sized companies engaged in R&D activities to benefit from these incentives.
- **Enabling Small Enterprises to Benefit from TDZs:** Small enterprises yet without an income have a difficulty in covering such high rent costs and cannot benefit from TDZs as desired. Arrangements towards the need for support on rent and site allocation should be taken into account to enable enterprises especially those that are in an incubation to benefit from TDZs more.
- **Improving Commercialization Process of R&D Activities:** Commercial product potential of researches must be examined and followed up more when providing incentives and supports in our country where the rate of conversion of academic researches and R&D activities into patents and commercial products is low
- **Promoting Incubation Centers:** Inclusion of the establishing costs of incubation centers that will be founded by enterprises, universities, entrepreneurs and micro-scale SMEs with R&D Centers within their bodies benefiting from the Law No. 5746 on Support for Research and Development Activities into the scope of the incentive and availing entrepreneurs, producing R&D projects for software together with their employees in these R&D centers, and employees in these SMEs of the tax incentives provided under the Law No. 5746 will contribute to the development of the software sector in particular.
- **Reassessment of Funding Timing for TEYDEB Project Supports:** Covering the project costs in TEYDEB TUBITAK supports periodically and assessing financing alternatives before commencement of the related projects and costs will be useful. Interest-free and flexible repayment loans to be provided before the projects are launched will encourage R&D activities more and accelerate applications to TEYDEB projects which have been showing a falling tendency recently
- **Bringing the funds allocated to the sector into use:** Continuation of the efforts towards putting the Universal Service and R&D Fund into use and bringing it into the sector

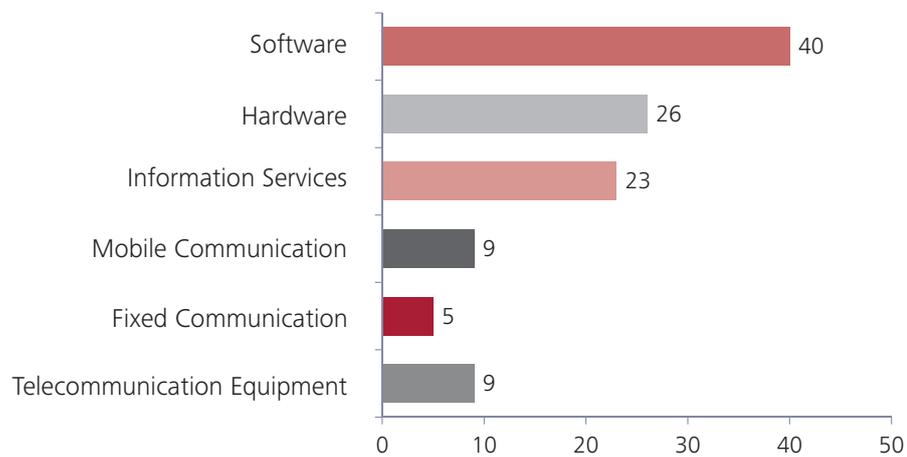


Addendum: Results of the survey study for Information and Communication Technologies sector

The Information and Communication Technologies Sector Research was conducted with the participation of 74 companies between the dates 11 January and 3 February 2012.

Question 1:
Please specify the sub-sector of your company in the Information and Communication Technologies (ICT) sector:

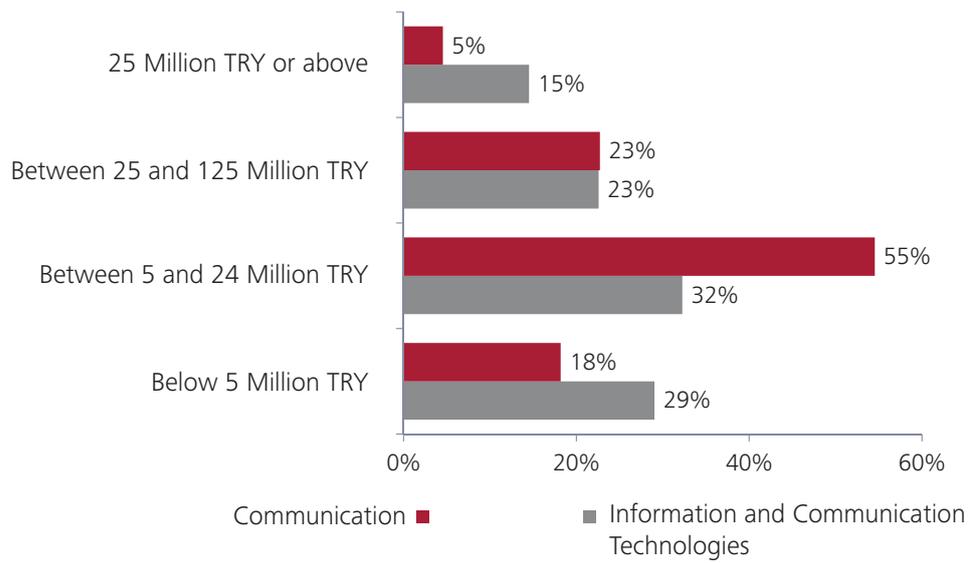
(If in more than one sub-sectors, please select the first two categories generating your maximum net sales revenue.)



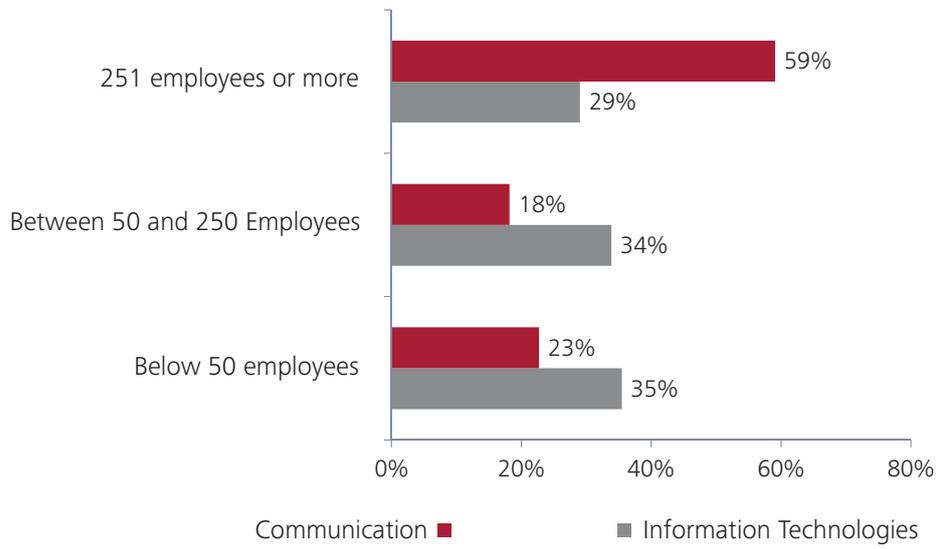
In the next chapter of answer analyzes, the software, hardware and IT services are grouped as "IT", and mobile, fixed communications and telecommunication equipment sub-sectors are grouped as "Communication".

Question 2:
Please specify which one of the following ranges turnover of your company falls in:

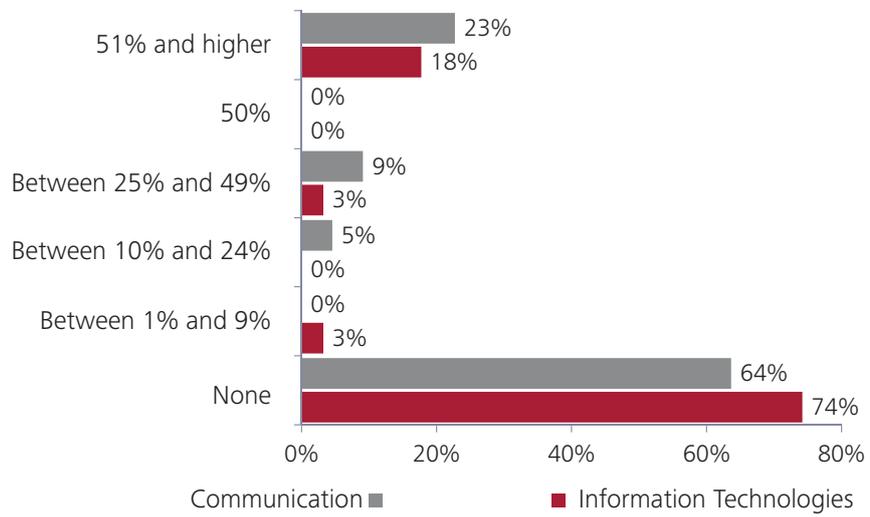
(Please assess over turnover of Turkey office for global companies.)



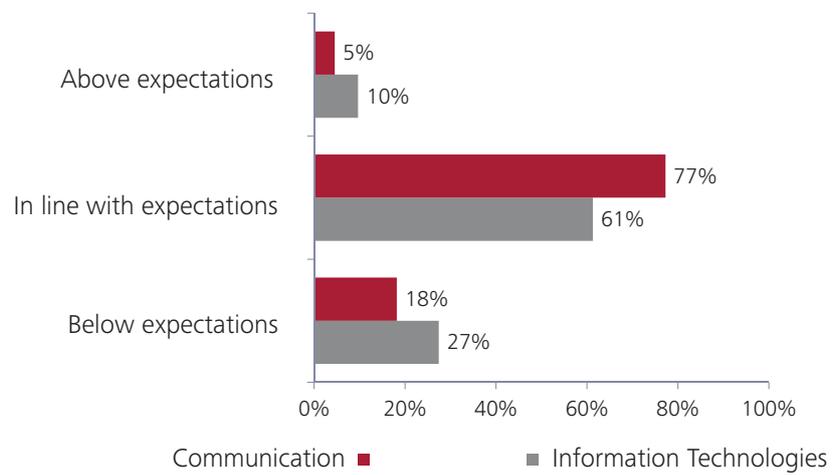
Question 3:
Please specify which one of the following ranges employees of your company falls in:



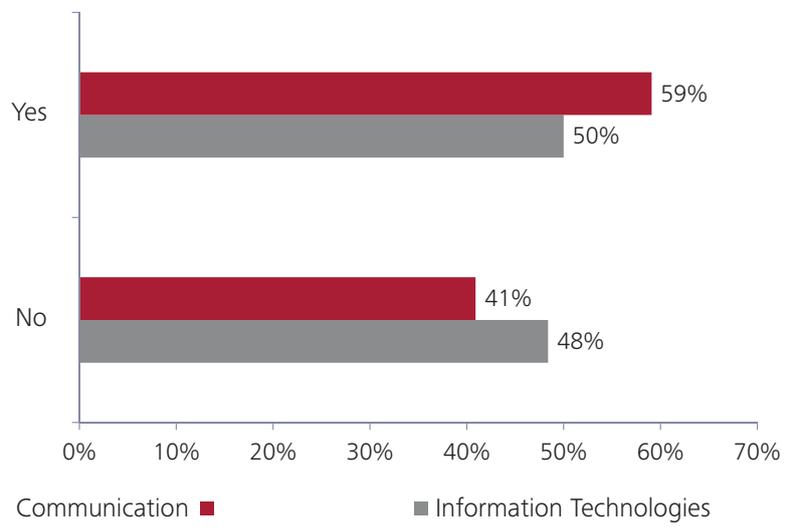
Question 4:
Please specify the rate of the international investment in your company's share capital:



Question 5:
Please specify by comparing the returns of your company's investments to your expectations:

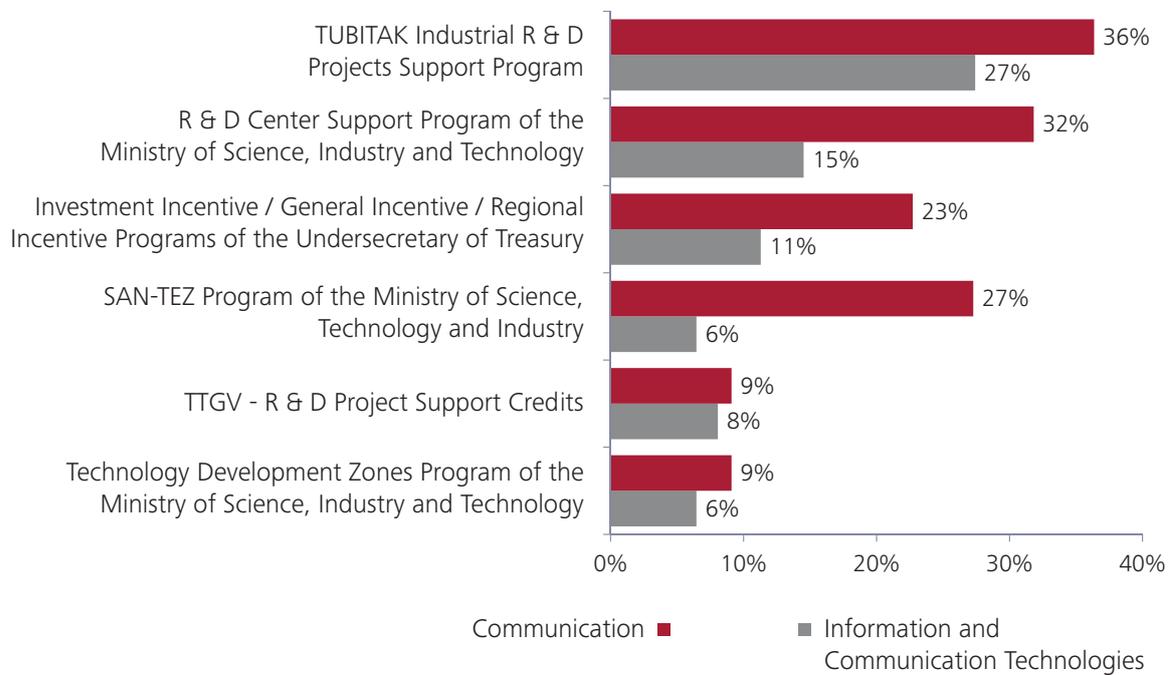


Question 6:
Do you benefit from the incentives and supports provided by the public sector?



Question 7:

Please specify incentives and supports you have utilized if you answered "Yes" to the previous question:



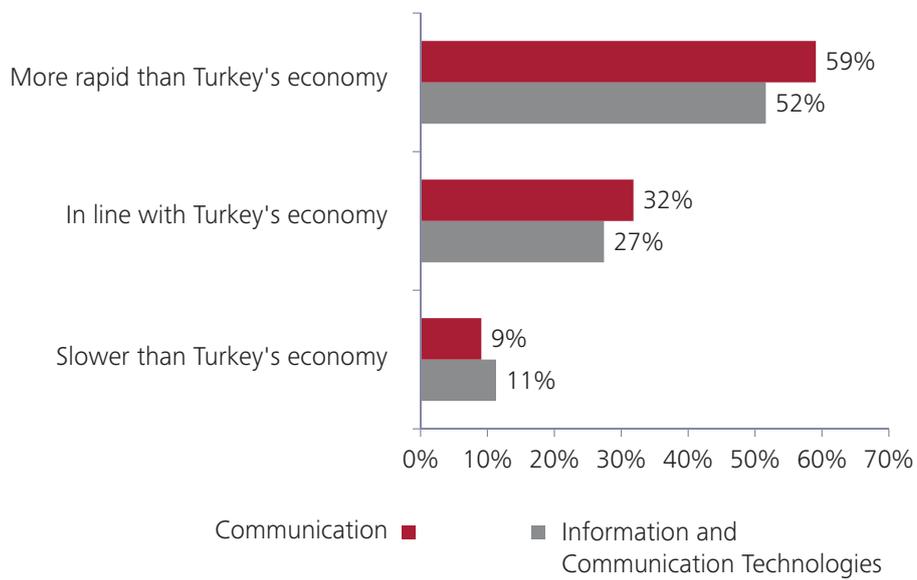
Other incentives and supports stated to have been utilized by a smaller number of companies in the survey are as follows:

- TUBITAK Technology Transfer Support Program for the Benefit of SMEs
- TUBITAK SME R&D Initial Support Program
- TUBITAK International Industrial R&D Projects Support Program (Eureka, Eurostars, Joint Technology Initiatives, MNT-ERA.NET; II) ;
- Technopreneurship Capital Support Program of the Ministry of Science, Industry and Technology

Incentive and support programs utilized by the participants selecting the option other as follows:

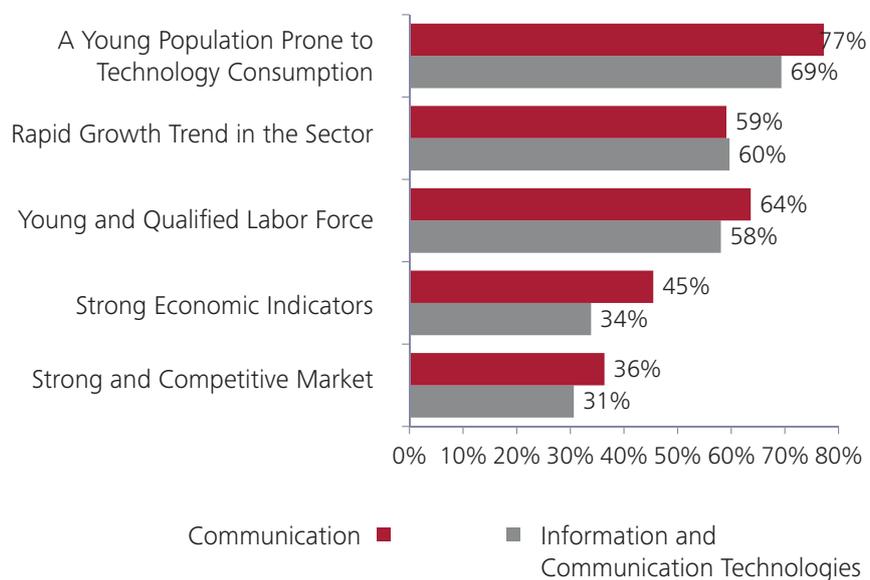
- KOSGEB R&D Support
- Ankara Development Agency Support Programs
- KOSGEB Credit Support Program
- KOSGEB Trade Support Program
- TUBITAK KAMAG Program

Question 8:
Please specify your expectation for the next 3 years by comparing the growth rate of the ICT sector in Turkey to the growth rate of Turkey's economy:



Question 9:
Please specify what are the strengths in the ICT sector in Turkey:

(Select a maximum of five areas that you think you are associated with.)



Factors specified by a smaller number of companies as strength in the survey:

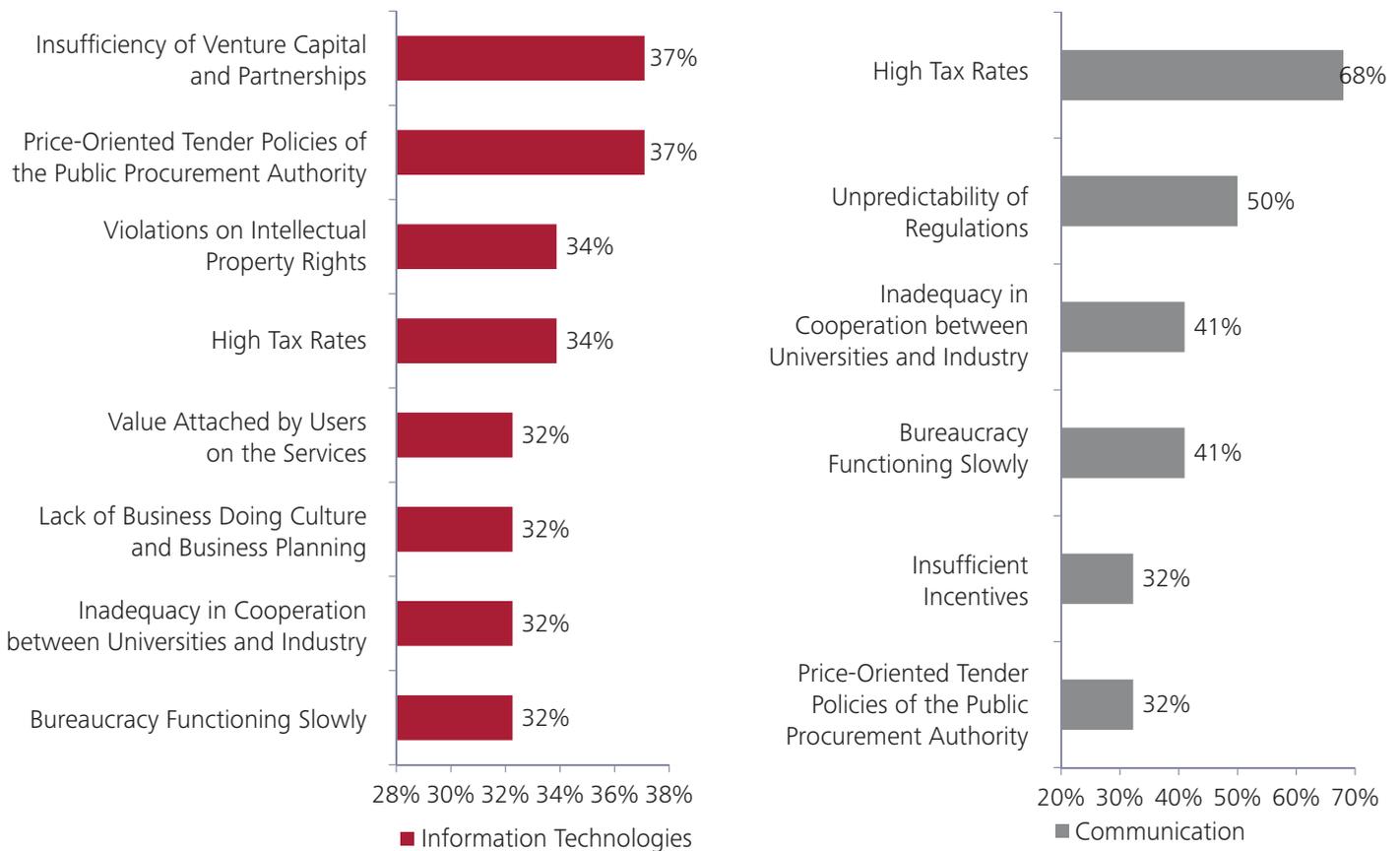
- Institutionalization and Transparency of Companies, Reduction of the Informal Economy
- Supports provided for R & D Activities
- The Importance Placed on the Sector by the Government and the Sector Related Policies
- A Competitive Technology Development Environment
- Geographical Position of the Country
- A Positive Externality Provided by the Clustering Effect Emerging with the Technology Development Zones
- Incentives Provided by the Public Sector

Factors specified by stakeholders in the option other:

- The Need for Information Technologies for New Business Models
- Public Investments

Question 10:
Please specify what are the strengths in the ICT sector
in Turkey:

(Select a maximum of five areas that you think you are associated with.)



Factors specified by a smaller number of companies as a trend in the survey:

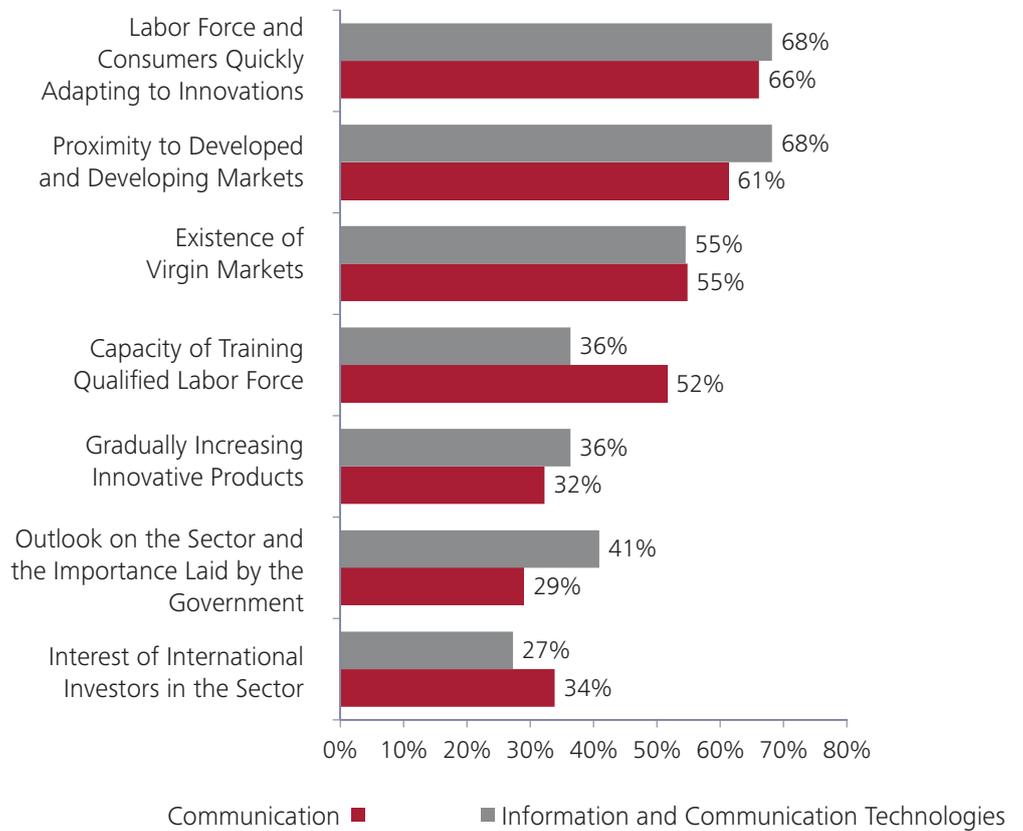
- Heavy and Unfair Conditions of Competition
- Restricted and Expensive Educated Labor Force
- Lack of Standards Parallel to Global Laws and Practices
- Difficulties in Accessing to Finance
- Complex Tax Structure
- Scarcity of Outsourcing Procurements by Large Companies in Service and Software Use
- Lack of Differentiated Products and Services
- Disruptions in Practices in the Technology Development Zones
- Lack of Competitive Physical Infrastructure

Factors specified by stakeholders in the option other:

- Lack of Focus in Incentives

Question 11:
Please specify what are the opportunities in the ICT sector in Turkey:

(Select a maximum of five areas that you think you are associated with.)

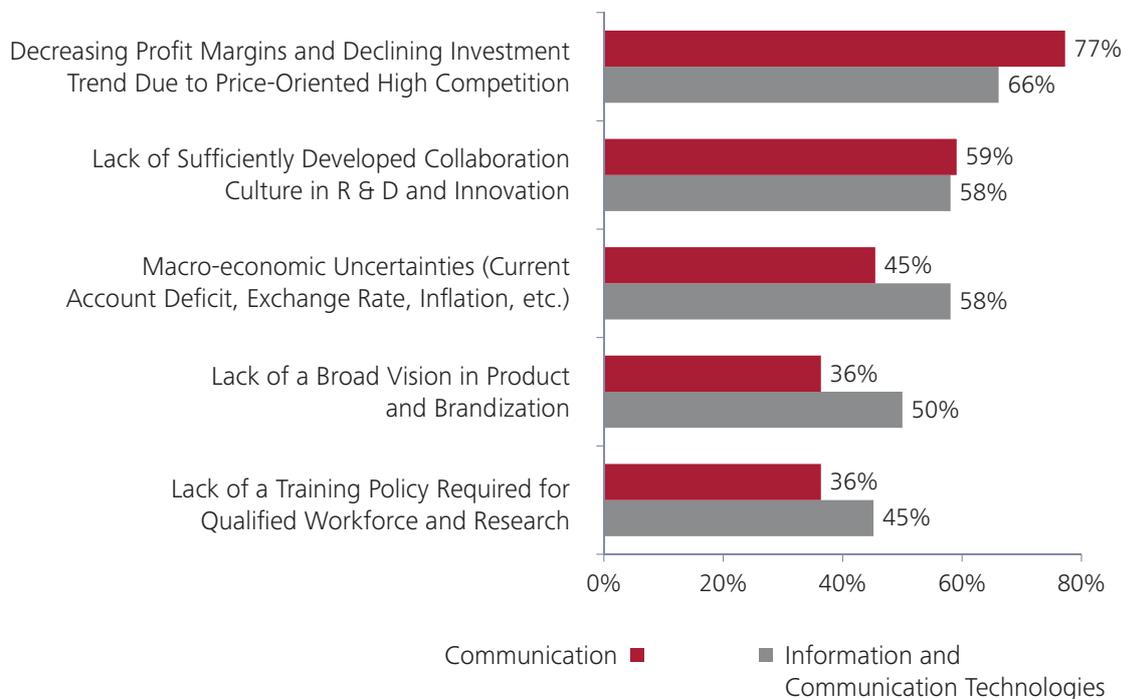


Factors seen as an opportunity by a smaller number of companies in the survey:

- Making Regulations with the new Turkish Commercial Code

Question 12:
Please specify what are the threats in the ICT sector in Turkey:

(Select a maximum of five areas that you think you are associated with.)



Factors seen as an opportunity by a smaller number of companies in the survey:

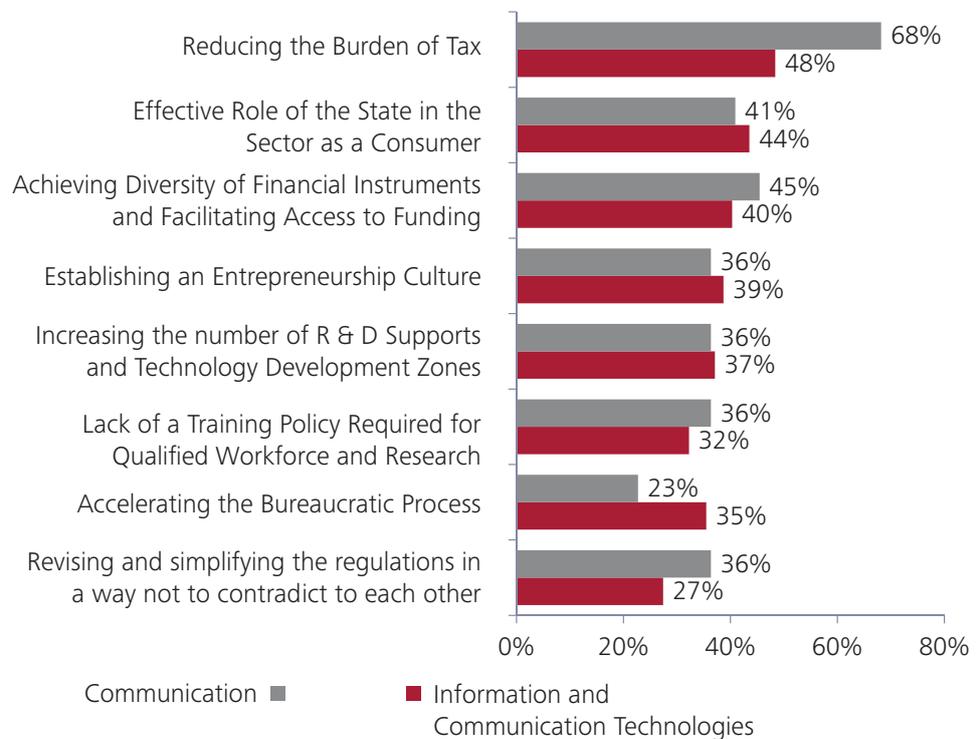
- Inadequacies in Implementation of the Competition Regulations
- Lack of Core Competence Area Comparing to the Countries Competed
- Political Uncertainties
- Protectionist Attitude Towards Domestic Production

Factors specified by stakeholders in the option other:

- Investment Constraints
- Non-existence of National IT Investment Policies by Determining International Competition Areas

Question 13:
Please specify what should be done to improve the investment efficiency and to attract new investments in Turkey:

(Select a maximum of five areas that you think you are associated with.)

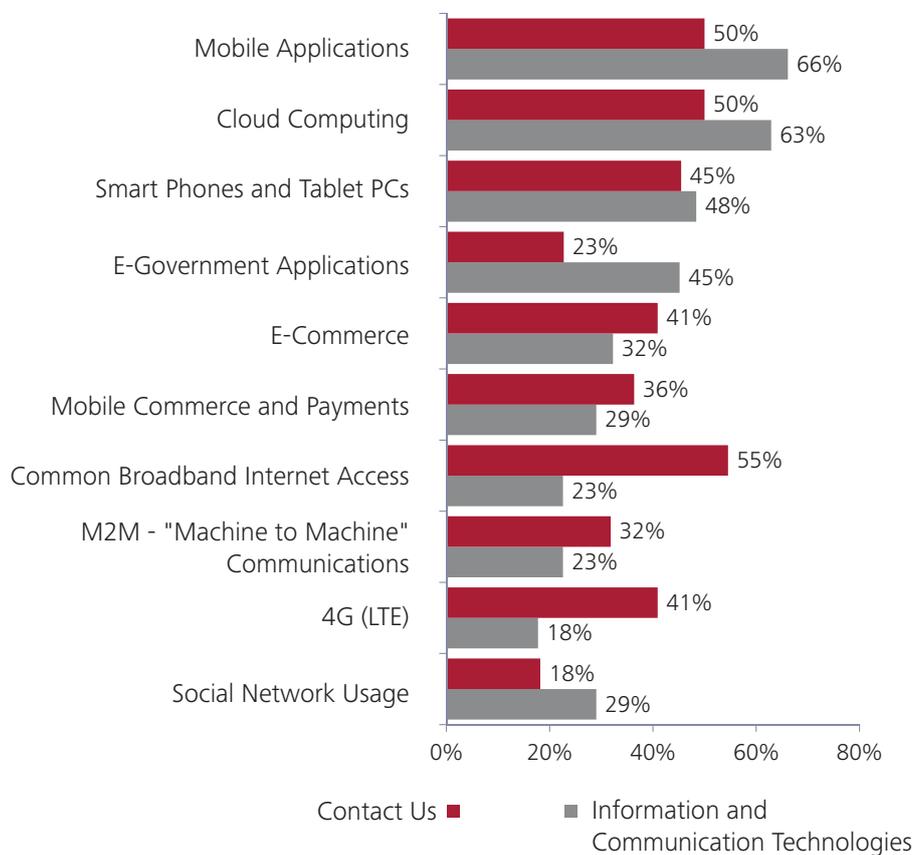


Factors deemed necessary by a smaller number of companies to improve the investment efficiency in the survey:

- Transparency in Regulatory Bodies
- Promoting the Principles of Corporate Governance
- Arranging the Regulations on the Establishment of New Company and Company Merger According to the Global Standards
- Minimizing Bureaucratic Barriers in Establishing Venture Capital and Partnerships and Creating A Suitable Environment

Question 14:
Please specify what trends would be effective in the ICT sector in Turkey:

(Select a maximum of five areas that you think you are associated with.)



Factors seen as an opportunity by a smaller number of companies in the survey:

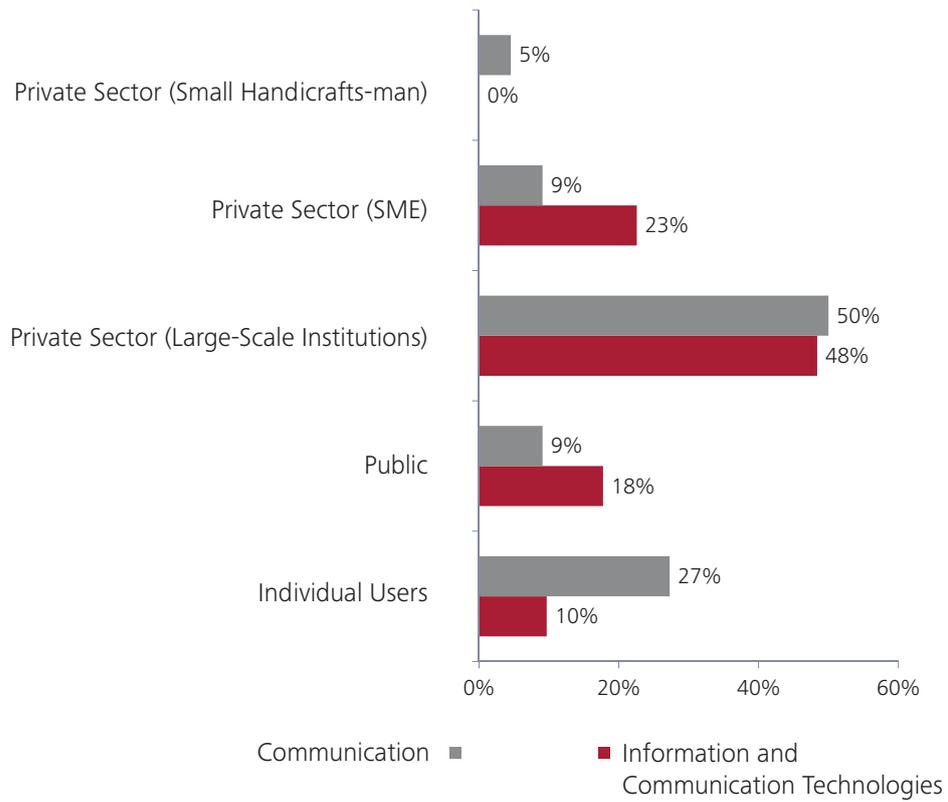
- Convergence
- Virtualization
- Public Wireless Internet (Wi-Fi Public Hotspots) Usage
- Video Communication
- Unified Communications
- Green Information Technology (Green IT)

Factors specified by stakeholders in the option other:

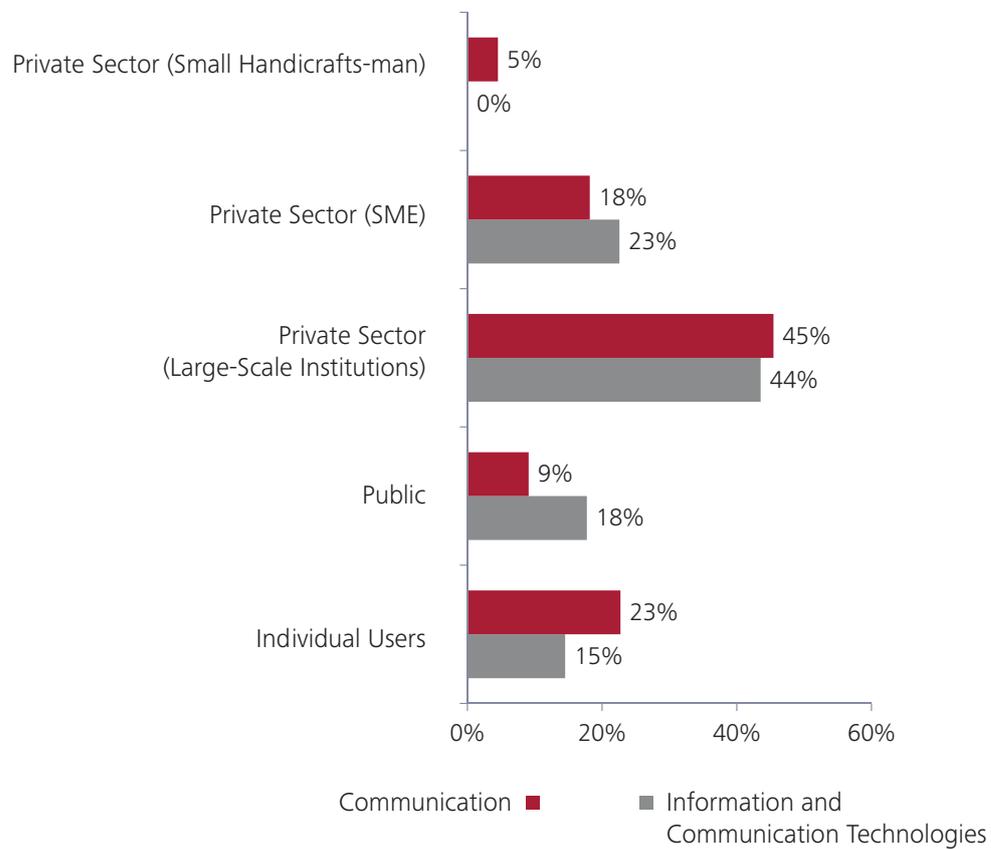
- CRM
- Specialized Business Software Application Areas

Question 15:
Please specify which user segment is preferential now for your company:

(Select a maximum of five areas that you think you are associated with.)



Question 16:
Please specify the user segment that you think it would be preferential after 5 years for your company:



Question 17:
Which sectors are affected more by the ICT sector in Turkey?
(Please list.)

	Information Technologies	Contact Us
1.	Public Services	Financial Services
2.	Health	Public Services
3.	Training	Training
4.	Environment	Health
5.	Energy	Manufacture / Industry
6.	Professional Services	Media
7.	Manufacture / Industry	Professional Services
8.	Retail	Retail
9.	Financial Services	Energy
10.	Media	Transportation
11.	Tourism	Tourism
12.	Construction	Environment
13.	Transportation	Construction

Question 18:
Which sectors will be affected more by the ICT sector in Turkey after 5 years? (Please list.)

	Information Technologies	Contact Us
1.	Public Services	Public Services
2.	Training	Training
3.	Financial Services	Financial Services
4.	Health	Health
5.	Energy	Energy
6.	Professional Services	Professional Services
7.	Manufacture / Industry	Manufacture / Industry
8.	Retail	Retail
9.	Media	Media
10.	Transportation	Transportation
11.	Environment	Tourism
12.	Tourism	Environment
13.	Construction	Construction

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